Professional and Practice-based Learning

Stephen Billett
*Editor*

# Learning Through Practice

## Models, Traditions, Orientations and Approaches

Springer

# Professional and Practice-based Learning

Series Editors:

Stephen Billett, Griffith University, Australia
Christian Harteis, University of Regensburg, Germany
Hans Gruber, University of Regensburg, Germany

*Professional and practice-based learning* brings together international research on the individual development of professionals and the organisation of professional life and educational experiences. It complements the Springer journal *Vocations and Learning: Studies in vocational and professional education*.

Professional learning, and the practice-based processes that often support it, are the subject of increased interest and attention in the fields of educational, psychological, sociological, and business management research, and also by governments, employer organisations and unions. This professional learning goes beyond, what is often termed professional education, as it includes learning processes and experiences outside of educational institutions in both the initial and ongoing learning for the professional practice. Changes in these workplaces requirements usually manifest themselves in the everyday work tasks, professional development provisions in educational institution decrease in their salience, and learning and development during professional activities increase in their salience.

There are a range of scientific challenges and important focuses within the field of professional learning. These include:

- understanding and making explicit the complex and massive knowledge that is required for professional practice and identifying ways in which this knowledge can best be initially learnt and developed further throughout professional life.
- analytical explications of those processes that support learning at an individual and an organisational level.
- understanding how learning experiences and educational processes might best be aligned or integrated to support professional learning.

The series integrates research from different disciplines: education, sociology, psychology, amongst others. The series is comprehensive in scope as it not only focusses on professional learning of teachers and those in schools, colleges and universities, but all professional development within organisations.

Further volumes of this series:
http://www.springer.com/series/8383

Stephen Billett
Editor

# Learning Through Practice

## Models, Traditions, Orientations and Approaches

Springer

*Editor*
Prof. Stephen Billett
Griffith University
School of Vocational
Technology & Arts Education
4111 Brisbane Queensland
Mt. Gravatt Campus
Australia
s.billett@griffith.edu.au

ISBN 978-90-481-3938-5 e-ISBN 978-90-481-3939-2
DOI 10.1007/978-90-481-3939-2
Springer Dordrecht Heidelberg London New York

Library of Congress Control Number: 2010926022



*Cover design*: eStudio Calamar S.L.

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

# Series Foreword

## Professional and Practice-based Learning

This series of books for Springer constitutes an important international forum for studies of professional and practice-based learning. Its origins are located in the need for a focussed and cross-disciplinary scholarly forum to propose, explain, and further elaborate how learning through and for occupational practice proceeds and how that learning can be promoted and supported. The need for effective occupational preparation is well understood, but increasingly is being extended to practice-based experiences, and their integration within programmes of initial occupational preparation. However, the need for professional learning throughout working lives has become essential within the last decades as the requirements for occupational practices constantly change, and likely become more demanding. Additionally, professional learning is not only a matter of working life, but also a matter of social participation, as successful accomplishment of occupational challenges provides the basis for access to societal resources. In all, occupational development, transitions in individuals' occupational careers, as well as shifts in jobs, activities, and tasks make learning throughout working life essential. Also, because changes in these workplace requirements usually manifest themselves in the everyday work tasks, professional development provisions in educational institutions decrease in their salience, and learning and development during professional activities increase in their salience. Consequently, educational enquiry has now to focus on the analysis and the support of learning within and throughout professional life. Scholarship on professional and practice-based learning is, therefore, emerging as a crucial topic within educational enquiry.

Indeed, there is wide interest in such a forum. Professional learning, and the practice-based processes that often support it, are the subject of great interest and attention in the fields of educational, psychological, sociological, and business management research, and also in government, employer organisations, professional associations, and unions. Importantly, the concept of professional learning encompassed in this series goes beyond what is often termed professional education. Instead, it includes learning processes and experiences outside of educational institutions in both the initial and ongoing learning for the professional practice.

Readers can draw on contributions from a range of disciplines and subdisciplinary fields as they confront a range of scientific challenges and important focuses within the field of professional learning. These challenges include understanding and making explicit the complex and massive knowledge that is required for professional practice and identifying ways in which this knowledge can best be initially learnt and developed further throughout

professional life. A major issue of the book series will be analytical explications of those processes that support individuals' learning as well as organisational change.

In all, the series aims to establish itself as a strong and highly esteemed platform for the discussion of concepts of professional learning that focus on both the individual development of professionals and the organisation of professional life, and educational experiences to support and sustain that learning. The series aims to overcome the compartmentalisation of research methods and paradigms by being inclusive of the approaches used in the field of professional and practice-based learning.

Stephen Billett
Hans Gruber
Christian Harteis

# Series Editors' Foreword

There is a growing interest in practice-based learning in countries with both advanced and developing economies. Much of this interest is directed towards augmenting students' learning within vocational or higher education programmes of initial occupational preparation or those for professional development (i.e., further development of occupational knowledge across working life). Of course, the worth of contributions from practice settings and experiences with authentic instances of occupational practice has been long acknowledged in the major professions and trades. Indeed, most trades and professions have a requirement for individuals to engage in an extensive period of practice prior to being accepted as a tradesperson or professional. Yet, there is now a growing interest in occupationally specific higher education programmes of all kinds now providing these kinds of experiences for novice practitioners, which makes the contributions of this book important.

Beyond their use in initial occupational preparation, there is a wider set of considerations about the utility of practice-based experiences for the promotion of ongoing development across working life. In particular, occupational practice and experiences in practice settings are now being used as a vehicle for professional development, and, increasingly, in educational processes organised by universities, technical colleges, and professional bodies, which are promoting practice settings and activities as sites and the focus for learning experiences. Hence, at this time, there is a wide and growing interest in the kinds of learning experiences provided in practice settings - usually workplaces or work settings - that are essential for developing the knowledge required to effectively practice occupations.

Hence, the fresh views about and appraisals of what we know about practice settings and how these might be progressed to secure effective outcomes for learners advanced through the contributions of this edited volume are timely and most welcomed. Through these contributions, this book explores ways in which learning through practice can be conceptualised, enacted, and appraised through an elaboration of the kinds of traditions, purposes, and processes that support this learning. This includes curriculum models and pedagogic practices that support these purposes. These elaborations are advanced through the two sections of this book: *Conceptual premises of learning through practice*, and *Instances of practice*.

The contributions across these two sections stand to both redress the limitations in existing premises and inform ways forward, conceptually and procedurally. Often, in both initial occupational preparation and professional development, practice-based experiences are seen as merely an adjunct to an educational provision that is organised and structured in colleges or universities or through programmes offered by professional bodies and other agencies, rather than as experiences that are both legitimate and effective in their own right. Such is the

association between rich learning and educational institutions that practice-based experiences are often seen as being both posterior and inferior to those provided through educational institutions and programmes. However, it is important that the qualities, processes, and outcomes of learning through practice are appraised: understood, utilised, and critically evaluated on their own terms, rather than as being positioned as merely augmenting those provided by educational institutions. This is because they have particular attributes and make salient contributions to learning processes. Appraisals of these kinds are advanced by the different perspectives and contributions within this edited volume. What they show is how the processes and outcomes of learning occurring through experiences outside of those institutions progress; and they propose curriculum models and pedagogies suited to practice settings that can support that learning. Hence, the contributions of the international collection of contributors to this volume are most salient because much of what is assumed to constitute effective learning experiences - processes that enrich the outcomes of that learning, including conceptions of curriculum and pedagogy - is restricted to and privileged by the norms and practices of educational institutions. However, across the two sections, the detailing of the qualities of learning through practice, including their contributions, limitations and particular features, are advanced critically and thoughtfully. This volume, while seeking to make a space for learning through practice, seeks to do so rigorously and critically and through its efforts advance a field of human practice that is more practiced than theorised.

Stephen Billett, Hans Gruber, and Christian Harteis (January 2010)

Thanks to the contributors to this volume for responding in timely and helpful ways to the requests made during its preparation.

In addition, I would like to acknowledge the editorial support provided through the Griffith Institute for Educational Research and, specifically, the diligence, care, and efforts of Andrea Kittila, without whose editorial expertise the volume would be of far lesser quality.

Stephen Billett, Brisbane, January 2010

# Contents

## Contributors

### *Stephen Billett (Griffith University, Australia)*

Professor Stephen Billett has worked as a vocational educator, educational administrator, teacher educator, and in professional and policy development in the Australian vocational education system and now as an academic at Griffith University, Australia. He investigates learning through and for work, the nature of work and working knowledge, and how this knowledge is best learnt. He publishes in journals, sole-authored books (*Learning through work*: *Strategies for effective practice*; *Work, change and workers)* and edited volumes (*Work, subjectivity and learning; Emerging perspectives of work and learning)*, and is the editor-in-chief of *Vocations and Learning*.

### *Wolff-Michael Roth (University of Victoria, Canada)*

Wolff-Michael Roth is Lansdowne Professor of Applied Cognitive Science at the University of Victoria. He studies knowing and learning across the entire lifespan, from kindergarten to school, the workplace, and into retirement. His main focus has been mathematical and scientific knowing. He has published over 320 journal articles, over 140 book chapters, and over 40 books and special journal issues. His most recent books include the edited volumes *ReUniting sociological and psychological perspectives* and *Mathematical representation at the interface of body and culture*, and the single-authored *Dialogism: A Bakhtinian perspective on science and learning*.

### *Michael Eraut (University of Sussex, United Kingdom)*

Michael Eraut has been a Professor at the University of Sussex since 1986. His interest in workplace learning developed in the early 1980s and stretches across a wide range of professional and vocational sectors: business, education, engineering, healthcare, and management. His pioneering book *Developing professional knowledge and competence* has been followed by a long series of research reports, book chapters, and journal articles. His theoretical focus on the nature and epistemology of practice has been supported by detailed studies of both NVQs and professionals' early-career learning and mid-career learning.

## *Karen Jensen (University of Oslo, Norway)*

Karen Jensen is Professor at the Institute for Educational Research, University of Oslo. She has published widely on issues of professional learning and moral motivation, especially related to the health professions. She was scientific leader for the research project *Professional learning in a changing society* (2004-2008) financed by the Research Council of Norway. This project was a comparative study of four professional groups aiming to develop theories on professional learning and identity formation in a direction that is sensitive to the shifts in knowledge and culture characteristic of today's society.

## *Monika Nerland (University of Oslo, Norway)*

Monika Nerland is Associate Professor at the Institute for Educational Research, University of Oslo. She teaches in the areas of higher education and work life learning, and conducts research on institutional practices and learning in professional education and work. She has previously worked in teaching education and music education as a teacher, supervisor, and administrator. Her doctoral dissertation (2003) is a study of cultural practices in the education of professional musicians. Recent publications include articles in the journals *Journal of Education and Work; Vocations and Learning;* and *International Journal of Lifelong Education.*

## *Gloria Dall'Alba (University of Queensland, Australia)*

Dr Gloria Dall'Alba teaches and researches in the School of Education at the University of Queensland, Australia. She has held positions at the University of Melbourne and RMIT University in Australia, and Karolinska Institute in Sweden. Her research draws upon hermeneutic phenomenology, especially related to learning, teaching, professional practice, and qualitative inquiry. She has published in journals such as *Review of Educational Research; Studies in Higher Education;* and *Organization Studies,* as well as book chapters with Kogan Page, Nova Science, and Wiley-Blackwell. Her recent books are *Learning to be professionals* and an edited volume, *Exploring education through phenomenology: Diverse approaches*.

### *Jörgen Sandberg (University of Queensland, Australia)*

Jörgen Sandberg is a Reader in Management in the School of Business at the University of Queensland, Australia. His research interests include competence and learning in organisations, leadership, qualitative research methods, and philosophy of science. His work has appeared in several journals, including *Academy of Management Journal, Harvard Business Review, Journal of Management Studies,* and *Organizational Research Methods*, and in books and book chapters. His most recent book is *Managing understanding in organizations.* He is currently carrying out research on professional practice and its development.

### *Rose-Marie Axelsson, (Linköping University Sweden)*

Rose-Marie Axelsson is a PhD in Educational Sciences and is currently working at Linköping University, Sweden. Her thesis, *Flexible people: Higher education and work through physicians' and engineers' life-trajectories* (2008), focused on individuals' learning and professional identification. Besides that, she is interested in conditions of knowledge and knowledge production in today's society, pedagogical processes and the construction of knowledge in different practices, the relationship between higher education and working life, as well as long-term aspects of gendered processes in these contexts.

### *Madeleine Abrandt Dahlgren (Linköping University Sweden)*

Professor Madeleine Abrandt Dahlgren works at Linköping University, Sweden within the Faculty of Educational Sciences and the Faculty of Health Sciences. Her main research interest concerns student learning in higher education with a particular view to professional learning in different fields, as well as the relationship between higher education and working life and the study of pedagogical processes within healthcare and medical education. She publishes in journals and books, both solely and together with colleagues. These publications include *Practice epistemology for health professionals*; *Portraits of problem-based learning*; and *From expert student to novice professional*.

### *Lars Owe Dahlgren (Linköping University Sweden)*

Lars Owe Dahlgren is a Professor of Education at Linköping University and also a visiting Professor of Medical Education at Karolinska Institutet in Stockholm. His

research has focused on, for example, student learning in higher education, the impact of higher education on students, the transition from higher education to work life, medical education, and patient communication. In the 1970s he developed phenomenography together with colleagues at Gothenburg University as a qualitative research approach to studying human learning. In the 1980s he took part in developing the version of problem-based learning (PBL) that was implemented at the Faculty of Health Sciences at Linköping University.

## *David Guile (University of London, United Kingdom)*

Dr David Guile is a Reader in Lifelong Learning at the Institute of Education, University of London. His main interests are in work-based learning, professional education, vocational education and training, and learning and teaching in higher education. He leads the MA Lifelong Learning, and is on the editorial boards of the *Journal of Education and Work*; *The Journal of Vocations and Learning*; and *Understanding Medical Education*. He also co-directs the book series *Education and the knowledge economy* for Sense Publications, with David Livingstone from the Ontario Institute of Educational Studies.

## *Laurent Filliettaz (University of Geneva, Switzerland)*

Laurent Filliettaz is Associate Professor at the University of Geneva, in the field of adult education. He received his PhD in linguistics in 2000 and is the author of several books and articles published in French and English, analysing verbal interactions in professional settings from the perspectives of discourse analysis, pragmatics, and various theories of action. Since 2005, Laurent Filliettaz has been leading a research programme sponsored by the Swiss National Science Foundation (SNF) promoting applied linguistic methods in the field of vocational education and training.

## *Richard Coll (University of Waikato, New Zealand)*

Associate Professor Richard K. Coll is Director of Cooperative Education at the University of Waikato, Hamilton, New Zealand. He was awarded the Ralph W. Tyler Award for excellence in research for cooperative education by the USA-based Cooperative Education and Internships Association in 2001 and the Donald MacLaren award for the internationalisation of cooperative education by the World Association for Cooperative Education in 2003. He is international editor

of the *Journal of Cooperative Education and Internships*, and co-edited the *International Handbook for Cooperative Education*. His research interests are concerned with aspects of work-integrated learning and science education.

## *Chris Eames (University of Waikato, New Zealand)*

Dr Chris Eames is Director of the Centre for Science and Technology Education Research, University of Waikato, Hamilton, New Zealand. He has 17 years' experience in cooperative education practice and research. He has a PhD in theories of learning in cooperative education. He is an associate editor of the *Journal of Cooperative Education and Internships*, and co-edited the *International Handbook for Cooperative Education*. His research interests are concerned with aspects of work-integrated learning, and environmental and science education.

## *Rob F. Poell (Tilburg University, the Netherlands)*

Dr Rob F. Poell is Professor of Human Resource Development (HRD) in the department of Human Resource Studies at Tilburg University in the Netherlands. His main interest is in workplace learning and his publications have appeared in *Adult Education Quarterly*; *Small Group Research*; *Management Learning Human Resource Development Quarterly*; *Applied Psychology*; *International Journal of Human Resource Management*; *Personnel Review*; *European Journal of Teacher Education*; and *Journal of Advanced Nursing*, amongst others. He is currently the editor-in-chief of *Human Resource Development International.*

## *Ferd M. Van der Krogt (Radboud University, the Netherlands)*

Dr Ferd J. Van der Krogt is Associate Professor (emeritus) of Human Resource Development (HRD) in the Department of Education at the Radboud University Nijmegen in the Netherlands. His interest is in the organisation of HRD in organisations. He is currently doing action research especially into the HRD strategies of workers, using the learning-network theory as a framework.

### *Mark Berchman (University of Illinois Urbana-Champaign, USA)*

Mark Berchman is an apprenticeship instructor at the IBEW (International Brotherhood of Electrical Workers)-NECA (National Electrical Contractors Association) Technical Institute located just outside Chicago, Illinois (USA). The IBEW-NECA Technical Institute is a joint educational initiative between the members and contractors of Local 134 of the IBEW. Mark also teaches online labour studies courses for the University of Illinois at Urbana-Champaign (USA) and has been teaching and investigating the social dynamics of learning in labour and community education programmes over the past 10 years. He holds a Master Degree concentrating in Adult Education from DePaul University (USA).

### *Helena Worthen (University of Illinois Urbana-Champaign, USA)*

Clinical Associate Professor Helena Worthen teaches at the University of Illinois in Champaign-Urbana in the School of Labor and Employment Relations, where the labour education programme pursues the land grant mission of outreach to working people. She studies how people learn to negotiate and survive their jobs. As a teacher, she focuses on the development of knowledge and social relationships required to engage in collective resistance to downward pressure on labour standards. She holds a PhD in Education from the University of California, Berkeley.

### *Peter Johansson (University of Stockholm, Sweden*

MA Peter Johansson is a PhD student in Education at the Department of Education, Stockholm University, Sweden. He is currently working on a thesis about the construction of pedagogic interventions in adult education. He also gives lectures in courses in workplace learning and organisation theory at the Department of Education.

### *Jon Ohlsson (University of Stockholm, Sweden)*

Jon Ohlsson, PhD, is an Associate Professor and Senior Lecturer at the Department of Education, Stockholm University, Sweden. Jon's research interests include collective learning processes in organisations and work teams. In a current project he is dealing with teachers' collective learning and competence development in the local school organisation. He has published books and a

number of international conference papers concerning issues on workplace learning and pedagogical perspectives on learning organisations.

## *Marianne van Woerkom (University of Tilburg, The Netherlands)*

Dr. Marianne Van Woerkom is Assistant Professor, Human Resource Development, Department of Human Resource Studies, Tilburg University, Netherlands. Her research interests are in the area of learning in organisations. She publishes in such journals as *Journal of Workplace Learning*; *International Journal of Lifelong Education*; *Adult Education Quarterly*; *European Journal of Work and Organizational Psychology*; *International Journal of Human Resource Management*; *Personnel Review*; *Journal of Business and Psychology*; and *Journal of Managerial Psychology.* Together with Rob Poell, she has recently edited a volume on workplace learning *(Workplace learning: Concepts, measurement and education).*

## *Tim Mavin (Griffith University, Australia))*

Tim Mavin is a Senior Lecturer, and manages undergraduate programmes at Griffith University. He has a 20-year flying career in both domestic and international airlines, including time as an airline pilot instructor on the Boeing 737. He continues to work with both domestic and international airlines developing training and assessment programmes for both pilots and cabin crew. Tim is currently completing his Doctor of Education with the University of Queensland. He is also a qualified and practicing high school teacher in Queensland, Australia .

## *Patrick Murray (Griffith University, Australia)*

Associate Professor Patrick Murray manages postgraduate aviation programmes and safety research at Griffith University. After 15 years as an Air Force pilot, Patrick flew Boeing 747 aircraft for Cathay Pacific Airways, where he was Senior Check and Training Captain. He then worked with the team at the University of Texas *Human factors research project* in the development of 'LOSA' as a tool for measuring critical team performance. Following this Patrick was appointed the Head of Air Transport Operations at CASA – the Australian aviation safety regulator. Patrick is a director of an international consultancy, specialising in aviation training, human factors, and safety management.

# Chapter 1
# Learning through Practice

**Stephen Billett**

Griffith University, Australia

## 1.1 Learning through Practice

There is a growing interest in practice-based learning in countries with both advanced and developing economies. Much of this interest is directed towards augmenting students' learning within vocational or higher education programmes of initial occupational preparation or those for professional development (i.e., further development of occupational knowledge across working life). The worth of contributions from practice settings and experiences with authentic instances of occupational practice, of course, has been long acknowledged in the major professions and trades. Indeed, most trades and professions have a requirement for individuals to engage in an extensive period of practice prior to being accepted as a tradesperson or professional. So, there is now a growing interest in occupationally specific higher education programmes providing these kinds of experiences for novice practitioners. However, beyond their use in initial occupational preparation, there is a wider set of considerations about the utility of practice-based experiences to promote ongoing development across working life. In particular, occupational practice and experiences in practice settings are now being used as a vehicle for professional development. Increasingly, educational programmes organised by universities, technical colleges, and professional bodies, are often either premised upon or partially based within the learner's occupational practice. Hence, at this time, there is a wide and growing acceptance that the experiences provided in practice settings, usually workplaces or work settings, are essential for developing the knowledge required to effectively practice occupations.

However, often, in both initial occupational preparation and professional development, practice-based experiences are seen as an adjunct to an educational provision that is organised and structured in colleges or universities or through programmes offered by professional bodies and other agencies, rather than experiences that are both legitimate and effective in their own right. Such is the association between effective learning and educational institutions that these kinds of experiences are often seen as being both posterior and inferior to those provided through educational institutions and programmes. However, it is important that the qualities, processes, and outcomes of learning through practice be appraised: understood, utilised, and evaluated on their own terms, rather than as being positioned as merely augmenting those provided by educational institutions. This

S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2_1, 

appraisal is important because much of what is assumed to constitute effective learning experiences - processes that enrich the outcomes of that learning, including conceptions of curriculum and pedagogy - is premised on the norms and practices of educational institutions. Yet, these premises may be quite unhelpful and/or inappropriate for understanding the processes and outcomes of learning occurring through experiences outside of those institutions, and the development of curriculum models and pedagogies suited to practice settings. Hence, a fresh view and appraisal of what we know about practice settings, their contributions, and how these might be progressed to secure effective outcomes for learners is now required. Consequently, the overall project for this book is to explore ways in which learning through practice can be conceptualised, enacted, and appraised through a consideration of the kinds of traditions, purposes, and processes that support this learning, and the curriculum models and pedagogic practices used to support these purposes. It is these issues that are taken up through the contributions from the two sections of this book: *Conceptual premises of learning through practice*, and *Instances of practice*.

The key aim for this opening chapter is to set out the purposes, and introduce and overview these two sections and their contributions. However, before doing so, it is necessary to elaborate, firstly, the emerging and growing interest in practice-based learning foreshadowed above, and, secondly, the kinds of purposes that are likely to be realised by learning through practice. This discussion then leads to addressing issues of definitions and conceptions of learning through practice, which is the focus for the first section of the book. In all, the beginning here is to introduce and provide points of reference to the contributions that follow.

Before proceeding further, it is important to capture what constitutes practice and then learning through practice. The definition taken here of practice is that which occurs through the usual or everyday exercise of the occupation. That is, practice comprises the enactment of the kinds of activities and interactions that constitutes the occupation. This is referred to as *praxis* in some traditions, and is used to distinguish between practice and theory. Here, however, it is assumed that practice is enacted through access to and the exercise of forms of conceptual, procedural, and dispositional knowledge that underpin competent practice. Moreover, learning through practice is seen as a process that arises through the exercise of the occupational practice, and there is no distinction between engaging in practice and learning. Certainly, the process of learning is now widely acknowledged as being a ubiquitous and ongoing activity that is a necessary part of everyday conscious thinking and acting. In essence, the process of humans' construal and construction of experience constitutes learning. There is also no privileging of particular settings as sites of learning, except through the qualities of activities and interactions (i.e., experiences), because it is what and how individuals construe and construct from their experiences that ultimately shapes what they learn, not necessarily what social settings intend them to learn or even press them to learn (Billett, 2009a).

Such views are not radical. They are highly consistent with the constructivist movement that developed across the 20th century, post behaviouralism, and are even premised on earlier accounts of cognition (e.g., Baldwin, 1898). Across the 20th century and into this new one, successively, the likes of (Piaget, 1968/1971) with his theory of equilibrium, Vygotsky with his theory of subjectification (Vygotsky, 1934/1987), Husserl's (1936/1970) phenomenological account of human meaning making, Schutz's (1970) processes of typification, Luria's (1976) concept of appropriation, through to more recent accounts of viability from Van Lehn (1989) and von Glasersfeld (1987) to contemporary accounts of realising subjectivity (Somerville, 2006) and sense of self, and sociological accounts of maintaining ontological security (Giddens, 1991) all emphasise the ongoing process of meaning-making by individuals regardless of the place and activities in which they are engaging. So, there is nothing new or perfectly fanciful about the idea of learning through everyday practice. What yet has to be more broadly accepted though is that there is no reason why this learning cannot be as worthwhile, robust, legitimate, and otherwise as valuable as that which arises through intentional educational experiences afforded by schools, colleges, and universities (Rogoff & Gauvain, 1984; Scribner, 1984). This is not to denigrate the worth of educational experiences and the learning that arises from these institutions. Instead, it is to suggest that particular kinds of learning most likely arise through different kinds of activities and interactions in different settings. In particular, for developing many of the capacities required for effective occupational practice, experiences in practice settings likely have the potential to make many important contributions that simply cannot be afforded by experiences in educational institutions. However, in all of this, there is a danger that pragmatic agendas on the part of governments and other external influences and a lack of care to acknowledge both the contributions and the weaknesses of experiences in practice settings will lead to unrealistic and unhelpful expectations, and commensurate disappointment should these expectations not be realised.

## 1.2 Emerging and Growing Interest in Learning through Practice

As noted, there is growing interest from government, industry spokespersons, professional associations, and students in how approaches to and models of learning through practice can assist the initial preparation, and further development of skills, for the professions and other occupations. This interest seems to be particularly driven by a concern that, unless experiences include a quite extensive engagement in authentic instances of the occupation to be practiced, and unless learning through practice settings are part of educational provisions for occupations, experiences will be unsuccessful in effectively preparing individuals both for the transition from educational programmes into the

occupational practice and to be effective in that practice. However, provisions of learning through practice have long existed in and for some occupations. There are long-standing practice-based approaches to learning in a range of occupations, including those referred to as the professions and trades. Indeed, as foreshadowed, admission into the trades, through apprenticeship arrangements, and major professions can be realised only after completing extended periods of practice (e.g., medicine - residency, law - articled clerk, accountancy - probation period) in authentic activities and, usually, in the settings were those occupations are practiced (e.g., hospitals, law firms, and accountancy firms). This preparatory practice often includes having access to close guidance by more expert practitioners, and these settings also provide opportunities for demonstrating competence in the occupational practice. Yet, beyond these occupations with their traditional arrangements is a growing expectation that similar kinds of experiences should be available for the preparation for just about all occupations that are being prepared through higher education institutions (Department of Innovation, Universities, and Skills, 2008; Universities Australia, 2008). Much of this interest to have these provisions organised more widely, and even universally, is in response to complaints about problems with the direct employability of graduates and the increasing focus on occupation-specific courses in both vocations and higher education, and has two principal sources, both of which have specific and difficult educational purposes.

First, higher education programmes are increasingly focusing on the preparations for particular occupations, leading to claims that universities are now largely focused on higher vocational education (Billett, 2009b). With this more widely applied and intense focus on preparation for occupations has come expectations that graduates from such programmes should be able to: i) enjoy smooth transitions into the particular occupation and ii) be competent in the instance of professional practice in which they are employed (Department of Innovation, Universities, and Skills, 2008; Universities Australia, 2008). However, fulfilling this expectation represents tough educational goals (Billett, 2009b). Achieving these goals means that beyond learning the canonical knowledge of the occupation (i.e., its concepts, procedures, and values), graduates will need to know something about how this knowledge is applied in the particular situation in which they are to practice. However, the circumstances of occupational practice are inevitably quite diverse, often unknown. As a result, the goals and resources for occupational practice, and the processes by which occupational practice is undertaken, can be quite different, rather than uniform, and sometimes difficult to predict. They may even be unknown to students and their teachers.

Consequently, beyond an interest in securing experiences within authentic instances of professional practice, there is also a need for graduates to be aware of at least something of the diverse instances of the enactment of occupational practice, and identify and understand something of their similarities and distinctions. So, beyond the canonical knowledge of the profession, there is a need to understand something of the diverse instances and particular ways that that the

practice is conducted to meet the requirements of those settings. For instance, doctors, teachers, and nurses are often trained in large city-based institutions. Yet, how medicine, schooling, and nursing is practised away from metropolitan centres may be quite distinct from students' current experiences, both in terms of the actual practices, but also the range and the scope of duties that might fall to them as practitioner. Helpfully, however, a preparation that includes the development of capacities to apply canonical occupational knowledge in different ways may well have benefits other than an initial smooth transition. Through this kind of understanding adaptable professional knowledge may well be generated in graduates, and these understandings will provide a strong base for adaptive practice in the future. Rather than the adaptability of knowledge being premised on cleverly manipulating what one knows, understanding something of the contextual requirements for performance and having an appropriate repertoire of responses is what likely leads to being effective in the application of knowledge to new circumstances.

Although this kind of expectation about the job readiness of graduates may be new for those in higher and professional education, this kind of government, industry, and community expectation has long shaped expectations of vocational education. In those sectors, the apprenticeship model of practice-based learning is often looked to as an exemplar because of the extensive periods of practice-based learning, which are assumed to assist the development of knowledge that is applicable to the exercise of the occupation. However, the experience within vocational education has been that failure to secure 'job ready' graduates only increases external demands for controlling the educational process, its goals, and means of enactment. It follows, then, that as higher education programmes become more aligned to specific occupational outcomes, failing to realise these kinds of expectations are likely cause greater intervention into its organisation, enactment, and regulation of content, experiences, and outcomes. So, there is much at stake here for those working in universities, polytechnics, or vocational education institutions.

The second demand for practice based experiences is found in the need for ongoing professional development. Given that the requirements for occupational practice are constantly changing, there is a growing need to find ways of continuing to develop occupational practice throughout working life. Therefore, beyond participation in professional development courses, there is a growing interest to find ways of supporting ongoing development throughout individuals' working life that can be realised within and as part of work practice. Imperatives associated with cost and pedagogic effectiveness, and some dissatisfaction with the orthodox provision of taught courses, are likely leading now to a consideration of practice-based options as being the most appropriate and worthwhile for this purpose. Yet, this interest throws up a range of interesting educational challenges. These include developing and legitimising practice-based conceptions of curriculum and pedagogy, and the assessment and certification of learning that

will occur outside of educational programmes and institutions and be reliant upon other practitioners and settings for its exercise.

Hence, there is growing need to identify approaches to and models of practice-based learning that can be exercised within settings where occupational practices are enacted and, preferably, as part of those practices to assist both the initial development of occupational capacities, and their ongoing development throughout working life. Identifying, elaborating, and discussing such approaches and models are the focus of this book. However, it is not sufficient simply to identify curriculum models and pedagogic approaches without understanding the traditions, circumstances, and developments that have led to the efficacy of these particular models. Consequently, the approach here is not only to identify models of practice-based learning from across a range of occupations, but also to understand the particular institutional and cultural contexts in which these models are used and where their effectiveness will be judged, as well as traditions and practices that have given rise to these models and their efficacy.

However, beyond these very pragmatic and efficiency-driven imperatives to understand learning through practice, are the scientific premises that seek to understand the processes, circumstances, and kinds of learning in which humans engage. Although much of the conceptual development, research, and theorising about learning is associated with provisions of education, there is a range of scientific interests and conceptual positions that privilege learning in its own terms and not necessarily in its relationship to what occurs through experiences that are intended as educational and enacted through educational institutions. For instance, anthropology, although focusing on cultural practices and norms, emphasises processes of learning those practices and norms often situated outside of educational institutions. Lave's (1988) investigations of numeracy and the development of occupational practice in settings not only were central to questioning the cognitive perspective of thinking and acting, but also opened the possibilities for considering the relationship between learning and participation in cultural practices. Similarly, the cultural psychologist Scribner (Scribner, 1985), in emphasising how place and artefacts shaped processes of cognition, also opened up considerations of the contribution of learning from practices, such as working in a dairy. Then, the work of Rogoff (1990) as a sociocultural theorist added notions of reciprocity in apprenticeship-type learning in learning for both occupational and more general kinds of knowledge. The long-standing contributions from sociology, such as Bourdieu's (1977) concepts of field and habitus, inform understandings about the process of knowledge construction through participation in social practices, and the lasting consequences of those learning experiences, for instance with language and dialect. Moreover, the contributions to learning as an everyday experience by meta-theorists such as Grusec and Goodnow (1994) and Valsiner (2000) are not so constrained in their considerations as to limit the purview of their theorising to what occurs in schooling. Within mainstream theorising about learning, there was a considerable shift from a focus on cognition as individuals' use and manipulation of their

knowledge to include the importance of the contributions of the physical and social contexts in which the purposes for the goal-directed activities and interactions were generated, and the contributions of those settings to the enactment of those activities and interactions and their cognitive legacies (i.e., learning). Hence, there was a shift to accounts of situated cognition (Billett, 1996; Brown, Collins, & Duguid, 1989; Lave & Wenger, 1991), cognitive apprenticeships (Collins, Brown, & Newman, 1989), communities of practice (Lave & Wenger, 1991), distributed cognition (Salomon, 1997), and activity systems (Engestrom, 1999), which all emphasised the settings in which thinking, acting, and learning occurred. In response to concerns about overly cognitive accounts of learning, a flurry of inquiries followed these leads.

Indeed, the range of advances across the scientific fields informing learning has led to a significant change in how learning through practice and in practice settings is viewed within the nonscientific community. In part, this changing of views and acceptance of the contributions of practice settings may well contribute to high levels of expectations about learning that occurs through practice. Yet, a range of issues about the kinds of learning that arise from particular kinds of experiences has been raised by this scientific effort, yet remains unanswered. So, this growing field of scientific endeavour is seeking to understand further the processes of learning through practice and, in doing so, make concrete suggestions about how individuals' learning, albeit for or beyond working life, might best progress. Many of the contributions to this book address both conceptual issues about learning through practice and also those issues associated with informing how this learning might be assisted and enhanced. Certainly, the first section of the book explicitly focuses more on the former, whereas the second section focuses more on the latter. Nevertheless, there is a range of contributions within each section that informs both the conceptual and procedural dimensions of learning through practice.

It follows, therefore, that there is need to identify well founded models of practice-based learning that can be used within workplace or practice settings and as part of work or practice activities to assist both initial development of occupational capacities, and their ongoing development throughout working life. However, as has been demonstrated elsewhere, it is not sufficient simply to identify effective curriculum models and pedagogic approaches without understanding the traditions, circumstances, and developments that have led to these particular models. In preparing their chapters, the authors were asked to generate contributions that explicate not only an approach and model, but also the context and traditions that support and make the model appropriate for that particular occupation and practice setting.

## 1.3 Approaches to and Models of Learning through Practice

The contributions here comprise chapters representing a range of conceptual focuses in the first section, and cases from across diverse occupational practices that offer models of practice-based learning, in the second section. In different ways, each chapter also identifies the traditions, contacts, and approaches that are central to the effective working of learning through practice. In different ways, the chapters focus on either the initial preparation of occupational competence, or its ongoing development throughout a life of professional practice. Rather than having a central and consistent conceptual premise, of necessity, the contributions here have quite diverse and distinct conceptual and procedural orientations, which are laid out in the first section. However, the coherence and overarching premises derived from these distinct contributions can be located in a common focus and interest, and as discussed in this introductory chapter.

This first chapter introduces some of the imperatives and expectations that are driving the need for learning through practice to be understood more fully and as legitimate processes of learning with worthwhile outcomes in their own right, and provides an overview of its organisation and content, and then offers some renderings of what is proposed across the contributions. Each of the following chapters elaborates particular approaches and traditions associated with learning through practice across occupations such as social work, aviation, aquaculture, jewellery, nursing, et cetera. These references include either those referring primarily to the initial preparation for occupational practice or those that are deployed to secure effective ongoing development throughout working life.

## 1.4 Section One: Conceptual Premises of Learning through Practice

In his chapter entitled ‘Learning in practice, learning for practice,’ Wolff-Michael Roth proposes that there is significant difference between learning for and within practice, and learning on behalf of practice, which occurs elsewhere. The key premises here are that not only are the pedagogic circumstances distinct, but so too are the purposes of and ways of knowing that are privileged in both settings. Central to the view of learning in practice here is that the ways of knowing as theory and practice are distinct and not easy to reconcile. This then shapes what passes as epistemology, but also how curriculum and pedagogy for practice might be considered. It is claimed that tacit modes of learning arise not through explicit teaching, but through engagement in practice that encompasses ways of knowing and learning that are distinct from those within educational institutions. Further to this, the model of learning through practice proposed here is one premised upon ways of knowing that are embedded within the practice itself and the kinds of

knowing needed to enact the practice. Yet, these tacit modes of learning through enacting practice by themselves can be enhanced by particular kinds of pedagogic activities which, as instanced, required the practitioner to represent their tacit learning in some way. This requirement creates an embedded practice that has significant pedagogic qualities in so far as it generates the kinds of knowledge structures that make explicit what was tacit, and generates richer understanding about practice, but from and through practice, not on behalf of it. So, the distinction here is that more than being two distinct sets of social settings and practices, the forms of knowing and knowledge privileged in the educational and practice setting are quite distinct and, therefore, difficult to reconcile.

Michael Eraut's chapter titled 'Knowledge, working practices and learning' similarly proposes that the knowledge exercised in practice is distinct from the codified knowledge that is privileged within educational institutions. The former kind of knowledge, referred to as personal knowledge, is characterised by both situational and strategic procedural qualities (i.e., assessing, deciding, acting, and monitoring). This knowledge arises through engagement in practice, and it is directed towards securing personal meaning and is seen as being distinct from codified knowledge (i.e., it is uncodified knowledge). As such, codified knowledge is a counterpart to knowledge that is held to be inherently socially situated. Hence, the view proposed here emphasises the learning through practice as personal learning trajectories, which comprise personal renderings arising from engagement with sets of activities that are accessed through participation in practice settings. The conceptions of curriculum proposed here are those of the activities and interactions that are afforded by the practice settings with which the practitioners engage (e.g., the allocation and structuring of work activities). However, the concept of practice-based curriculum here is premised on the epistemological agency of the learner as much as what is afforded by the setting. Yet, there are also pedagogic qualities of practice including interacting and observing other and more experienced practitioners through processes such as receiving feedback, responding to questions, and being mentored, coached, and supervised. That is, there are a range of close interpersonal interactions and more distant forms of guidance that have shaped the pathway of the personal learning trajectory. This shaping is often ordered by those who supervise or manage learners and thereby reflect the ways in which the norms of the practice can shape the overall curriculum for the learner as well as the pedagogic practices that formulate the learning trajectory. Yet in all of this, it is claimed here that these affordances shape rather than dominate individuals' learning through practice, which ultimately is a personal learning trajectory.

In the chapter 'The practices of learning through occupations,' I make the point that not only does the need for occupational practice arise from human and societal need, but that it is essential for human and societal existence, continuity, and development. In this way, the conduct and development of occupational practice is shaped by societal imperatives and structures. Importantly, across human history the vast majority of this kind of development has occurred through

practice, as has the development and remaking and transformation. Consequently, the required curriculum models and pedagogic practices are those that sit within societal conditions and are energised by society's imperatives. For instance, the requirements for meeting the needs of massive populations within ancient China led in part to a model of production premised upon highly organised teams of supervisors and workers, team hierarchy, and the development of highly specific skills associated with the production of artefacts. All this was enabled by societal arrangements that shaped the nature and organisation of work and participation in work, which seemingly is how artisans came to learn that highly skilled practice. It is presumed that the pedagogic practices were as much a process of novices observing and listening and participating, as being directly taught through instruction. Indeed, it was the structuring of the activities that shaped the overall pathway of learning or curriculum. Similarly, in ancient Greece, a society premised upon fixed social classes and the sentiments of ruling elites about the division of occupations meant that for artists and artisans, in particular, specific occupations became associated with specific families within a class system. The vast majority of occupations, other than in the professions, were to be learnt and practiced within family units. Hence, opportunities for learning and processes of learning were shaped by societal ordering. Typically it seems, the curriculum was that which was enacted within the family with the son, and possibly male relatives, engaging with the father in progressively learning the practice, albeit carpentry, masonry, or playing musical instruments, per instances. The pedagogy was again a process of participation, observation, and practice. This pedagogy extended to the play in which children engaged within the family as part of a preparation for a life of engagement in the family occupation.

This kind of model of learning through practice and through family association seemingly extends across European history, up until the various industrial revolutions led to the decline of family-based businesses and the collection of labour into larger and factory-based units. Again, the practice curriculum was societally ordered on the basis of the kind of occupations in which individuals could engage and also the opportunities for learning those occupations. Doubtless, pedagogies of practice occurred in different ways across different occupations, quite likely exercised in ways that are identified in anthropological accounts of learning and in societal situations where no education provision existed (e.g. see (Pelissier, 1991).

Yet, within all this, is a consistent and emerging theme of the purpose of learning through practice being not only the development of individuals' capacities, but also the remaking of the kinds of the practices that communities and societies require, and the further development of these practices to accommodate new problems and as new technologies emerge. Hence, resolving about how to proceed and to develop further the occupational practice had to occur within the confines of practice and associations of those who practiced. Of course, all of this does not provide an adequate explanation for why we should consider now practice settings as places to learn. Moreover, it is likely that the

array of knowledge that is required for contemporary work is in part, but not wholly, different from the knowledge required in earlier times. Certainly, symbolic knowledge is emphasised more now, and that which may be difficult to access through practice alone presents a strong case for learning to be distributed across practice and educational settings, or at least the adoption of pedagogic practices that can make that knowledge accessible through practice-based experiences. Yet, despite this, what we do know is that the contributions of settings is important both in the development of knowledge from learning and in understanding its enactment given the diverse requirements of practice. In many ways, because practitioners are now more informed, having access to a range of knowledge from outside of the practice setting is not to weaken or make irrelevant the contributions from the practice setting but instead provide means by which contributions can be more fully accessed and appraised.

In partial contrast to the explanation provided by Michael Eraut, Karen Jensen and Monika Nerland emphasise the epistemic qualities of socially derived artefacts as shaping learning through practice: 'Objectual practice and learning in professional work.' These artefacts are held to be both powerful and pertinent in occupations that are premised upon symbolic and abstract knowledge. In this way, the understanding of learning through practice advanced here acknowledges the constructive process of learning through practice by individuals, but emphasises that learning is ultimately mediated by cultural tools and objects. This mediation is central to the negotiation between personal agency and the material world in which the individual engages, and thereby becomes a central quality of both the exercise of practice and also the process of learning through practice. Given the nature of the proposed negotiations between the individual and the social practice, the artefacts and objects can be seen as having a particular pedagogic property. That negotiation then suggests a form of social agency that is pitted against the agency of the learner. The agency of the social world is seen to be promoted through particular kinds of artefacts and objects, thereby emphasising their pedagogic qualities, to the extent that it is suggested that multiple objects and artefacts provide a rich environment for learning that likely leads to highly reflexive outcomes. In this account, therefore, artefacts are seen to represent both organising events (i.e., curriculum) and also have within them pedagogic properties that, when exercised together, lead to high-level outcomes.

In contrast to perspectives, such as some of those above, that privilege an institutional or epistemological account of practice, the chapter by Gloria Dall'Alba and Jörgen Sandberg entitled 'Learning through practice: A lifeworld perspective' emphasises the ontological dimensions of practice: the process of becoming and ways of being in and through practice. The authors propose that many current accounts of learning through practice emphasise it as a singular relational whole, fail to account for the diversity of practices, and view that process as unidirectional. Instead, the account here emphasises the personal transformation that occurs through processes of becoming and being in practice. Like Roth's account, the perspective here is premised on a phenomenological

approach that views the process and outcome of participating in practice as arising through an entwinement with the lived world premised on a personal process of being: personal-social. In emphasising the dual processes of becoming and being, the account here proposes a way to understand both the trajectory of learning a practice (i.e., becoming) and then continuing to learn through that practice (i.e., being). Hence, considerations of curriculum here are personal trajectories rather than pathways established by others. The pedagogic quality of practices here are similar to those proposed in Nerland and Jensen's chapter with objects, artefacts, and others comprising those with which the process of learning (becoming and being) is inevitably intertwined. Here, epistemology is personally ontological. All of this constitutes a lifeworld perspective that seeks to correct earlier explanations that focus on the world as a given, unitary, and linear phenomenon rather than an account premised upon what is experienced, understood, and negotiated, and what subsequently serves as the basis for further negotiations.

The themes of becoming and being as personal trajectories premised on negotiations between subjectivities and the world as experienced are continued in the chapter 'Conceptualising professional identification as flexibility, stability and ambivalence.' Here, Rose-Marie Axelsson, Madeleine Abrandt Dahlgren, and Lars Owe Dahlgren provide an account of these negotiations as being advanced through the exercise of life politics as a personal learning project premised on flexibility, stability, and ambivalence. This triality is offered as an explanatory premise for negotiating the flexibility demanded through changing times and transforming self, of seeking personal stability and the capacity to be confident to practice. It also suggests a relational basis for becoming and being comprise a necessary ambivalence towards the lived world. Here, again, the concept of curriculum in practice is one of a personal trajectory, that is, a pathway negotiated through the exercise of life politics. The pedagogic qualities of that trajectory are more premised on a personal epistemology that shapes the nature of engagements with peers and more experienced practitioners. These engagements are essentially dialectic, and, privilege the process of meaning making. Yet, the entwinements that constitute life politics here are often shaped by the demands of the particular practice in which individuals are engaged (i.e., engineering less and doctoring more entwined), and by different kinds of continuities for practicing. Through all this, the negotiations for becoming are particularly premised on a capacity for flexibility, a quest for stability with the exercise of ambivalence being directed towards managing ontological security. So, concepts of the negotiations between the personal and social are captured here in terms of life politics, with the curriculum (i.e., pathway) and pedagogy (premises for engagement) of practice being part of those negotiations.

In all, these accounts articulate different starting points, emphases and perspectives, whilst discussing learning through practice. Together, however, much of what they propose is about needing to understand learning through practice from considerations of the processes through which that learning occurs. These processes are constructed and negotiated, shaped to a greater or lesser

degree by the broader social environment and also the particular qualities of the setting in which practice occur. Moreover, throughout, the importance of meaning-making as both a process of learning and, subsequently, knowing arises consistently in these accounts albeit proposed in different ways.

## 1.5 Section Two: Instances of Practice

The second section comprises contributions that offer instances of practices as bases for understanding how learning through practice might best proceed, continuing the considerations of what constitutes curriculum, pedagogy, and epistemologies of practice, and how these are best arrayed.

The jewellery-making sector is the context for David Guile's chapter and is used to consider the process of learning through practice by a student on a placement in a jewellery manufacturing company. The student works as a designer whose brief is to assist the company move its products towards the higher end of the jewellery market. She is supported by the manager, and through engagement with production staff comes to learn much about the marketing requirements and the possibilities and limitations of the production processes. She also learns that in practice she has to work in ways that are quite different from her college-based experiences. This difference included the quantum of designs to be generated and the processes she came to use. These processes included engaging with resources that articulated trends in designs and pointed to those that are likely to be most marketable. It is proposed that together these kinds of demands and experiences are generative of a 'space of reason,' which constitutes the parameters for and means of performance.

The developmental process was deemed to be successful in so far as the company had access to marketable and producible design and the student learnt much through the experience. For her, learning through practice provided access to a range of activities and resources that allowed her to be generative of designs and develop capacities to become a designer (space of reason). However, there were other kinds of outcomes for this student. The learning through practice also assisted her come to understand what she liked about the work and the ways in which she wanted to work in the future. So while the process of learning through practice arose through affordances of the workplace and her agency, the outcome was not socialisation, as some refer to and claim. Instead, the outcome was to engage in a different way of practicing in the future. Consequently, through his analysis within 'Developing vocational practice and social capital in the jewellery sector: A new model of practice-based learning' Guile questions the easily made claims that learning through practice is reactive and limited in its scope of application (i.e., non-expansive). Instead, the evidence here is of a personally transformative experience for the learner and a process of remaking of practice (that of the jewellery company). At the centre of these changes, Guile identifies something of the epistemic qualities of practice.

The chapter 'Guidance as an interactional accomplishment: Practice-based learning within the Swiss VET system' by Laurent Filliettaz elaborates the processes and outcomes of interactions between learners and more experienced workers in practice settings (workplaces) and in apprenticeship programmes. The majority of apprenticeships are conducted in such settings and engagements with and interactions between apprentices and vocational trainers (i.e., more experienced workers) are held to be a key pedagogic quality. Yet although seen as an ideal form of initial occupational preparation, and one that this is held as an exemplar, there are significant problems in the level of successful completions because of withdrawals and failures in examinations. In seeking to improve apprentices' experiences, this chapter identifies and elaborates four different kinds of interactions that occur between apprentices and more expert workers, and, in doing so, depicts qualities of a practice-based pedagogy that is widely adopted for the development of occupational capacities across a range of practice settings. The qualities reflected here include those that are both likely to be helpful and unhelpful in assisting novices become effective practitioners. More than the simple efficacies of these interactions as pedagogic practices are the personal and social contexts in which they are transacted. These transactions include the readiness as well as whom they are, and also the readiness and capacity of the mentor to provide guidance. Then, there are the kind of occupational practices in which the apprentices engage, and the degree by which it is possible for apprentices to progress along an occupational pathway given the kinds of work and workplace organisation. In all, this chapter highlights that workplaces can provide a curriculum in terms of a pathway of activities and pedagogic practices that can potentially lead to rich and effective learning. However, the prospect for these outcomes to be realised is dependent upon sets of social and personal factors, and the negotiations between them. In particular, elaborated here is the centrality of the engagement, which is inherent in the dialectic between the apprentice and vocational trainer as both a pedagogic practice and a personal epistemology of practice.

The chapter 'Cooperative education: Integrating classroom and workplace learning' explores the premises for integrating learning experiences within practice settings with those in educational programmes. Chris Eames and Richard Coll propose that each kind of setting on its own is insufficient to develop the kinds of learning that are required for effective occupational practice. Consequently, students require experiences in both settings, and, importantly, that these experiences be integrated in some way. The two settings are seen as laboratories in which students participate and through which they learn, and through which that learning is enriched by processes of personal reflection and teacherly guidance. Hence, in this way, the two settings are seen as being distinct cultural practices with particular purposes and providing particular kinds of activities and interactions through which students as novices come to learn the knowledge required for practice, partially from practice. Consequently, what is proposed here is that learning through practice needs to extend beyond where the

practice is actually enacted, to another setting that provides experiences on behalf of that occupation to develop knowledge for that practice that cannot be learnt through it. Hence, here, conceptions of curriculum are about ordering experiences across two distinct forms of social practice (i.e., the academy and the workplace). Pedagogic effort is directed towards realising effective outcomes that combine the two sets of experiences, and that epistemological effort needs to be directed towards learning in both settings, yet also towards integrating students' experiences within and across both kinds of settings. However, the chapter concludes that although these kinds of programmes have long been enacted, the actual process of integration across these two settings, how this occurs, how best this integration can be supported, and, therefore, the implications of such programmes for curriculum and pedagogy, remain largely unknown. The significance of these claims is that much of the interest now in utilising practice settings as sites of learning is a part of programmes offered through educational institutions, principally universities. Yet, without understanding how best the totality of the curriculum might be organised, in what ways it needs to be exercised within each of the two social practices, what kind of pedagogic practices are likely to be helpful with each setting, and in what ways learners need to be prepared as active learners and as reconcilers of learning in both settings, the pathway forward remains quite perilous.

In the chapter 'Individual learning paths of employees in the context of social networks' by Rob Poell and Ferd Van der Krogt, learning through practice is seen as a process and outcome of individual employees' learning pathways, premised on personal action theories. Consequently, the starting point is a consideration of the employee and their participation in work activities and their learning through them. Compared and contrasted here are practice-based experiences provided through participation in everyday practice in the workplace and also those experiences that intentionally seek to develop further employees' knowledge. In both of these kinds of experiences social networks are held to play a key role in learning through and for practice. In particular, the roles of these social networks are held to be important in how employees go about construing and constructing knowledge from what they encounter in practice settings. Hence, while placing considerable emphasis on the trajectory of the learner, the explanation of learning through practice provided here is one that emphasises the particular qualities of experiences, the role four different kinds of social networks play in both kinds of settings, and the broader set of institutional facts that shape how work is organised and progressed. In particular, meaning and its coherence to others in the work setting is held to be promoted by engagement with others and social networks that are themselves a product of the setting in which the work is practiced. The emphasis on broader sets of institutional facts mean that different kinds of practices and practice settings will afford particular sets of opportunities, networks, and premises for promoting employee learning pathways. Hence, concepts of curriculum here are found within both individual pathways and structuring of experiences through the practice settings. Pedagogic potentials are

exercised through interactions with others through social networks and also the logical agency of individual employees through the exercise of their action theories.

A consideration of the relationship between economic imperatives and learning through apprenticeship is used in 'Apprenticeships: What happens in on-the-job training (OJT)?' by Helena Worthen and Mark Berchman to explain how the opportunities for regulating learning experiences in practice settings are shaped by economic rather than pedagogic logic. In particular, taking a community-level analysis of these factors, it is concluded that the opportunities to intervene and secure rich learning outcomes in apprenticeship programmes in the US construction sector are regulated by the social and economic circumstances in which they are enacted. The starting premise for this chapter is that, ultimately, economic logic determines the opportunities for kinds of learning that can be structured through work activities. However, this logic is exercised in terms of the work that is available (i.e., the number and range of construction jobs) and the likely contract kind of employment that constitutes work and work practices in the building sector. This means that opportunities for apprenticeships are regulated by economic activity and that the space provided for learning through practice will be shaped by direct economic imperatives at the individual trade-worker level (e.g., how much time the experienced practitioner can give an apprentice, and also the kinds of tasks that the apprentices can undertake). At another level of community engagement is the role taken by trade unions and different modes of support across indentureship offered by particular trade union arrangements. Then, there are also the kinds of community practices that distribute opportunities on the job in ways that are separate from purely economic imperatives. These include issues of race and gender and also alignment between an individual and the culture of work practice. Hence, while identifying an array of learning experiences that arise through apprenticeship programmes, the influencing of experiences is shaped by sets of economic and community practices. In this way, the curriculum of practice is seen as being premised upon key economic, institutional, and situational practices. Further, as a pedagogic practice, opportunities to access and engage with more experienced workers are also mediated by the same set of factors. Although off-the-job training facilities offer important contributions in terms of easing the process of direct instruction, the experiences they provide may not always readily translate back into performance through work, because the nature of the activities and the kinds of interactions and possibilities for practice are quite distinct. In all, the account here is one of the powerful mediating roles of institutions and societal sentiments in the distribution of opportunities for learning through practice.

An inquiry-based interactional strategy for learning through practice is advanced in the chapter by Peter Johnasson and Joh Ohlsson, 'Interactive research as a strategy for practice-based learning.' It focuses on the work of teachers and education administrators. Instead of practitioners being guided by more expert partners, in this case outside of the practice setting, it is proposed that an

interactive and dialogic approach is most suited to addressing both the needs of practitioners and also the particular problems that arise in practice settings may be unknown and unknowable to experts, which limits their capacity to provide direct and effective guidance. So, here the concept of curriculum is centred on a dialogue between practitioners and external agents, yet directed towards specific issues or problems that occur within the practice and that are faced by practitioners. The purpose of this curriculum and associated practice-based pedagogies is about remaking and transforming practitioners' practice, with competence in performance being associated with the imperatives of particular practice settings. The pedagogic practices deployed here are those between external agents and practitioners in order to promote an engaged reflection and collaborative processes when addressing specific practice-based problems. Factors shaping the likely success of these strategies are premised upon the degree by which the practitioners are ready to and are confident in their capacity to progress these collaborations. The pedagogic dimensions of these interactions were promoted by the use of specific strategies that included meetings and sharing of concerns and potential responses through a facilitated process ordered by the researchers as external agents. It is through these interventions that collective learning is secured and commitments to remake practice are emphasised.

The microsocial processes that constitute the relationships between coaches and those whom they coach is the central focus of the chapter by Marianne van Woerkom. Entitled 'The relationship between coach and client: A crucial factor for coaching effectiveness,' it examines in detail a well established practice of developing individuals' capacities in workplaces through the guidance of a more experienced or expert partner. The value of these kinds of relationships is that they provide experiential, tailored, closely mediated, and immediate support and guidance. The particular form of guidance referred to here - coaching - is seen as being a form of guidance that is regular, face-to-face, and dealing with finer points of performance as well as general advice and support. Coaching, in this way, is contrasted with mentoring, which is seen as being more about guidance across a career. Yet, what is proposed here is that the quality of the microsocial processes that constitute the relationship between the coach and the person being coached is central to its effectiveness. Moreover, the quality of this relationship is seen to be person-dependent in a reciprocal and dual way. That is, there are ways in which particular coaches like to engage, and are ready and able to participate and contribute, on the one hand, and then there are the expectations, preferences, and needs of the coachee on the other. The analysis of the microsocial factors that form the bases of the relationship presented in this chapter indicates the need for personal epistemologies to be considered in pedagogic practices and the intricacies of the interpersonal processes that need to be accommodated in such developmental processes. The kinds of preferences of those who teach and guide and the expectations of those who are positioned as coachees, learners, or students are likely to feature in every kind of pedagogic practice. However, they are most likely to be at their most crucial in developmental processes that are one-on-one

and focused on the articulated and particular developmental needs of individuals and how these might need to be addressed. The processes of identification and disclosure of needs and the sharing of those with an individual who is positioned to guide and assist on a personal basis renders the relationship between the two as being particularly crucial. In discussing these factors, this chapter emphasises the importance of individuals' subjectivities, their beliefs and dispositions as articulated through their sense of self and personal epistemology, and how these might best be met. It is perhaps no surprise that in the early part of this chapter, coaching is seen to be analogous to psychotherapy.

In defining what constitutes learning through practice at the beginning of this first chapter, it was suggested that practice referred to that which occurs through the usual or everyday exercise of the occupation. Yet, the account in the chapter by Tim Mavin and Patrick Murray, 'Developing cockpit resource management through practice,' challenges this assumption in one way and reinforces it in the other. On the one hand, it proposes that for really effective practice-based learning for pilots, the use of simulation and sophisticated simulators is far more preferable to engaging in authentic instances of flying a commercial aeroplane. It is proposed that there are significantly more opportunities to learn about piloting through simulators than flying because real risks can be avoided, scenarios presented, responses evaluated, and capacities developed in ways that are far more effective in simulator-based training than when flying aeroplane. Moreover, it is claimed that these experiences are authentic because the pilots treat them as authentic experiences. On the other hand, then, the use of the simulators emphasises the importance of engaging in authentic experiences, which in this instance are those provided through sophisticated simulators and authentic instances of practice. In particular, the authors suggest that many of the faults and accidents that occur are premised upon the failure of the cockpit team to work together effectively and to understand the requirements for coordinating activities and for checking and monitoring each other's responses. These kinds of factors seem to be a more likely cause of aviation accidents than do mechanical faults. Even when mechanical faults occur, it is the quality of capacities of the cockpit team (i.e., cockpit resource management) that allows an appropriate response. What is suggested here is that experiences provided by the simulators are so authentic that they represent instances of learning through practice as defined within this book. In this way, much of what has been discussed in earlier chapters is revisited here, in terms of a curriculum that provides a pathway along which pilots must progress. Here, there is the opportunity to move from familiarity with a particular aircraft, to being able respond to a range of problems that could potentially occur on a commercial flight. The pedagogic qualities of the simulators are heightened by the objects and artefacts that comprise the simulator and provide authentic kinds of experiences. Here, the epistemic worth of the simulator is emphasised through its construction at an artefact primarily concerned with developing and assessing occupational performance. Yet, within all this, without the engagement of the pilots as individual and team members and the exercise of their personal

epistemologies, which include previous experience as well as their capacities, then the potency of both the mode of curriculum and the pedagogic practices would be far weaker. That is, the bases by which the pilots engage, and are pressed to engage by the requirements for effective performance, are central to the experiencing of the curriculum and the value of the pedagogic worth of the simulators.

From these chapters arises a range of conceptions and models for curriculum pedagogy and learner engagement. These contributions, then, offer approaches that are deemed to be more or less appropriate to their specific circumstances and can inform approaches in other circumstances, and provide the basis for developing further the range of practices that might be enacted to secure effective learning through practice.

## References


Baldwin, J. M. (1898). On selective thinking. *The Psychological Review, 1,* 1-24.

Billett, S. (1996). Situated learning: Bridging sociocultural and cognitive theorising. *Learning and Instruction, 6*(3), 263-280.

Billett, S. (2009a). Conceptualising learning experiences: Contributions and mediations of the social, personal and brute. *Mind, Culture and Activity, 16*(1), 32-47.

Billett, S. (2009b). Realising the educational worth of integrating work experiences in higher education. *Studies in Higher Education,, 34*(7), 827-843.

Bourdieu, P. (1977). Cultural reproduction and social reproduction. In J. Karabe (Ed.), *Power and ideology in education* (pp. 487-511). Oxford: Oxford University Press.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32-34.

Collins, A., Brown, J. S., & Newman, S. E. (1989). Cognitive apprenticeship: Teaching the crafts of reading, writing and mathematics. In L. B. Resnick (Ed.), *Knowing, learning and instruction: Essays in honour of Robert Glaser* (pp. 453-494). Hillsdale, NJ: Erlbaum & Associates.

Department of Innovation, Universities, and Skills. (2008). *Higher education at work*. London: Author.

Engestrom, Y. (1999). Activity theory and individual and social transformations. In Y. Engestrom, R. Miettinen, & R. L. Punamaki (Eds.), *Perspectives on activity theory* (pp. 19-38). Cambridge: Cambridge University Press.

Giddens, A. (1991). *Modernity and self-identity: Self and society in the late modern age*. Stanford: Stanford University Press.

Grusec, J. E., & Goodnow, J. J. (1994). Impact of parental discipline methods on the child's internalisation of values: A reconceptualisation of current points of view. *Developmental Psychology, 30*(2), 4-19.

Husserl, E. (1970). *The crisis of the European sciences* (D. Carr, Trans.). Evanston: Northwestern University Press. (Original work published 1936)

Lave, J. (1988). *Cognition in practice: Mind, mathematics and culture in everyday life*. Cambridge, UK: Cambridge University Press.

Lave, J., & Wenger, E. (1991). *Situated learning - legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.

Luria, A. R. (1976). *Cognitive development: Its cultural and social foundations*. Cambridge, Mass: Harvard University Press.

Pelissier, C. (1991). The anthropology of teaching and learning. *Annual Review of Anthropology, 20*, 75-95.

Piaget, J. (1971). *Structuralism* (C. Maschler, Trans. and Ed.). London: Routledge & Kegan Paul. (Original work published 1968)

Rogoff, B. (1990). *Apprenticeship in thinking - cognitive development in social context*. New York: Oxford University Press.

Rogoff, B., & Gauvain, M. (1984). The cognitive consequences of specific experiences - weaving versus schooling among the Navajo. *Journal of Cross-Cultural Psychology, 15*(4), 453-475.

Salomon, G. (1997). *Distributed cognitions: Psychological and educational considerations*. Cambridge, UK: Cambridge University Press.

Schutz, A. (1970). *On phenomenology and social relations* (H. Wagner, Ed.). Chicago: University of Chicago Press.

Scribner, S. (1984). Studying working intelligence. In B. Rogoff & J. Lave (Eds.), *Everyday cognition: Its development in social context* (pp. 9-40). Cambridge, Mass: Harvard University Press.

Scribner, S. (1985). Knowledge at work. *Anthropology and Education Quarterly, 16*, 199-206.

Somerville, M. (2006). Subjected bodies, or embodied subjects: Subjectivity and learning safety at work. In S. Billett, T. Fenwick & M. Somerville (Eds.), *Work, subjectivity and learning* (pp. 37-52). Dordrecht, The Netherlands: Springer.

Universities Australia. (2008). *A National Internship Scheme: Enhancing the skills and work-readiness of Australian university graduates.* Canberra: Author.

Valsiner, J. (2000). *Culture and human development*. London: Sage Publications.

Van Lehn, V. (1989). Towards a theory of impasse-driven learning. In H. Mandl & A. Lesgold (Eds.), *Learning issues for intelligent tutoring systems* (pp. 19-41). New York: Springer-Verlag.

von Glasersfeld, E. (1987). Learning as a constructive activity. In C. Janvier (Ed.), *Problems of representation in the teaching and learning of mathematics* (pp. 3-17). Hillsdale, NJ: Lawrence Erlbaum.

Vygotsky, L. S. (1987). Thinking and speech. In A. C. C. R.W. Rieber (Ed.), *L.S. Vygotsky, The collected works of L.S. Vygotsky. Bd. 1: Problems of general psychology* (pp. 39-285). New York: Plenum. (Original work published 1934)

# Chapter 2
# Learning in Praxis, Learning for Praxis

**Wolff-Michael Roth**

University of Victoria, Canada

**Abstract** Over the past decade, I have conducted ethnographic research across academic and non-academic settings about what and how people know at work and about how they become experienced and competent practitioners as they begin to participate in workplaces. The common experience across all of these sites include an experienced abyss between what is taught and tested in formal schooling and the competencies that are required to be good at work. At the same time, tacit modes of learning were identified that allowed new practitioners in all these fields to become competent practitioners. Considerable transformations of practice and learning could be observed, among non-academic as well as among more academic professions, when (new and old) members engaged in the practice of reflection. In this chapter, I use practice theory and cultural-historical activity theory to articulate similarities and differences in school learning and learning on the job, and learning by implicit (tacit) and explicit modes. I focus in particular on the ways in which reflection on practice, generally mediated by some technology provides renderings that allowed a rejoining of theory and practice to occur.

## 2.1 Introduction

> The concept of practical rules is called theory, when these rules, as principles, are thought at a certain level of generality and when thereby a set of conditions is abstracted that *necessarily* influence their [rules] enactment. (Kant, 1964, p. 127, my translation and emphasis)

Practitioners across many disciplines – academic, technical, professional, and manual work – note a gap between what they do at their everyday workplace and what they are asked to learn when they attend school prior to beginning work, during temporary returns to college for upgrading their diplomas, and during situations where in one or another way they are provided with in-service training opportunities. This distance between the formal teaching of a discipline and the knowledgeability and learning that occurs at work is evident from the following excerpt recorded during a project that allowed elementary teachers to teach science courses by working in groups of two, three, or more.

> Christina: I just improved so much in [teaching kids to think for themselves by asking productive questions]. I don't think three university courses could have given me what [co-teaching] gave me in these two months.

S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2_2, 

> Bridget: It was the same thing for my learning. Even for someone who knows the unit theoretically; it is another thing to read it, but it is a whole different thing to do it with you. . . . This [co-teaching] experience has changed my thinking about this unit [although] I wrote it, tested it, and had done workshops with teachers on it for the past three years. . . . I am just dying to re-write that manual now, to me it is looking so amateurish now.

The two teachers in this excerpt, Christina and Bridget, talk to a group consisting of fellow teachers and researchers about their experience of teaching together. They articulate some of the fundamental aporias that divide the theory and praxis of teaching. There is a fundamental but not sufficiently recognised gulf between learning *how to* teach and learning *about* teaching. Christina suggests that she had probably learned more during the 2 months of teaching with Bridget than she could have learned in 'three university courses.' Bridget agrees, saying that it has been the same thing for her. She has learnt while teaching the science unit with Christina; she has learnt even though she designed the curriculum. She credited Christina for much of her learning in praxis.[1] Teaching, however, is not the only domain where the abyss between learning *about* the job in a formal (training, education) institution and learning *on/for* the job is apparent. Most interestingly, Bridget had written the manual for the curriculum on the ground of her experience as a teacher who developed the curriculum in her own class. And yet, after having taught the course together with another teacher, she is 'dying to re-write that manual now.' That is, as part of the co-teaching experiences, her ideas about how to represent the course in the manual (i.e., its formal representation) also has changed.

Over the past decade, I have conducted ethnographic research across academic and nonacademic settings about what and how people know at work – 'the work of our hands, as distinguished from the labor of our bodies' (Arendt, 1958, p. 136) – and about how they become experienced and competent practitioners as they begin to participate in workplaces. The forms of work that I investigated, together with my graduate students, includes the teaching of science, as well as the everyday work of electricians, mariners, dentists, and field ecologists moving to and from their college experience. I also conducted studies in fish hatcheries and a research laboratory of experimental biologists and two groups of environmentalists, where there were newcomers working at the elbow of old-timers and who were learning in the process. The common findings across all of these sites include our identification of an experienced gap, even abyss, between what is taught and tested in formal schooling and the competencies that are required to be good at (and to do good) work.

---

[1] The terms practice and, more often, practices – as in the theory of communities of practice (Lave & Wenger, 1991) – are used to denote (a) patterned action(s). As a recurrent pattern, an action therefore is already theorised. *Praxis*, in the Aristotelian tradition (e.g., Heidegger, 1927/1977), contrasts *theoria* and is used here to denote the concrete doing and acting that characterises everyday coping, real concrete life. It is related to *pragmata*, the things we know in the manner they appear in *praxis*, and *phronesis*, the wisdom that experienced practitioners exhibit.

At the same time, we identified invisible (tacit) modes of learning that allowed new practitioners in all these fields to become experienced, competent, and knowledgeable practitioners.[2] However, we found that invisible modes alone never – or only over very long periods of time – led to expert practice. Considerable transformations of praxis and learning could be observed, among non-academic as well as among more academic professions, when (new and old) members engaged in reflection on their praxis, which, on the job, occurred for example while practitioners were asked to represent what they were doing in some formal way. This included fish culturists who created and analysed databases of the fish populations in their care that led them to a better understanding of fish and feeding practices.

Taking this experience of practitioners seriously – without the mutual sneering between practitioners and theorists that Immanuel Kant already noted in his days – we need to ask questions. These may turn out to be difficult because they question the very existence of our formal training and schooling institutions. What is the relationship between concrete praxis and explicit rule-based knowledge used to explain praxis? How does learning accrue from praxis? What do practitioners learn in praxis that they do not and perhaps cannot learn in formal institutions and from books? How do practitioners act when two practices appear to conflict? In this chapter, I articulate a way of thinking about the similarities and differences in school learning and learning *at work* (in the dual sense of the expression), and learning by implicit (tacit) and explicit modes. I focus in particular on the ways in which reflection on praxis, generally mediated by some technology (i.e., video, computer model), provides renderings that allow a rejoining of theory and praxis to occur. I conclude with reflections and implications from my research of learning *in* and *for* praxis.

## 2.2 Praxis and Theory

In trying to come to grips with the abyss between theory and praxis, we need to think in fact about epistemology, the implicit or explicit theories of learning that underlie what it means to know. Such theories guide instruction. For example, lectures explicitly or implicitly presuppose that knowing means hearing and remembering certain pieces of explicit knowledge (i.e., information) that can be talked about and transmitted in verbal communication. It is also assumed that once a person can remember what has been presented in a lecture – for example, about the method of doing scientific research in biology as part of a biology programme, how to bend an electrical conduit as part of an electrician programme in a local college, or how to do fish culture calculations – the person can apply or can attempt to apply this knowledge. But what if this assumption does not hold? What

[2] I use the term knowledgeable not only to indicate knowing (how) but also the *ability* to know (exhibit knowledge about) what is required to do good work, that is, the ability to learn.

if the forms of knowing learned in everyday mundane praxis are very different from knowing words about the practice? What if to know means to be able to find one's way around the world rather than to construct and encode formal knowledge in the mind?

### *2.2.1 A Historical Perspective*

Already toward the end of the 18th century, the French philosopher François-Pierre-Gonthier Maine de Biran noted that there is a difference between praxis and its description, for example, between seeing and the utterance 'I see.' Thus, 'the words 'I see' denote the representation of my vision and not my vision itself, however, it is upon the latter, on the basis of its *radically immanent experience* and only upon it their signification rests' (Henry, 2003, p. 153, my translation and emphasis). In a strong sense, it cannot be otherwise, as our practical presence in the world – both on evolutionary and cultural-historical scales – always already preceded any description and theory of what humans have done. Humans were speaking before any known formal grammar and there were stonemasons building giant cathedrals prior to any architect thinking about structural properties of buildings, and so on. There have been architectural marvels – Colossus of Rhodes, Egyptian pyramids, the Hanging Gardens of Babylon – prior to the class of people doing what architects do today. In fact, architects first emerged from a division of labor where master stonemasons, supervising the construction of Gothic cathedrals with a constantly changing workforce, eventually evolved into architects, entailing a split between the theory and praxis of constructing (Turnbull, 1993). That is, having its seed in an existing division of labor between master craftsman – with tremendous practical knowledge and experience – and a regular less experienced workforce, architectural praxis emerged as a new type of activity that produced and reproduced building plans. New subjectivities and forms of identity emerged in the form of the 'gentleman architect,' 'who did not serve an apprenticeship but learned from books and thereby avoided the taint of being, or associating with, craftsmen' (p. 331). In the process, the skills embodied by the master craftsmen 'were lost, never to be recaptured' (p. 330).

The introductory quote to this chapter shows that philosophers have thought about the difference between theory and praxis for some time. In fact, long before Kant, Aristotle already distinguished between *epistêmê* (approximately translated as knowledge) characteristic of *theoria* and *technê* (craft) characteristic of *praxis;* and between two virtues, *sophia* (theoretical wisdom) and *phronesis* (practical wisdom). Much later, for Kant – the master craftsman of metaphysicians (Nancy, 2008) – the problem lies not in that there is theory that does not apply to praxis but in that there is insufficient theory. However, given the cultural experience of the difference between the skills developed in praxis and the theories concerning the objects and products of that praxis, on the one hand, and the descriptions and theories of practical doing, on the other hand, it is not surprising that someone

interested in the cultural-historical evolution of labor and commerce would articulate the rule of the primacy of praxis. Thus, a truly historical approach to the question of theory and praxis, such as the one that attempts to understand the emergence of architects from stonemasons, 'does not begin by looking for concepts, as does the idealist tradition in philosophy, but explains the formation of ideas out of material praxis' (Marx & Engels, 1968, p. 38, my translation). For the two authors, what matters is the knowledgeability required to transform the world rather than simply understanding it. A century later, Arendt (1958) would articulate *vita activa* – labor, work, and action – as the basic conditions of human life. Here, 'work provides an "artificial" world of things, distinctly different from all natural surroundings. . . men constantly create their own, self-made conditions, which, their human origin and their variability notwithstanding, possess the same conditioning power as natural things' (pp. 7–9). Transformation, however, means being able to act appropriately and, by adapting the world, improving life conditions and the control human beings have over their lives. Practical knowledge, knowing one's way around the everyday world of work and knowing how to adapt it, always already precedes theoretical knowledge (Merleau-Ponty, 1945); and this is so at both the cultural-historical (phylogenetic) and the individual developmental (ontogenetic) scales.

### *2.2.2 A Phenomenological Perspective*

An important advance in understanding everyday knowing and learning was brought about by phenomenological analyses conducted during the first half of the 20th century. The categorical reconstruction of cognition achieved in the process suggests that everyday absorbed copying is the primordial mode of human being-in-the-world (e.g., Heidegger, 1927/1977). In absorbed coping, the tools in the hand of experienced practitioners are not objects of consciousness in the way a cognitive scientist considers them. Thus, a carpenter might be hammering a nail *for the purpose of* fastening a beam to a post and, *in order to* do so, he uses a particular hammer. The hammering hammer itself is not present to consciousness as long as it is ready-to-hand (*zuhanden*) nor is its physical position in three-dimensional space. But the hammer becomes an object of consciousness, it becomes present-at-hand (*vorhanden*), when something is wrong (e.g., the handle is cracked or the hammer is too small [large]). The *in-order-to* and *what-for* relations are part of a set of relations that bind tools, objects, talk, and so forth to a referential totality, itself characteristic of the project in the care (*Sorge*) of the person. It is in and out of this referential totality – for example, building a house – that any of the identifiable entities and actions take their sense. The relevance structures are based on *for-the-sake-of-which*, *in-order-to*, *what-for*, and *what-in* relations.

To understand everyday coping wherever this occurs, we have to begin our analysis with being-in-the-world taking care of things (*sorgen für*) as the character

of human existence, which is the source of the existentially experienced nature of the spatiality of the world. If this being-in-the-world structure of absorbed coping is eliminated from our considerations, then an action appears metaphysically motivated, and we come to the conclusion that humans are first thinking beings that are subsequently relocated into physical space. It is precisely this way of thinking about knowledge that leads cognitive scientists to the *grounding problem*, which pertains to the question of how any 'knowledge' relates to, and comes to be grounded in, the real world of our experience. For Heidegger, therefore, the gap is a problem created by metaphysical theories of knowledge and knowing as located in the head independent of praxis. Thus, any word, not only a theoretical one, *accrues to* an existing referential totality rather than existing in and for itself and thereby acquiring something that Anglo-Saxon scholars call 'meaning.'[3] Language and any other sign *primordially* is used in the practical mode, is ready-to-hand, always already a familiar aspect of a referential totality, before it becomes an object of reflection and theory (i.e., present-at-hand).

Human beings always already find themselves in a social world populated with other human beings, oriented by the things that they care of/for, in a world shot through with signification (Arendt, 1958). The structures of the lifeworld are continually (co-) produced as human beings go about their work. For example, when someone from my research team interviews an electrician, fish culturist, or sailor, then the interlocutors do not only talk *about* something but, in the process of talking, also produce the interview as a recognisable event. They are not merely finding themselves in a predetermined box named 'interview,' but they knowledgeably produce the situation simultaneously. The methods that go into the production of this order tend to be invisible. But it is not theory that can make them visible, for example, by having social researchers order cases of interviews, for the 'true principle of order has its own substance, which is not found through ordering activities, but is already presupposed by it' (Heidegger, 1927/1977, p. 52). The perception required to produce order by means of ordering activity is fundamentally grounded in an already-being-in/with-the-world (*Schon-sein-bei-der-Welt*). The (theoretically motivated) ordering activity is itself a particular way of being-in-the-world and must not be interpreted as a process by means of which the subject produces ideas about something that is stored inside. With respect to this inside, there could otherwise 'arise the question how [the ideas] 'correspond' to reality' (p. 62). We clearly see here how Heidegger distinguishes between the production of order in everyday coping and the production of theoretical description – which is a very different activity with different relevance relations and specified methods, but which presupposes the former (and its methods). This

[3] Neither the German that Hegel, Marx, or Heidegger use nor the French that Merleau-Ponty and Bourdieu employ has a direct equivalent for 'meaning.' German distinguishes between *Sinn* (sense) and *Bedeutung*, a term that – having in its semantic field the verb *deuten* – has more to do with reference than meaning in the context of Heidegger's term for referential relation (*Verweisungszusammenhang*). French distinguishes between *sens* (sense) and *référence* (reference) and focuses on signification.

is precisely the crucial difference that ethnomethodology (e.g., Garfinkel, 1996) points out between itself and all other social research (both quantitative and qualitative): The latter is concerned with identifying order using 'scientific method' without realising that this ordering requires forms of perception that are grounded in the competence of the everyday methods of producing social order prior to all science.

Praxis theory, as we know it today, has its origin in the analyses that Karl Marx and Friedrich Engels provide – thereby following, but turning on their head, the ideas of G.W.F. Hegel (1807/1979) – concerning the emergence and development of consciousness. Here, *theory* may actually be a misnomer, a particularly Anglo-Saxon preference, as the different titles of a seminal work on the issue suggests. In French, the work is entitled *Le sens pratique* (Bourdieu, 1980), which translates directly as 'the practical *sense*'; but in English (where the terms practice and logic denote patterned action and a mode of thought, respectively), the title changes to *The Logic of Practice* (Bourdieu, 1990). The term logic, in the semantic field of the Greek term *logos* – historically denoting reason and rationality – does not capture what Bourdieu highlights: the fact that praxis is shaped more by a sense of the game than by any formal reason and rationality. Thus, using gift exchanges as a paradigmatic example, Bourdieu shows why the right timing and temporality of giving and giving-in-return cannot be formalised. Much like a game of soccer or a boxing match, competent practitioners rely on a practical sense (*phronesis*) that allows them to do the right thing at the right time by minimising the gap between any general rule used to explain the behaviour and the solicitude of the moment. Competent performance, whether on the part of a knowledgeable carpenter, an expert fish culturist, a master electrician, or a successful academic constitutes an improvised performance more than anything else. Thus,

> the practical sense . . . does not embarrass itself with rules and principles (other than in the case of malfunction and failure), even less calculations and deductions, which are in any case excluded by the urgency of action that 'suffers no delay'; it is that which allows to appreciate, in a single instant and in the heat of the action, the sense of the situation and to produce immediately an opportune response. (Bourdieu, 1980, p. 177, my translation)

Bourdieu proposes *habitus*, a set of structured structuring dispositions, as responsible for generating appropriate action in the heat of the moment. Habitus is an *immanent* law inscribed in human bodies in the course of their lives in a structured society, reproduced and transformed in practical engagement. In daily life, therefore 'the world of working is the archetype of our experiences of reality; all the other provinces of meaning may be considered its modifications' (Schutz, 1996, p. 38). Most importantly, 'everything that can be communicated about the derivative provinces of meaning has an incidental and metaphorical character and is rather a hint than a statement' (p. 38). Any theory of practical action, from this position, constitutes a derivative, has a metaphorical character that presupposes working knowledge of the world, and is a *hint toward* rather than a *statement about* the nature of praxis.

Given the distinction scholars such as Heidegger, Garfinkel, or Bourdieu make between knowing in the praxis of everyday affairs and theory derived through inquiry into such praxis, one might be tempted to think that when practitioners talk *about* their praxis, they are able to come closer to its truth. Such thinking is fallacious, and the practitioner's explanations come no closer to the heart ('truth') of the matter than do the theorist's. This is so because practitioners

> voluntarily seek recourse to the ambiguous language of the *rule*, of grammar, of morals, and of law, to explain a social practice that obeys very different principles. They thereby dissimulate from their own eyes the truth of their practical mastery as an *ignorant doctrine*, that is, as a mode of practical knowing that does not enclose knowing its own principles. (Bourdieu, 1980, pp. 174-175, my translation)

A good example of this gap is the problem athletes (e.g., tennis players or golfers) face when they attempt to change how they play and, as they consciously consider their performance and how to change it, generally play worse initially. A researcher might tell her graduate students the method she employs in coding data and yet cannot get them to consistently code the set of data that their team is currently working with.

Although practitioners are no closer to the truth of their actions than the theorist, reflecting on their actions, there is evidence that reflection on praxis eventually improves this praxis (e.g., Schön, 1983). Next to the inevitable learning that occurs in praxis even in the most menial and routine work situations (Lee & Roth, 2005), reflection on praxis constitutes a second mode by means of which practitioners come to improve what they do. But, importantly, the aforesaid suggests that practical understanding always already precedes, accompanies, and concludes any learning through formal reflection and analysis. At the same time, those who have learned *about* the practice in an educational institution, that is, those who have learned a language for talking about the practice, tend to lack the practical understanding and experience required for appropriate action. In essence, therefore, they know something different, and this knowing may have little if anything to do with the knowledge required to be a good performer. Thus, a theatre critique may be a competent commentator of some performance even though he may not be able to match the performance of the most amateurish of actors.

## 2.3 Learning at/for Work: A Case from Fish Culture

One of the workplaces that I have come to know and understand very well is the fish hatchery where I returned regularly over a period of 5 years as part of a research project designed to study knowing and learning in the everyday world. I not only observed (e.g., videotaped, interviewed) the people working in the hatchery, but also apprenticed to their jobs, initially working at their elbow and later doing what they normally do when they were busy with something else (e.g.,

while being interviewed by a graduate student). I therefore developed not only intimate theoretical knowledge but also a keen practical sense of aqua culture and fish husbandry. In the course of my research, I was able to document the intricate understanding that one fish culturist (Erica) in particular continued to develop of fish, of fish husbandry, and of various mathematical forms that turned out useful in modeling the coho salmon population in her care. It turns out that the mathematical representations that are part of her model allow her to have a better sense of certain aspects of fish and the development of the fish population; and her practical sense, understanding, and daily interactions with the fish not only provide the conditions for developing a practical sense of the mathematical representations but also allow her to develop a mathematical understanding that she articulates when asked about what she is doing and why. In the following, I provide some descriptions of Erica's knowing and learning *in* praxis, which always already is knowing and learning *for* praxis, to better raise healthy fish – in contradistinction to knowing and learning in and for itself characteristic of schools.

On one of my first days in the fish hatchery, Erica invites me to her office to show me how she is keeping data on the coho population presently in her care. This care, as apparent in the conceptual and categorical analyses of knowing in everyday mundane life pointed to above, frames a referential totality within which Erica operates.[4] She raises the coho population so that the smolts can be released into the river 18 months after fertilisation to begin their ocean migration at the end of which they return, in 2 to 4 years' time; these return to the same hatchery where Erica has released them.[5] In her office, Erica shows me a graph in which she displays the average weight of the coho fish, which she tracks since the small fry have been transferred from a fish tank into the three earthen ponds at about 6 months of age (Figure 2.1, left). In fact, Erica does not only record and plot on the computer monitor the average weight in *each* of her three ponds, but she also plots two additional curves. The first is based on a set of data recorded some 20 years earlier by a fish scientist; and it presently stands out because it is far away from the four other lines visible (Figure 2.1, left). The second graph other than the actual data is based on her own predictions, an 'ideal' derived from her experience, of how the population should evolve. Erica can change the evolution of the coho population by increasing or decreasing the amount of feed that she or one of her helpers feeds – but this is not as simple as it sounds (see below).

When Erica begins to talk about the visible display on the computer, which she has generated from a database that I come to know well in the course of spending 5 years with her, it becomes apparent that she is intimately familiar with the data,

[4] Such care involves emotion (Heidegger, 1927/1977), the role of which I do not have the space to show here, but which interested readers may find elsewhere (Roth, 2007).

[5] Coho are one of five species of Pacific salmon, which are fishes that are born in fresh water but after some time migrate to the oceans where they develop from finger size into five to twenty pound adults (depending on species). The young fish (called fry) turn into smolts after having undergone the physiological changes that ready them for life in the ocean.

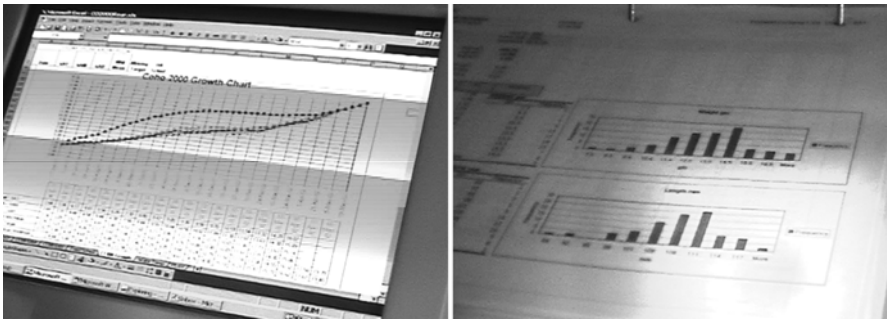


**Fig. 2.1** Left. Erica uses a computer-generated graph to track the evolution of the average weight of coho fish. Right. Erica knows that the graph depicts only the mean value and that the weights (as lengths) of the fish are distributed as depicted in the histogram she produces.

their transformations, and the fish that are modeled by data and representations. I am initially surprised how someone with a high school education who has dropped out of a junior college in her 2nd year could have developed such a tremendous practical sense for mathematics and statistics that Erica exhibits during our conversation. For example, she tells me that the increases in weight, indicated by 'how steep the lines are,' are much larger during the spring and summer than during the winter when the fish feed less and where she feeds less to keep the fish on the anticipated ideal trajectory. She has a practical understanding of how feeding patterns depend on the water temperature and how it changes along the life cycle of the fish, which is influenced by the length of the day ('photo period'). She also explains to me why she does not follow the scientist's growth path: In that curve, there is a nearly flat section (Figure 2.1, left), which she explains as a period of no growth. She suggests that she does not follow this curve because she has to starve the fish to keep it where the graph suggests. From her experience, the fish are healthier at the end of their stay in the hatchery if they can continue to grow even during the winter months, so she chooses a slower growth trajectory.

Erica does not just understand the graph as representing average weight. She talks to me about the weight and length distributions of the fish. Each point on her line graph, she says, is in fact the center of a distribution. Upon request, she rapidly generates the length and weight distributions corresponding to one of the data points and displays it on the monitor (Figure 2.1, right). Erica not only talks to me about the simple histograms nearly following a normal distribution but also about those distributions that exhibit two modes. For example, upon my question concerning the two modes, she suggests that there appears to be a part of the population that is short and fat and another part that is long and skinny. Her answer thereby is not only about the curves but also about the fish. This intimate coexpressed understanding of mathematics and fish population also becomes apparent in other contexts. For example, Erica relates the bimodal distribution to an index that fisheries scientists and fish culturists know under the names of *Fulton index* and *condition coefficient*. This coefficient, which she displays upon

request for each fish, is calculated as the ratio of fish weight and the cube of fish length multiplied by 100,000 (implemented in her spreadsheet as $K = [100 \cdot w/l \cdot l \cdot l] \cdot 1000$). Erica tells me that the fish in the lower mode of the weight histogram tend to have coefficients lower than 1, whereas those in the upper mode tend to have coefficients greater than 1. Again, although $K = 1$ is the ideal coefficient according to scientists, she, as her coworkers in this model hatchery, prefers higher coefficients because the populations tend to be more resilient to 'repeated stress,' to which the population is subjected, based on her experience, during bird attacks or during sampling episodes. That is, throughout her answers to my questions, Erica exhibits intimate familiarity about the relationship between the distributions and the actual fish.

Where might Erica have developed such an intricate understanding? In the course of my stay, I repeatedly work with her in the 'wet lab.' After catching a considerable number of fish with a dip net and placing them into a 5-gallons bucket, which we carry to the lab, we enter some carbon dioxide into the water to anaesthetise the fish. Once they have calmed down, Erica takes one fish at a time, places it on a special ruler that she keeps in her left hand, measuring its overall length, and then inspects the fish closely for overall condition, abrasions of the eye, or signs of infection on the skin (Figure 2.2, left). She then places the fish in a plastic bowl filled with water sitting on an electronic scale that she has tared immediately following the weight measurement of the previous fish. When she works alone, Erica herself enters length and weight measurement into the computer and adds any comments about general health for each fish; when she has a helper (e.g., me), this person enters the data on the computer.

Every now and then Erica, peaked by her interest where the coho population finds itself in terms of its development, stops sampling to plot the distributions and to check the average weight and condition coefficients. In this way, she experiences the changing of these representations in the course of collecting the data, following the evolution especially when there are individual fish that sometimes stand out. She often mutters to herself 'darn' or 'damn,' which I find out to be associated with particularly small (weight or length) specimen; at other times, I can hear a squeal of joy or an extra loud 'YEA' following a particularly large fish. She has a practical sense, built in and from experience, that early on in the sampling episode extremes tend to affect the average weights and lengths more than later; and she exhibits a practical sense for the influence of extreme specimen on the shape of the distribution. That is, in response to the rhetorical question framed above, Erica's practical sense and practical understanding of the relation between real fish and their representations in the database (i.e., histograms and condition coefficients) develop in the course of her extended and extending praxis.

Other aspects of the fish culturists' intimate familiarity with mathematics and real fish astonished me during the earlier part of my research, but they too can be traced to actual practices. For example, Erica and her mentor Mike can take a fish in the hand and, briefly inspecting it, predict the condition coefficient. After actually making the measurements, we find out that both are generally correct within 1% of the actual value. How, I wonder, can Mike and Erica predict the

**Fig. 2.2** Left. Erica not only measures the length and weight in her sample (100 fish) but also inspects each specimen closely. Right. Every now and then, peaked by curiosity of where her population might be, Erica displays the weight distribution repeatedly while sampling.

coefficient given that it related weight to the cube of length? The work in the wet lab provides me with an answer. Each time the weight and length of the fish is entered, the spreadsheet calculates the condition coefficient according to her specification. This provides Erica with opportunities to see the coefficient immediately after having inspected the fish. That is, she develops the sense required for matching coefficients and a specimen's appearance during the experience of doing one sampling episode per month in each pond from the month of April of one year to the month of June of the following year. That is, she does at least 45 sampling episodes of 100 fish a year, by processes, conducting measurements, and inspecting 4,500 coho. Her intimate knowledgeability continually emerges in the course of an intensive praxis shaped by an utmost sense of care for the well being of each successive fish population.

Keeping the fish populations on their developmental trajectories is a complex endeavor that involves handling many variables and having a practical sense for how the coho fish develop in the changing and never entirely predictable conditions of a fish hatchery. Keeping the fish on the anticipated trajectory (Erica's 'ideal model') is not as easy as simply varying the amount of feed thrown to the fish each day. For example, the fish feeding patterns change with weather conditions and across seasons. Moreover, there is no direct relation between amount of feed thrown into a pond and amount of weight gained by the fish. This is why fish culturists calculate the feed conversion rate – that is, amount of weight gained divided by total weight of feed – a rate that also depends on the type of fish feed, its physical characteristics (e.g., composition, wet, dry, pellet size, krill on the outside or inside of the pellet). The feed is not always the same, depending on availability, pricing, or financial situation of the hatchery (sometimes fish culturists trade feed for some other item or service with other fish hatcheries). Conversion rates also depend on the skill of the feeder. Inexperienced feeders

cannot see the difference in feeding rates and, therefore, often throw food even though the fish no longer feed, allowing the food to sink to the bottom, spoil, and sometimes cause infections. Experienced feeders can see how well (much) the fish feed and, if these are doing less so than anticipated, competent fish culturists know how to coax the fish into feeding without wastage due to distributing too much food. There are, therefore, a large number of both explicit and implicit features of everyday life in a fish hatchery that influence fish growth rates, and knowledgeable fish culturists such as Erica and Mike are so good that they can keep the fish close to the anticipated ideal trajectory despite the complexity of the task. Here again, there is a close relation between their sense for and practical understanding of the mathematics representing the fish and the life of a fish hatchery more generally.

In summary, then, this case study provides us with a (ever so cursory) description of the intricate knowledgeability that relates the growth of fish populations in a fish hatchery and the mathematics used to model the population to its growth. My description exhibits that there are some forms of formal knowledge at work that someone might be able to learn in the abstract from a textbook, but that much of what it takes to successfully raise a brood of salmon requires a tremendous amount of practical sense and practical understanding that comes with experience. This experience is gained as fish culturists participate in the daily praxis of fish hatching. This participation is not some abstract form of behaviour but, rather, it is shaped by the referential totality organised around the care for the particular fish population(s) for which an individual fish culturist is responsible. Everything a fish culturist does, says, and thinks is shaped by the place of that action, speech, or thought in the totality of relations, including the *in-order-to*, *what-for*, *for-the-sake-of-which*, and *what-in* relations. And these relations are not taught and available in formal schooling. Thus, Erica uses the spreadsheet *in order to* keep data *for the sake of* raising a healthy brood *in* the fish hatchery and *for* the release. Very much as apparent in phenomenological analyses of everyday coping, the anticipated and future use of the product of work also is included in the referential relations. Erica is conscious of the role that her coho brood will have on the local economy, the commercial, sports, and aboriginal fisheries, tourist industry, employment rates, and so forth.

Erica has learned much of what she knows – what she can articulate as knowledge in a formal way – while participating in the daily praxis of fish hatching and without a formal education in the profession. She has not acquired fish culture knowledge in the abstract, but has learned while participating *in* praxis and, more importantly, she has learned *for* praxis, that is, *in order to* increase her control over conditions, *for the sake of* raising and producing healthy broods, to be released (*for*) into the rivers to increase populations. That is, not only is what she does shaped by these significance relations but so is what and how she learns. This learning pertains not only to the fish, its biology, and the particulars of fish breeding, but also to the different mathematical forms that she uses to model the fish (i.e., coefficient, weight and length distributions, average weights, and temporal changes therein). Much of the embodied, immanent knowing that it takes

to feed, to calculate the amount of feed to be thrown daily, weekly, or monthly to keep the fish population on its trajectory, is so dependent on the particulars of the situation – not all of which are due to the hatchery itself but also depend on the politics of funding and on other industries – that it cannot be learned in the abstract.

This hatchery is an 'indicator hatchery,' that is, it stands out from all the other hatcheries that the federal government operates in the province. It stands out in terms of the knowledgeability each individual members displays and in terms of its overall performance, its members' willingness and capability to work with scientists in a nearby federal research station. It stands out although, remarkably, all of its fish culturists, coming from some other occupation, have learned fish husbandry on the job. Nowadays, though, employment advertisements state requirements of formal training, which future fish culturists can undergo in a nearby college. The courses students pursue include aquatic plant ecology, invertebrate zoology, aquaculture, and fish husbandry. But they also include co-operative terms and, for some, summer employment opportunities. Yet, as I find out while some of the future fish culturists come for co-operative experiences into the hatchery, students tend to know very little about what to do in concrete everyday praxis. Although Mike, the most knowledgeable (he had received a federal award for his contributions to the generation of biological and fish husbandry knowledge although having but a high school diploma) fish culturist of all recognises that formal schooling is necessary nowadays, he also notes the gulf between the knowledgeability displayed by these co-op students, on the one hand, and that of unschooled fish culturists, even with only 10 years experience, who have learned the trade in and for praxis.

## 2.4 Coda

There are considerable differences between knowing how to do well in school concerning some discipline – how to study for and write a test – and knowing how to do well on the job in the discipline. In both locations, practitioners and learners frequently collude to make the best given the reigning conditions. Thus, the research of my team in upgrading programmes for seafarers shows that college instructors and students know that what they learn to pass the course has little or nothing to do with what the mariners need to be able to do when they get back onboard ships. The instructor – generally an experienced mariner – helps students in passing the tests and in getting their diploma; and the students cooperate by doing the best they can under these conditions knowing well that what they learn is of little relevance onboard ship. On the other side, our research shows how journeymen and master electricians tell apprentices that the way in which they are in the process of bending and placing some wiring is not how it is taught in the college courses concurrently taken by the apprentices. Rather, they do the job in a manner that best satisfies the contingencies of the moment, whether these are

contingencies arising from praxis or contingencies arising from the conditions of the (social, material) world.

Throughout this chapter, I articulate conceptual reasons for practical and theoretical knowledge to be different. It remains now with us, society in general, to draw the implications of this situation. An extreme position that one might take would be to ask for the abandonment of schools and for the *de-institutionalisation* of learning, situating it instead entirely in the praxis of what is to be learned. But this position has the disadvantage that merely participating in praxis may not come with knowing how to act in moments of breakdown.[6] An alternative approach, therefore, would be to pair learning *in* and *for* praxis with opportunities to learn *about* praxis that are grounded in the praxis itself. This is how the teacher education programme at the University of Pennsylvania had been organised for a number of years, as salient in the title of one of the studies we produced: *Teaching to Learn* (Tobin & Roth, 2006). Here, the students in the programme (co-) taught together with master teachers or peers during the day and came together after school (in school, at the university) to talk about issues arising from their day at work. While talking about work, the professors and supervisors accompanying the students during their year in the programme assisted in the development of practical theories of their teaching that would allow them to increasingly take control of the life conditions at work. Because of their inclusion in the worksite, the new teachers, as we called them, productively contributed to the education of school students all the while learning to teach.

As a result of the studies that I conducted in a variety of academic and non-academic workplaces, I have come to the conclusion that traditional theories of knowledge and knowing rooted in metaphysics – including radical and social constructivism – are ill suited to explain how people cope and learn in mundane everyday pursuits. Knowledge and knowing are not located in, nor do they originate from, the mind in terms of formal or informal concepts because *Dasein* (being-there), 'in its primary kind of being . . . is always already 'outside' together with some being encountered in the world already discovered . . . in perceiving, preserving, and retaining the cognising Dasein remains *outside as Dasein*' (Heidegger, 1927/1977, p. 62, original emphasis). Thus, the methods of producing patterned talk and actions are very much bodily and embodied, always drawing on resources embedded in social and material relations. Much as in other pursuits, the development of expertise as fish culturist – or electrician, empirical biologist, ship officer, or environmental activist – takes place *in* praxis and *for the sake (purpose) of* praxis *in order to* do better in the future.

Many educators hear about the theory–praxis abyss on a daily basis. Now is the time to do something about it. The framework presented in this chapter has turned out to be suitable for understanding what is happening and what is required for

[6] Lave & Wenger (1991) also note exploitation of apprentices that may occur because of their vulnerability during this stage of their careers and the impediment to learning that arises from it, for example, when apprentices are excluded from participating in certain parts of praxis that are deemed by residents as less annoying, keeping the tedious jobs to the apprentices.

learning in and for praxis to occur. The choice and responsibility of doing something that is of relevance to/for future practitioners lies with educators.

## References

Arendt, A. (1958). *The human condition*. Chicago: University of Chicago Press.

Bourdieu, P. (1980). *Le sens pratique* [The logic of practice]. Paris: Les Éditions de Minuit.

Bourdieu, P. (1990). *The logic of practice*. Cambridge, UK: Polity Press.

Garfinkel, H. (1996). Ethnomethodology's program. *Social Psychology Quarterly, 59*, 5-21.

Hegel, G. W. F. (1979). *Werke Band 3. Phänomenlogie des Geistes* [Works vol. 3. Phenomenology of spirit]. Frankfurt: Suhrkamp. (Original work published 1807)

Heidegger, M. (1977). *Sein und Zeit* [Being and time]. Tübingen: Max Niemeyer. (Original work published 1927)

Henry, M. (2003). *Philosophie et phénoménologie du corps* [Philosophy and phenomenology of the body]. (5th and revised ed.). Paris: Presses Universitaires de France. (Original work published 1965)

Kant, I. (1964). *Werke VI: Schriften zur Anthropologie, Geschichtsphilosophie, Politik, und Pädagogik* [Works 6: Writings on anthropology, philosophy of history, politics, and pedagogy]. Wiesbaden: Insel Verlag.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

Lee, Y. J., & Roth, W.-M. (2005). The (unlikely) trajectory of learning in a salmon hatchery. *Journal of Workplace Learning, 17*, 243-254.

Marx, K., & Engels, F. (1968). *Werke Band 3: Die deutsche Ideologie* [Works vol. 3: The German ideology]. Berlin: Dietz. (Original work published 1846)

Merleau-Ponty, M. (1945). *Phénoménologie de la perception* [Phenomenology of perception]. Paris: Gallimard.

Nancy, J.-L. (2008). *The discourse of the syncope*. Stanford, CA: Stanford University Press.

Roth, W.-M. (2007). Emotion at work: A contribution to third-generation cultural historical activity theory. *Mind, Culture and Activity, 14*, 40-63.

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.

Schutz, A. (1996). *Collected papers vol. 4*. Dordrecht, The Netherlands: Kluwer Academic Publishers.

Tobin, K., & Roth, W.-M. (2006). *Teaching to learn: A view from the field*. Rotterdam: Sense Publishers.

Turnbull, D. (1993). The ad hoc collective work of building Gothic cathedrals with templates, string, and geometry. *Science, Technology, & Human Values, 18*, 315-340.

# Chapter 3
# Knowledge, Working Practices, and Learning

**Michael Eraut**

University of Sussex, United Kingdom

**Abstract** I define personal knowledge as 'what individual persons bring to situations that enables them to think, interact and perform.' It can be observed only through a series of holistic performances, each involving several kinds of knowledge. Lifelong learning can be tracked through entries on learning trajectories. Professional practices grow through increasing recognition of situations, development of routines, reflection and discussion of new or complex problems. Most learning events are embedded in normal work, so access to learning depends on the nature of the work environment and the behaviour of those involved. The key factors affecting informal learning are appropriate levels of challenge and support, confidence and commitment, and personal agency. These factors, in turn, are influenced by the allocation, structuring, and perceived value of the work. Managers should be appraised on their crucial role in developing learning.

## 3.1 My Perspective on Knowledge

The debate between individual knowledge and sociocultural knowledge has become somewhat sterile. My own position on this issue is analogous to the long-recognised distinction between the particle and wave theories of light. An individual perspective on knowledge and learning enables us to explore both differences in what and how people learn and differences in how they interpret what they learn. A social perspective draws attention to the social construction of knowledge, the contexts for learning, and the wide range of cultural practices and products that provide support for learning. I intend to sustain this tension between individual and social perspectives throughout this chapter.

In universities knowledge is primarily associated with publication in books and journals, and subject to quality control by editors, peer review, and debate. This *codified knowledge* is then given further status by incorporation into educational programmes, examinations, and qualifications. The model of knowledge creation is that of a discipline-based community knowledge base, to which individual authors and groups of co-authors add new contributions, an interesting combination of social and individual perspectives. Each publication of status has editors and referees controlling *acceptance*, using criteria that include recognition of previous work, originality, and credible evidence and argument. Journals of a

S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2_3, 

more scientific nature use the criteria of *truth* and *originality* according to the norms of the community from which the publication draws its readership.

*Cultural knowledge* that has not been subjected to academic publication plays a key role in most work-based practices and activities. There is much debate about the extent to which such knowledge can be made explicit or represented in any textual form; and the evidence gathered so far suggests that its amenability to codification has been greatly exaggerated (Eraut, 2000). What does appear to be generally acknowledged is that much *uncodified cultural knowledge* is acquired informally through *participation in working practices*; and much is often so 'taken for granted' that people are unaware of its influence on their behaviour. This phenomenon is much broader in scope than the implicit learning normally associated with the concept of *socialisation* because, in addition to the cultural practices and discourses of different occupations, one has to consider the cultural knowledge that permeates the beliefs and behaviours of colleagues, suppliers, and clients.

Whereas codified cultural knowledge is discussed in terms of its truth and validity, uncodified knowledge is discussed in terms of its ownership, location, and history: Who uses this knowledge, where and when? Both types of knowledge may be investigated for their range of meanings, and this is where the interaction of social and individual perspectives is particularly enlightening. The concept of *situated learning* postulates that the personal meaning of a concept, principle, or value is significantly influenced by the situations in which it was encountered. My argument is that the meanings of these concepts expand whenever they are used in new situations. Hence personal interpretations of a concept or theory are shaped by the range of contexts in which they have been used or encountered. In these days of rapid mobility, the combined experience of such contexts is likely to be unique for each individual practitioner; and this will probably lead to those pursuing different career pathways acquiring slightly or even widely different meanings for the concepts they take for granted. Even codified knowledge is personalised to some extent.

These considerations led me to choose the term *personal knowledge* to describe the individual-centred counterpart to cultural knowledge, which I define as 'what individual persons bring to situations that enables them to think, interact and perform' (Eraut, 1997, 1998). This allows us to investigate the use of personal knowledge without necessarily having to represent that knowledge in codified form. Thus the defining feature of personal knowledge becomes not its truth but its use. This includes not just *personalised codified knowledge*, but other contributions to thinking, interacting, and performing such as:

- Know-how in the form of skills and practices
- Personal understandings of people and situations
- Accumulated memories of cases and episodic events
- Self-knowledge, agency, attitudes, values, emotions, and reflection
- Other aspects of personal expertise, practical wisdom, and tacit knowledge

All these aspects of personal knowledge are discussed in later sections of this chapter, but some explanations are needed at this stage. There is good evidence for *implicit learning*, in which people learn things they have seen and/or heard without being aware that they were learning; and often people become familiar with an object, an activity, or another person through a series of episodes or meetings without ever having set out with learning in mind. This is often the predominant way in which people develop their understandings of those they meet at work and in other social activities (Eraut, 2000).

The *tacit knowledge* gained in these ways then becomes a taken-for-granted feature of a person's world. This familiar phenomenon can be explained by Tulving's (1972) theory of memory, which distinguishes between *episodic memory* for specific personally experienced events and *semantic memory* for generalised knowledge that transcends particular episodes and is primarily associated with public codified knowledge. The link between these two types of memory depends on the use of *reflection* to connect personally experienced episodes with codified semantic knowledge. Tacit knowledge acquired by an individual through implicit learning and based on episodic memory can be recognised by others only when they draw inferences from observation of the individual's performance; but semantic knowledge acquired through a combination of intentional learning and reflection on experience is already available to the individual in an explicit form. Further discussion of tacit knowledge and modes of reflection can be found in Eraut (2000, 2004b).

Professional work, the focus of our Early Career Learning at Work project (Eraut, 2007a, 2007c), normally encompasses several distinctive practices, all of which form an observable part of a person's or group's *capability*. However, the *personal knowledge* that an individual contributes to this capability can only be inferred from evidence gathered though observing an appropriate selection of performances for each of the individual's practices, shortly followed by post-performance interviews with the person concerned and significant others, such as colleagues and clients. This holistic approach led to our knowledge-elicitation interviews exploring both participants' understanding of their own developing expertise (Steadman et al., 2005) and the interaction between their *values, emotions,* and *attitudes,* and their ongoing work. We were particularly interested in experiences of *emotional labour* and the extent to which participants felt that their personal agency[7] or initiative was encouraged or discouraged in the settings where they worked.

We gave particular attention to the informal learning that our research was able to discern through gradually increasing participation in work, but were concerned by the wide range of assumptions attributed to the concept of *communities of practice*. Precisely what constitutes a *community* and what counts as a *practice*? Hospital nurses in England are both members of a nationally recognised professional community that gives them their professional status and employees of a local Hospital Trust. They may continue to access formal learning opportunities

[7] An excellent discussion of agency in a range of occupations can be found in Billett (2006).

provided by both these communities; but their informal learning is mainly situated in the ward where they work. Hospitals could be described as a community in an ecological sense (Eraut, 2002), because hospitals accommodate several different types of worker and several professions contribute to the work that takes place in every ward, albeit not always the same professions and not for the same length of time. However, the concept of a community of practice often refers to a much smaller group of nurses working in the same ward, but even at ward level some nurses are regularly engaged in more specialist areas, some will have been given more management responsibilities; and most will have acquired personal variations within common practices from those nurses who helped them learn. Some may have learned from other professionals working on their ward. Nurses will normally find other nurses from whom they can learn; but to what extent can their learning experiences be ascribed to communal practices rather than those of a few helpful individuals? The extent to which a community of practice is observable varies greatly from one ward to another. In our ECL project we found huge differences in learning between two wards in the same department of the same hospital, which nurses and significant others attributed to the leadership of the ward manager and her most senior staff.

The complexity of the work is also significant. Some wards may be excellent for the quality of basic care; but much weaker in their handling of patients with more complex conditions. For example, the role of *fine tuning* an intervention to the needs of individual clients can be much more complicated than basic care. Fessey's (2002a, 2002b) study of wound-work in a surgical ward found that the local experts were not the most senior because they were part-time workers with children. As a participant observer working in the ward, she soon became aware that this community of *higher practice* chose to share their expertise with some recently qualified nurses but not others. They chose only those nurses whom they thought would stay in nursing and become net contributors to learning in the ward. The community of wound-work practice was a key asset to the ward and retained its special expertise, but was not part of its formal leadership.

Another perspective on communities of practice comes from the research on groups and teams. Hackman's (1987) review chapter on the design of work teams concluded that interventions should try and manage a group so that task effectiveness group processes emerged naturally. Hence, the main conditions for supporting a group's knowledge and skills were the design of the group, the organisational context, and group synergy. Group synergy required minimising any *inappropriate weighting* of member contributions and *fostering collective learning*. Two key issues that rarely surface are members' beliefs about teamwork itself (Miller, Freeman, & Ross, 2001) and the need for shared *mental models*, especially in fast-response teams, where members have to anticipate their colleagues' actions (Cannon-Bowers, Salas, & Converse, 1993). The problem is that, although teams of this kind can occur spontaneously, increasingly rapid changes in jobs make them increasingly unusual.

## 3.2 Learning Trajectories

Most early career professionals arrive at work with different profiles, according to their formal teaching and the range of workplace knowledge and skills they developed on placements. However, the variable profiles of newly qualified professionals are unlikely to be well described, and their new employers may not be sufficiently informed to make good use of their strengths and improve their relevant weaknesses. These problems could be addressed by assessments both before and after qualification that tracked their development over time and continued to chart their performance during a career of lifelong learning.

During two successive research projects on mid-career and early career professional learning in the business, engineering and healthcare sectors, we developed a common typology across these very different professions for classifying what was being learned (Table 3.1). However, instead of treating our categories as 'competences' we called them lifelong *learning trajectories* (Eraut, 2004b). Not only did the concept of learning trajectories fit our project's data much more closely than a set of competences (Eraut et al., 2005, Eraut & Hirsh, 2007), but it assumed that there also would be discontinuities of learning so that at any one time:

- Explicit progress is being made on some trajectories that contribute to lifelong learning
- Implicit progress on some other trajectories can be inferred and later acknowledged
- Progress on yet other trajectories may be stalling or even regressing through lack of use, or because new practices have not yet been adopted.

A second advantage of using learning trajectories is that they can reduce the need to base qualification decisions on limited samples of performance under conditions of high anxiety. Mapping progress over time also measures the ability to learn from experience, probably a better predictor of future performance than a final assessment.

A third advantage is the opportunity to include the context of performance in the learning record. What is learned is affected by the context and conditions for learning, and acquired competence does not usually transfer across contexts without significant further learning (see Section 5). Hence it is important to include information about the context and conditions in the performance record in order to indicate the domain of a professional's current competence. The implication of this need for amplification of the record is that entries on these learning trajectories are best considered as windows on episodes of practice, in which the aspect of learning portrayed by each trajectory plays a significant part. Each entry both presents a single holistic performance and covers all the trajectories that contributed to that performance. The performer is responsible for creating the window, but will often get their entry witnessed by other people who can verify it.

**Table 3.1** A typology of learning trajectories

| | |
|---|---|
| Task Performance | Role Performance |
| Speed and fluency | Prioritisation |
| Complexity of tasks and problems | Range of responsibility |
| Range of skills required | Supporting other people's learning |
| Communication with a wide range of people | Leadership |
| | Accountability |
| Collaborative work | Supervisory role |
| Awareness and Understanding | Delegation |
| Other people: colleagues, customers, managers, etc. | Handling ethical issues |
| | Coping with unexpected problems |
| Contexts and situations | Crisis management |
| One's own organisation | Keeping up-to-date |
| Problems and risks | Academic Knowledge and Skills |
| Priorities and strategic issues | Use of evidence and argument |
| Value issues | Accessing formal knowledge |
| Personal Development | Research-based practice |
| Self evaluation | Theoretical thinking |
| Self management | Knowing what you might need to know |
| Handling emotions | Using knowledge resources |
| Building and sustaining relationships | Learning how to use relevant theory |
| Disposition to attend to other perspectives | (in a range of practical situations) |
| | ***Decision-making and problem-solving*** |
| Disposition to consult and work with others | |
| Disposition to learn and improve one's practice | When to seek expert help |
| | Dealing with complexity |
| Accessing relevant knowledge and expertise | Group decision-making |
| | Problem analysis |
| Ability to learn from experience | Formulating and evaluating options |
| | Managing the process within an appropriate timescale |
| ***Teamwork*** | |
| | Decision-making under pressure |
| Collaborative work | |
| Facilitating social relations | ***Judgement*** |
| Joint planning and problem solving | Quality of performance, output and outcomes |
| Ability to engage in and promote mutual learning | |
| | Priorities |
| | Value issues |
| | Levels of risk |

Where possible, this entry should include the following information about the performance:

- The setting in which it took place, and features of that setting that affected or might have affected the performance
- The conditions under which the performance took place, for example, degree of supervision, pressure of time, crowdedness, conflicting priorities, availability of resources
- The antecedents to the performance and the situation that gave rise to the performance
- The other categories of expertise involved
- Any differences from previously recorded episodes
- Indicators of expertise in the domain of the trajectory having been maintained, widened, or enhanced.

The holistic nature of any complex performance should never be neglected, because it is unusual for a performance to use knowledge from only one trajectory, and the seamless integration of personal knowledge from several trajectories may itself be an important learning challenge.

The implication of using entries based on complete episodes of practice is that:

- The data displayed in each entry represents a whole performance, involving not only the relevant trajectories but also the ways in which they interact
- Each trajectory contains a sequence of entries which show how its particular track has progressed over time
- It enables future learning to address both further development along trajectories and whether the right trajectories were chosen and combined in the most appropriate way.

Within this overall framework it is still possible, indeed desirable, for different types of representation to be used for different trajectories and at different career stages.

## 3.3 The Construction of Professional Practices in the Workplace

In order to open a discussion about the way that practices are constructed in the workplace, Eraut (2000) developed a generic model for professional practices comprising *four distinct but interacting elements*:

- *Assessing clients, workers, and situations* (sometimes briefly, sometimes involving a long process of investigation), and continuing to monitor them
- *Deciding what, if any, action to take*, both immediately and over a longer period (either individually or as a member of a team)
- *Pursuing an agreed course of action*, modifying, consulting, and reassessing as and when necessary

- *Meta-cognitive monitoring* by individuals and/or collective monitoring within groups of the people involved, whether agents or clients, and the general progress of the problem, project or situation.

Each element can take many different forms according to the context, the time available and the types of technical and personal expertise being deployed. Although analytically distinct, they are often more integrated than the simple sequence of assessment, decision, and action advocated in many textbooks. Klein, Orasanu, Calderwood, and Zsambok (1993) present strong evidence that:

- Experts frequently generate and evaluate a single option rather than analyse multiple options concurrently
- Experts are distinguished from novices mainly by their *situation assessment* abilities, not their general reasoning skills
- When naturalistic decision problems are ill-structured, decision makers choose an option that is good enough, though not necessarily the best
- Reasoning and acting are interleaved, rather than segregated (Weick, 1983)
- Instead of analysing all facets of a situation, making a decision, and then acting, it appears that in complex realistic situations people think a little, act a little, and then evaluate the outcomes and think and act some more (Connelly & Wagner, 1988).

The implications for decision-making practice are that (1) the relationship between knowledge and decision-making is rarely simple, (2) good decision-making is critically dependent on how the decision is framed by the decision-makers in the light of their *situational understanding*; therefore (3) the balance is tilted more towards the *personal knowledge of the decision-maker(s)* and less towards any codified knowledge that might be available. When time is scarce, searching the literature or consulting a knowledge management system is tried only if there is a high expectation of getting a valuable pay-off very quickly.

Table 3.2 focuses on how the time variable affects the *mode of cognition* and/or *mode of consultation* of those involved. The model divides the time-continuum into three columns, whose headings seek to describe the *mode of cognition* used by the performers. Hence their timescales may differ according to the way the performers work. For example, in one context *rapid/intuitive* might refer to a minute, while in another context it might include periods of up to 10 minutes or even half an hour. The critical feature is that performers often have limited time to deliberate or think in any depth.

The *instant/reflex* column describes routinised behaviour that, at most, is semiconscious. The *rapid/intuitive* column indicates greater awareness of what is going on, and is often characterised by rapid decision-making within a period of continuous, semiroutinised action. As workers become more experienced, they acquire a wider range of *precedents* and recognise them more quickly and more accurately. So when they recognise situations, they can respond to them with already learned procedures (Klein, 1989). Rejecting these precedents leads to deliberative problem-solving and hence to a more time-consuming approach; so

the time available affects the degree of mismatch that is tolerated. The *deliberative / analytic* column is characterised by explicit thinking by individuals or groups, and may be accompanied by consultation with others. It often involves the conscious use of different types of prior knowledge, and their application to new situations. These areas of knowledge may either be used in accustomed ways, with familiar adaptations, or combined in novel ways that require a significant period of problem solving.

**Table 3.2** Interactions between time, mode of cognition and type of process

| Type of Process | Mode of Cognition | | |
|---|---|---|---|
| | Instant/Reflex | Rapid/Intuitive | Deliberative/Analytic |
| Assessment of the situation | Pattern recognition | Rapid interpretation<br>Communication on the spot | Prolonged diagnosis<br>Review, discussion and analysis |
| Decision-making | Instant response | Recognition primed or intuitive | Deliberative analysis or discussion |
| Overt actions | Routinised actions | Routines punctuated by rapid decisions | Planned actions with periodic progress reviews |
| Metacognitive engagement | Situational awareness | Implicit monitoring<br>Short, reactive Reflections | Monitoring of thought and activity, reflective learning<br>Group evaluation |

The *relationship between time and cognition* is probably interactive: Shortage of time forces people to adopt a more intuitive approach, while the intuitive routines developed by experience enable people to do things more quickly. Crowded contexts also force people to focus their attention and process their incoming information more rapidly. Even when a group has some time for discussion, individual members may feel that their contributions have to be short, relevant, and rapid. Hence meta-processes are limited to implicit monitoring and short, reactive reflections. But as more time becomes available, the role of meta-processes becomes more complex, expanding beyond self-awareness and monitoring to include the framing of problems, thinking about the deliberative process itself and how it is being handled, searching for relevant knowledge, introducing value considerations, et cetera.

Even when there is no emergency, experienced people typically prefer to do many things quickly and smoothly if they are confident in their own proficiency. However, there are also situations where speed beyond what even proficient workers consider to be appropriate is forced by the pressure for productivity. Then quality falls, the level of risk is higher and job satisfaction plummets. Both the development of proficiency and learning to cope with pressures for rapid action

involve *routinisation* and further work; but, whereas routines associated with proficiency lead to improvement in both quality and productivity, coping routines increase productivity at the expense of quality. In either case, routinisation leads to knowledge becoming less explicit and less easily shared with others, that is, more tacit. Tacit knowledge of this kind is also likely to lose value over time because circumstances change, new practices develop, and people start to shortcut routines without being aware that they are reducing their effectiveness.

The greatest benefit of routinisation is that it reduces workers' *cognitive load*, and thus enables them to give more attention to monitoring the situation or communicating with clients and colleagues, hence becoming both more productive and more effective. We would not survive for long if we could not take for granted many aspects of what we see and do in every day activities: signing documents, walking down stairs, accessing emails, or reading. Not everyone, however, takes the opportunity to take a more evaluative perspective on their practice. In many situations it is difficult to sufficiently disentangle routines from the practice in which they are embedded; and this makes it difficult, if not impossible, to either describe them or evaluate them. Indeed, the main purpose of routines is based on not having to think about them. The exception to this is when routines do not derive from increased proficiency but from *coping mechanisms* developed for handling work overload with little regard for quality.

The corresponding disadvantage of routinisation is *inflexibility*. Routines are very difficult to change, not only because this would imply a negative evaluation of the previous practice but also because such change involves a period of *disorientation* while old routines are gradually unlearned and new routines are gradually developed. During this period practitioners feel like novices without having the excuses or discounts on performance normally accorded to novices. The pain of change lies in the loss of control over one's own practice, when one's tacit knowledge ceases to provide the necessary support and the resultant emotional turmoil is reducing one's motivation. Hence, the need for time and support, when practices must change and new routines have to be established, is an order of magnitude greater than that normally provided (Eraut, 2004c).

## 3.4 How do People Learn at Work?

Our study of Early Career Learning (ECL) for the ESRC Teaching and Learning Research Programme (TLRP) was better funded than its predecessors, so we were able to conduct a longitudinal study of learning during the first 3 postgraduate years of three professions: prospective chartered accountants, qualified engineers, and nurses. This enabled us to include observations of our participants at work, which made it much easier for us to ask them about what they were doing using a discourse of description, and to move from what we saw to what we might have seen on other occasions. Next we asked about how they had progressed between our meetings, that is, what and how they had learned. We discovered that even in

accountancy, where there were several weeks of formal training each year, the large majority of learning events (at least 80%) were informal and integrated into their work. Thus most learning was not a separate activity but a by-product of their ongoing work; and most of these events involved working with other people. This both supports the theory of communities of practice and enabled us to develop Table 3.3, a typology of the learning modes of early career professionals.

The most useful starting points are *Working alongside others* and *Working with clients*, because they allow early career workers to observe and listen to other people at work and to participate in their activities, thus learning about new practices and new perspectives and becoming aware of different kinds of knowledge and expertise. This mode of learning, which includes a lot of observation as well as discussion, is extremely important for learning tacit knowledge or the knowledge that underpins routines and intuitive decisions and is difficult to explain. When people see what is being said and done, explanations can be much shorter because the fine detail of incidents, such as the tone of voice or visual features, contributes to their understanding. The interpersonal nature of what is seen and said provides evidence for the importance of the five non-codified types of personal knowledge (see section 3.1) that characterise workplace communications. A much fuller description of this typology can be found in Eraut (2007c).

**Table 3.3** A typology of early career learning

| Work processes with learning as a by-product | Learning activities located within work or learning processes | Learning processes at or near the workplace |
|---|---|---|
| Participation in group processes | Asking questions | Being supervised |
| Working alongside others | Getting information | Being coached |
| Consultation | Locating resource people | Being mentored |
| Tackling challenging tasks and roles | Listening and observing | Shadowing |
| Problem solving | Reflecting | Visiting other sites |
| Trying things out | Learning from mistakes | Conferences |
| Consolidating, extending and refining skills | Giving and receiving feedback | Short courses |
| Working with clients | Use of mediating artefacts | Working for a qualification |
| | | Independent study |

I also wish to discuss some of the learning activities. Six can be described as forms of personal agency, but the last two are both different and important. *Giving and receiving feedback* are both important, often vital, for most learning processes. We found four main settings for feedback:

**Immediate comment** on aspects of a task or role given **on-the-spot** or soon after the event by a co-participant or witness.

**Informal conversations away from the job** often convey indirect and/or unintended messages as well as intended advice; and second-hand feedback often misinterprets what was said.

**Formal roles such as mentor or supervisor** involve some responsibility for a learner's short- to medium-term progress and an obligation to provide formative feedback on a regular basis; but this may not happen in practice.

**Appraisal** is a process where designated appraisers are expected to give, but rarely succeed in giving, normative feedback on personal strengths and weaknesses; as well as discussing views on learning opportunities and meeting expectations.

Most people at work get too little feedback; so being proactive can be very important. Although most learners need short-term, task-specific, feedback as well as longer-term, more strategic, feedback on general progress, the two are not necessarily found together. Good short-term feedback on performance was often accompanied by an almost total absence of strategic feedback, giving even the most confident workers an unnecessary sense of uncertainty and lowering their commitment to their current employers (Eraut, 2007b).

*Mediating artefacts* play a very important role in structuring work and sharing information by mediating group learning about clients or projects in progress. Some artefacts in daily use carry information in a standard way that novices soon learn to understand. In both nursing and engineering, these include measurements, diagrams, and photographs. For example, patient records cover temperature, fluid intake and output, drugs administration, biochemical data, and various types of image. These refer both to the immediate past and to plans for the immediate future, and salient features considered important are prioritised for the incoming shift at every handover. Understanding the thinking behind the handover rituals is essential learning for newly qualified nurses.

A mechanical engineer was observed discussing virtual design 'drawings' on the screen over the telephone with colleagues, contractors, and clients on an almost daily basis; and she also sent digital photographs and measurements to initiate a discussion about a sagging bar. A water mains planning engineer and her colleagues all used her 'meterage' progress reports to decide whether to clean out a mains pipe, reline it with plastic piping, or replace it, all with different associated costs and time implications.

Trainee accountants learned how to interpret audit files and the 'tests' they were given for sampling their clients' data. They learned to give some priority to significant changes in accounts over time; and they needed considerable tact to find out how their clients' business processes were represented in their accounts when their clients' accountants regarded them as self-evident.

Then at a higher level of complexity, engineers used design specifications and software packages; and nurses used the MEWS protocol for deciding when a patient needed urgent attention and patient pathway protocols for patients with particular conditions. Accountants used software packages for organising their auditing processes. The really expensive ones were used as a guide for the auditors through their tasks, as a framework for assigning subtasks, as a repository of

accumulated judgements, as an archive of explanatory material, and as a record for the following year. The distinctiveness of these higher-level artefacts was their incorporation of a considerable amount of professional knowledge.

Finally, I should add that textbooks, technical manuals and sets of data can also be seen as mediating artefacts; and that it is usually best not to consider any artefact as containing all the knowledge you need. Much of the practical knowledge does not reside in the artefact itself, but in the conversations that take place around the artefact. However, these conversations would be very difficult to develop without the artefact, which therefore plays a very important role in sharing knowledge.

## 3.5 Transfer of Knowledge Between Contexts

The transfer of knowledge between education and workplace contexts is a well-recognised problem, which can be attributed to two problems: the narrow conception of practical knowledge used in most formal education, and the lack of any ownership of the transfer process itself. There is evidence from much professional training that the dominant discourses used in higher education and in professional workplaces rarely overlap (Eraut, Alderton, Boylan, & Wraight, 1995; Eraut, 1994); and that when 'teachers' in initial training do manage to interact with each other, the separate activity systems involved severely limit what 'good teachers' may achieve (Edwards & Mutton, 2007). This same problem occurs in Continuing Professional Education, which is only rarely followed up in the workplace(s) concerned. Eraut (2004a) opens up this hidden territory by deconstructing the transfer process into five interrelated stages:

1. The extraction of potentially relevant knowledge from the context(s) of its acquisition and previous use;
2. Understanding the new situation, a process that often depends on informal social learning;
3. Recognising what knowledge and skills are relevant;
4. Transforming them to fit the new situation;
5. Integrating them with other knowledge and skills in order to think / act / communicate in the new situation.

Not one of these stages is simple and, although they are presented here in a logical order, there is usually considerable interaction between them.

Salomon and Perkins (1998) made a distinction between forward-reaching and backward-reaching kinds of transfer. The *forward-reaching approach*, which anticipates that certain kinds of knowledge will be useful in the future, is most likely to occur in education and training contexts. Nearly all the taught components of professional and vocational education are intended for future use at work; but the evidence that this knowledge is used as intended is often disappointing. *Backward-reaching transfer* is required when one faces a new

situation and deliberately searches for relevant knowledge already acquired. This is very likely to occur with knowledge previously used in fairly similar contexts, when its relevance is quickly recognised; but committing time to searching for previously taught knowledge is rare without a promising starting point. The discourse and culture of the workplace are both so different from most education environments that persistent searching for what is perceived as *past knowledge* is very unusual. A major reason for this lack of commitment to exploring knowledge from one's past is a general failure to understand that transfer is a learning process, which often requires a lot more time than most people expect.

When transfer is from initial qualification programmes in higher education or further education, the learning problem is exacerbated by the difference between the forward transfer discourse of higher education and the backward transfer approach expected in the workplace. Formal education tends to assume that simple recognition of what it teaches is all that is needed; so it attends mainly to stage 1, the extraction of potentially relevant knowledge, even though perhaps half of its students fail to transfer knowledge from one HE course to another. HE may give some attention to stage 3, recognising relevant knowledge and skills, if students are asking for it, but not in any systematic way. Employers may give some attention to stage 3; but are liable to take understanding the new situation (stage 2) for granted, when they argue that knowledge from higher education should be 'ready to use' before graduates have even entered the workplace. Thus both cultures not only ignore the very considerable challenges of transforming and integrating knowledge and skills (stages 4 and 5) but deny their very existence!

The problem that remains is that of how best to help those who have learned knowledge appropriate for their field of work to use that knowledge in a range of potentially relevant situations. Before they start they need first to establish which areas of knowledge are relevant to a particular case or situation, second to focus more precisely on what knowledge is needed for a particular investigation, decision, or action, then finally to ascertain how that knowledge is interpreted in a manner appropriate to each particular situation and context.

Establishing which areas of knowledge are relevant is not as simple as it seems; because there is a marked contrast between the very large number of knowledge areas deemed relevant by those who teach them and the very limited number of knowledge areas that can be taken into account at any one time. The workers concerned have to assess the priority to be accorded to each particular area of knowledge in each particular situation; but in practice patterns of attention will soon be developed and only some knowledge areas will even be considered. The greatest difficulty at this stage is for experienced workers to recognise knowledge that is embedded in their practice but no longer explicitly discussed. Recognising what knowledge one needs in any particular situation is mainly learned through participation in practice and getting feedback on one's actions; and many aspects of one's knowledge repertoire remain dormant until triggered by a very specific aspect of the situation.

Occupational qualifications are no longer considered as unquestionably valid for a lifetime, nor are they regarded as preparation for only 1 or 2 years of work.

The knowledge resources that qualifiers take with them into the workplace have to last longer than that; so they must relate to a reasonable range of jobs, roles and workplaces. However, most of these knowledge resources will not become useful until they have been further transferred and resituated in one or more working contexts. Hence knowledge perceived as irrelevant in the workplace may not necessarily be irrelevant; those who still possess it may not yet have learned how to use it in a new context. With these considerations in mind, the selection of content and modes of learning for programmes intended to provide knowledge resources for a particular occupation should be conducted with great care, and the reasons for the selection should be public and subject to review.

Learning in education or training settings cannot be substituted for learning in workplace settings. Practice components of programmes have to be authentic. However, learning to practice and learning to use knowledge acquired in education settings do not happen automatically. The conclusions we can draw from the above discussion are that:

- Learning to use formal knowledge in practical situations is *a major learning challenge* in its own right – it is not a natural consequence of learning knowledge on its own, and trying to employ that knowledge in practice without critical questioning of its appropriateness and effectiveness will not meet the challenge.
- Such learning also requires both *time* and *support*. Learning programmes rarely allocate any time to this form of learning, but just assume (wrongly) that it will occur on its own.
- Not only has little thought been given to the kind of support needed for this kind of learning, but there is rarely any clarity about *who is responsible* for providing it (Eraut & Hirsh, 2007).

## 3.6 Factors Affecting Learning at Work

One prominent finding of our earlier research on mid-career learning was the overwhelming importance of *confidence*. Much learning at work occurs through doing things and being proactive in seeking learning opportunities; and this requires confidence. Moreover, we noted that confidence arose from successfully meeting *challenges* in one's work, while the confidence to take on such challenges depended on the extent to which learners felt *supported* in that endeavour by colleagues, either while doing the job or as back up when working independently. Thus there is a triangular relationship between challenge, support and confidence (Eraut, Alderton, Cole, & Senker, 2000). The contextual significance of the word 'confidence,' which was used by our respondents without further elaboration, depended on which aspects of this triangular relationship were most significant for particular people at particular points in their careers. The dominant meaning for most mid-career respondents usually came close to Bandura's (1995) concept of

*self-efficacy*, a context-specific concept, relating to ability to execute a particular task or successfully perform a role. For some mid-career respondents, however, confidence related more to *relationships* than to the work itself. Did they feel confident about the *support* and *trust* of their working colleagues, in more senior, more junior or parallel jobs? This depended on whether they perceived their more significant working relationships as mutually supportive, generally critical, faction-ridden or even overtly hostile. For early career professionals, this latter aspect of confidence was more prominent.

Figure 3.1 below shows how our early career (Eraut et al., 2005; Eraut &Hirsh, 2007; Eraut, 2007c) where observations over a 3-year period added greatly to our understanding of contexts, was able to expand this triangular relationship to include new features. We added *feedback* and *trust* to support, and the *value of the work* to the challenge, because both had a major influence on *motivation* and *commitment*. Feedback was especially important during the first few months of a new job, when it was often best provided by the person on the spot. This happened within the 'distributed apprenticeship' approach we found in accountancy, and in other organisations where local workplaces had developed a positive learning culture of mutual support. In the longer term, more normative feedback on progress and meeting organisational expectations also became important.

Equally important for developing confidence after the first few months was the *right level of challenge*. Newly qualified nurses were over-challenged physically, mentally and emotionally by their sudden *increase in responsibility* and the unceasing *pressure of work* in most ward environments. While some engineers progressed through a series of challenging assignments with remarkable rapidity, most of them were under-challenged and many of them were seriously under-challenged. The value of their work carried many nurses through their unnecessarily pressured start, and this was strengthened in some contexts by their *social inclusion* in supportive teams. We also noted the importance of *personal agency* in sustaining their motivation after their early period of settling into their new environment, and that this was not necessarily always aligned with their employer's priorities.

The role of *extrinsic motivation* is frequently discussed in the workplace, but intrinsic motivation is less well understood. Thomas's (2000) framework provides a useful basis for exploring it. Under *opportunities* he puts *sense of choice* over work activities and *sense of the meaningfulness* of their purpose; and under *accomplishment* he puts *sense of competence* in their work activities and a *sense of progress* in their purpose. This gives four kinds of intrinsic motivation, which were all prominent in the research reported above.

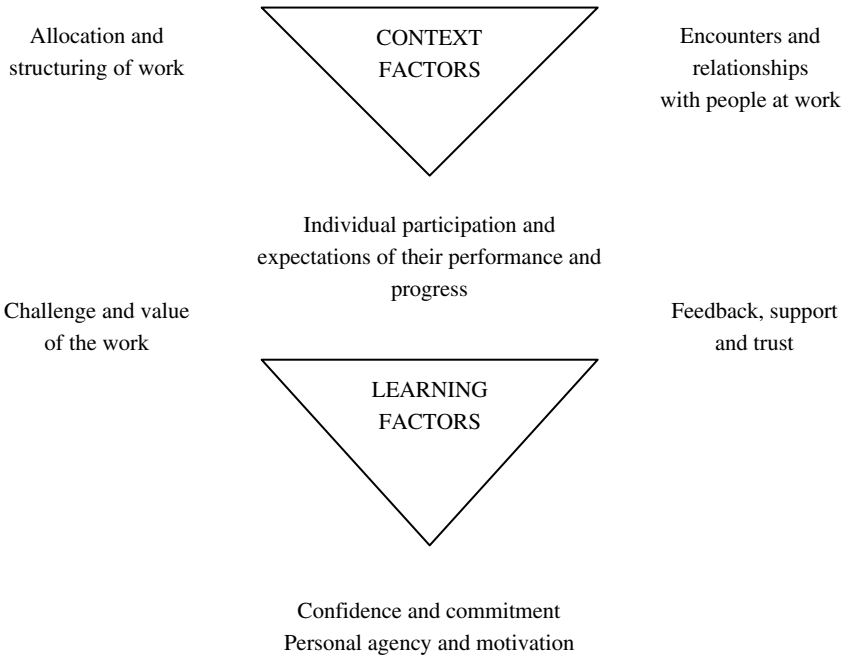


**Fig. 3.1** Factors affecting learning at work: The two triangle model

The inclusion of observation in this study enabled us to give more attention to the allocation and structuring of people's work, their relationships at work and their level of participation in workplace activities; and this led us to extend our model to include a second triangle. This mirrors the first triangle, but focuses on the contextual factors that influence its learning factors.

*The allocation and structuring of work* was central to our participants' progress, because it affected (1) the difficulty or challenge of the work, (2) the extent to which it was individual or collaborative, and (3) the opportunities for meeting, observing and working alongside people who had more expertise, and for forming *relationships* of *mutual trust* that might provide *feedback and support*. Our analysis of modes of learning in the workplace confirmed the importance of relationships by showing how many of the prominent modes of learning on the left side of Table 3.2 were dependent on good relationships with other people. These were not necessarily very close relationships but they required some mutual respect and a disposition to collaborate.

For novice professionals to make good progress a significant proportion of their work needed to be sufficiently new to challenge them without being so daunting as to reduce their confidence. Their workload needed to be at a level that allowed them to respond to new challenges reflectively, rather than develop coping

mechanisms that might later prove ineffective. In engineering the appropriateness of the allocated work differed hugely according to the company and the specialty. Very few graduate engineers in electronics or computer science had sufficiently challenging work and nobody appeared to take any responsibility for addressing this problem. The nurses, however, suffered from too much challenge during their first few months, when they had learned to prioritise and got used to handling drug rounds.

The accountancy organisations managed to provide appropriately challenging work for most of their new trainees for most of the time. This was achieved by (1) structuring the majority of the work into audit visits lasting from 2 days to a month, within which tasks of gradually increasing complexity were first observed and then assigned, and (2) the ongoing development of a strong community of practice that provided continuity across audit teams. Supporting learning was seen as a good investment, because it increased the capabilities of novice professionals very quickly, made them more useful and gave a good return for intensive early support. The cost of trainees' time was included in audit contracts, so they were expected to pay their way within a few months. This both added to their sense of inclusion and created clear expectations for their seniors to provide the necessary support. Other reasons why support was most readily available in accountancy were that:

1. Senior trainees were close at hand and often worked alongside the novice
2. Teams were quite small, sometimes very small, and their objective was a jointly constructed product - an audit report for a specific client
3. There were clear, usually non-negotiable, deadlines; and valuable time would be wasted if trainees got stuck and caused delays, however small their tasks
4. It was normally possible for more experienced trainees to pause or find a convenient stopping point in their own task to answer a question or advise on a problem
5. Their seniors knew from their own recent experience that such help would be needed; and providing it was a taken-for-granted part of the organisational culture.

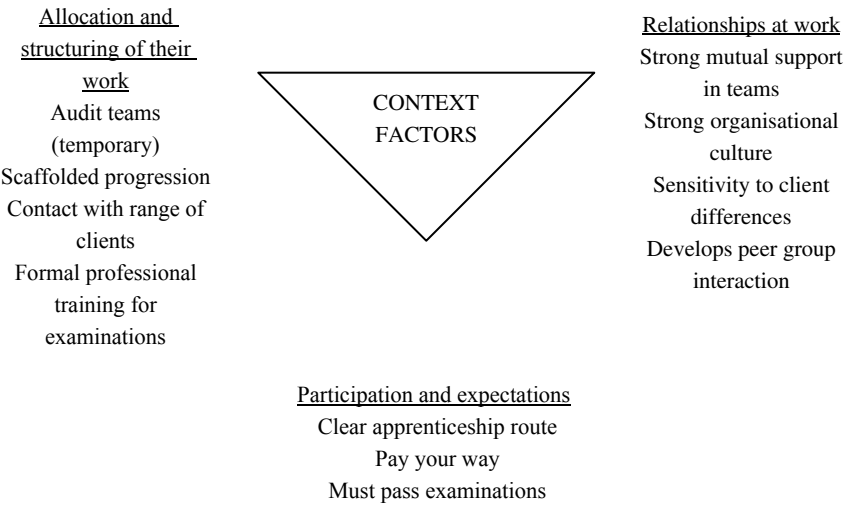


**Fig. 3.2** Context factors for the learning of 1st-year accountancy trainees

We found that decisions affecting the structuring and allocation of work could be determined by any combination of the following factors:

1. The nature of the work, the way in which the organisation handled it and the discretion given to local managers in decisions of this kind. In all three of our professions local managers had significant opportunities to facilitate learning through their allocation of work and support of novice workers.
2. The quantity and urgency of the work in hand at the time. This was a major issue in hospitals where work overload almost overwhelmed novice nurses, while at the same time reducing the amount of support they could get from more experienced colleagues; and was sometimes important in engineering, if a company was undergoing a fallow period that limited the supply of challenging assignments.
3. Periodic decisions made by managers in which learning needs might or might not have been considered. This was relevant when allocating novices to audit teams, nursing shifts or medium-term engineering tasks.
4. Decisions made by more experienced colleagues with delegated authority, who were currently working with the novice, and were probably best able to judge the appropriate level of challenge if they thought it was important.

Whether these decisions benefited the learning of the novice professional depended on the disposition, imagination, competence (in making these kinds of decisions) and available thinking time of those who made them.

## 3.7 The Role of the Manager in Supporting Learning

Managers and supervisors can play an important role in promoting and enhancing the learning of those whom they manage, both individually and collectively. However, knowledge of workplace learning is conspicuously absent from most workplaces, even though most of the required behaviours are within most workers' capability and common sense. The manager's role is not to do most of the learning support themselves, but to set the climate, encourage their staff to take on this role as an integral part of their working responsibility, and include the facilitation of learning in their management of performance.

To fulfil this role managers need to know that:

- Being over-challenged or under-challenged is bad for learning and morale. So providing an appropriate level of challenge is important for developing confidence and making good progress. Hence this needs to be given attention when allocating and structuring the work of individuals and groups. When this is not under the control of the managers concerned, they should discuss it with their immediate peers and draw it to the attention of their own managers.
- The quantity and quality of *informal learning* can be enhanced by increasing opportunities for workers to *consult* with and *work alongside* others in teams or temporary groups. Hence good opportunities are needed for meeting and working with others to develop mutual trust and cooperative relationships.
- They may need skills in conflict resolution and addressing bad relationships that threaten the group climate and/or achievement, and to consult others for a second opinion or mediation if they themselves are directly involved.
- Support and feedback are critically important for learning, retention and commitment. Feedback is most effective within the context of good working relationships, and the rapid feedback essential for short-term learning is best provided by people on the spot. Hence it is important for managers to develop a positive learning culture of mutual support both among individuals and within and across work groups.
- More traditional feedback on progress, strengths and weaknesses, and meeting organisational expectations, is also needed.
- Upsetting feedback, anxiety about one's status or performance, client behaviour, relationships or events outside the workplace can all influence the emotional dimension of a person's working life; and this may require ongoing attention for a period.

The role of line managers in supporting learning is quite complex. It includes identifying skill and learning needs at both individual and group level in relation to their understanding of what performance should resemble or achieve. It also embraces discussions with individuals about their own work and career aspirations and the extent to which the organisation can support these through learning opportunities inside or outside the organisation. Where the individual or team

needs learning support, it is up to the manager to think and consult about how this might best be provided.

Workplaces are complex interpersonal environments, where managers need to be well informed about relationships and personal or collective concerns without being unduly intrusive. They also need to delegate and to work through other people as well as by direct action. Otherwise, they will never have enough time to realise their good intentions and those they manage will have less opportunity for self development. It is increasingly recognised that frequent informal conversations with individuals and small groups create good settings for preparing people for coming issues, listening to their problems and concerns, seeking their advice, asking them to consult others about a problem and come back with suggestions, et cetera. In this context their personal interests need as much attention as the collective interest, if they are not to feel exploited. This means being supportive both when they have personal problems and in developing their future careers (Eraut & Hirsh, 2007).

## References


Bandura, A. (1995). *Self-efficacy in changing societies.* New York: Cambridge University Press.

Billett, S. (2006). *Work, change and workers.* Dordrecht: Springer.

Cannon-Bowers, J. A., Salas, E., & Converse, S. (1993). Shared mental models in expert team decision making. In N. J. Castellan (Ed.), *Individual and group decision making* (pp. 221-246). Hillsdale NJ: Lawrence Erlbaum.

Connelly, T., & Wagner, W. G. (1988). Decision cycles. In R. L. Cardy, S. M. Puffer, & M. M. Newman (Eds.), *Advances in information processing in organizations* (Vol. 3, pp. 183-205). Greenwich CT: JAI Press.

Edwards, A., & Mutton, T. (2007). Looking forward: Rethinking professional learning through partnership arrangements in Initial Teacher Education. *Oxford Review of Education, 33*(4), 503-519.

Eraut, M. (1994). *Developing professional knowledge and competence*. London: Falmer Press.

Eraut, M. (1997). Perspectives on defining 'The Learning Society'. *Journal of Education Policy*, *12*(6), 551-558.

Eraut, M. (1998). Concepts of competence. *Journal of Interprofessional Care*, *12*(2), 127-139.

Eraut, M. (2000). Non-formal learning and tacit knowledge in professional work. *British Journal of Educational Psychology, 70*, 113-136.

Eraut, M. (2002). *Conceptual analysis and research questions: Do the concepts of 'learning community' and 'community of practice' provide added value?* Paper presented at the American Educational Research Association Conference, New Orleans.

Eraut, M. (2004a). Transfer of knowledge between education and workplace settings. In H. Rainbird, A. Fuller, & H. Munro (Eds.), *Workplace learning in context* (pp. 201-221). London: Routledge.

Eraut, M. (2004b). Informal learning in the workplace. *Studies in Continuing Education, 26*(2), 247-273.

Eraut, M. (2004c). Learning to change and/or changing to learn. *Learning in Health and Social Care, 3*(3), 111-117.

Eraut , M. (2007a) Early career learning at work. In N. Entwistle & P.Tomlinson (Eds.), *Student learning and university teaching* (pp. 113-133). Leicester, The British Psychological Society Monograph Series II.

Eraut, M. (2007b). *Feedback and formative assessment in the workplace.* Paper presented at the Teaching and Learning Research Programme, seminar series on Assessment of Significant Learning Outcomes, London Institute of Education.

Eraut, M. (2007c). Learning from other people in the workplace. *Oxford Review of Education, 33*(4), 403-422.

Eraut, M., & Hirsh, W. (2007). *The significance of workplace learning for individuals, groups and organizations.* Oxford: SKOPE, Department of economics, University of Oxford.

Eraut, M., Alderton, J., Boylan, A., & Wraight, A. (1995). *Learning to use scientific knowledge in education and practice settings.* London: English National Board for Nursing, Midwifery and Health Visiting.

Eraut, M., Alderton, J., Cole, G., & Senker, P. (2000). Development of knowledge and skills at work. In F. Coffield (Ed.), *Differing visions of a learning society* (Vol. 1, pp. 231-161). Bristol: The Policy Press.

Eraut, M., Maillardet, F., Miller, C., Steadman, S., Ali, A., Blackman, C., et al. (2005). *An analytical tool for characterising and comparing professional workplace learning environments.* Paper presented at the British Educational Research Association Annual Conference, Pontypridd.

Fessey, C. A. (2002a). Capturing expertise in the development of practice: Methodology and approaches. *Learning in Health and Social Care*, *1*(1), 47-58.

Fessey, C. A. (2002b). The development of clinical nursing capability: An analysis of progression towards individual clinical and role skills in a surgical ward. *Learning in Health and Social Care*, *1*(3), 202-217.

Hackman, J. R. (1987). The design of work teams. In J. Lorsch (Ed.), *Handbook of organizational behavior* (pp. 315-342). Englewood Cliffs NJ: Prentice-Hall.

Klein, G. A. (1989). Recognition-primed decisions. In W. B. Rouse (Ed.), *Advances in man-machine systems research* (pp. 47-92). Greenwich CT: JAI Press.

Klein, G. A., Orasanu, J., Calderwood, R., & Zsambok, C. E. (Eds.). (1993). *Decision-making in action, models and methods.* Norwood, NJ: Ablex.

Miller, C., Freeman, M., & Ross, N. (2001). *Interprofessional practice in health and social care: Challenging the shared learning agenda.* London: Arnold.

Salomon, G., & Perkins, D. (1998). Individual and social acts of learning. *Review of Research in Education*, *23*, pp. 1-24.

Steadman, S., Eraut, M., Maillardet, F., Miller, C., Furner, J., Ali, A., et al. (2005). *Methodological challenges in studying workplace learning: Strengths and limitations of the adopted approach.* Paper presented at the British Educational Research Association Annual Conference, Pontypridd.

Thomas, K. W. (2000). *Intrinsic motivation at work: Building energy and commitment.* San Francisco: Berrett-Koehler.

Tulving, E. (1972). Episodic and semantic memory. In E. Tulving & W. Donaldson (Eds.), *Organisation of memory* (pp. 382-403). New York: Academic Press.

Weick, K.E. (1983). Managerial thought in the context of action. In C. Srivastva (Ed.), *The executive mind* (pp. 221-242). San Francisco: Jossey-Bass.

# Chapter 4
# The Practices of Learning through Occupations

**Stephen Billett**

Griffith University, Australia

**Abstract** This chapter draws on historical and conceptual accounts of learning to discuss and illuminate the nature and effectiveness of learning for occupations through practice. This discussion includes an analysis of the historical development of practice settings as places where occupational knowledge is generated, transformed, and sustained over time. It includes some consideration of how these kinds of settings were and are now valued as sites for the learning. Going beyond historical accounts, some of the changing conceptions about processes of learning and how place and culture can shape learning, along with the contributions of the learner, are then discussed. In all, it is proposed that the majority of human development and learning associated with the development of occupational capacities has arisen through practice-based experiences. Before the advent of mass education, practice settings were the inevitable place for the development of the majority of occupational knowledge. Indeed, it is a relatively new phenomenon for this development to occur outside of the settings in which it is practised. Importantly, the kinds of knowledge developed through learning-related activities in practice settings are more than those underpinning easy and repetitive tasks. Instead, they comprise complex, demanding, and often difficult-to-learn knowledge. However, to fully realise the contributions of these settings effective conceptual premises and adaptive curriculum, pedagogical, and epistemological procedures are required.

## 4.1 Learning for and through Practice

The exercise of skilful occupational capacities is central to quality human existence, and societal progress. The development of these capacities is well aligned to many changes across human history, including the skillfulness required to realise important economic and social provisions. These capacities provide for reliable sustenance and appropriate shelter, the manufacture of material goods and artefacts that provide for safe and comfortable existence and extend to healthcare provisions that secure and sustain good health and long lives. Consequently, the development and remaking of these capacities are of fundamental importance to the development, transformation, and continuity of humans, our societies, and our communities. So, considerations about how these capacities can be initially developed by novice practitioners and then developed further across their working

S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2_4, 

lives are important priorities for humankind. Yet, it is important within these considerations to view settings in which these occupational practices are enacted as sites for both initial and ongoing development. Indeed, if, in some way, it were possible to quantify the totality of the skilful occupational knowledge developed across human history and categorise these skills by their means of development, there would be one very clear conclusion. That is, the vast majority of those skills have been developed in and through the practice of the occupation, not through activities or institutions that are primarily concerned about skill development (e.g., schools, colleges, universities). Once considered, there is nothing remarkable about such a conclusion, could it be drawn. The existence of specialised educational provisions for developing occupational skills is relatively recent. Prior to the end of the 19th century, only very limited educational provisions for occupations were available and these were largely restricted to those preparing people to become doctors, clerics, and other elite professional through universities. It was only in response to mass social movements in the 19th century that the provision of vocational education emerge in many European countries (Gonon, 2005), for instance. So, when considered, it is noteworthy that the breadth, complexity, intricacy, and extent of the vast majority of the skilful knowledge that humanity has relied upon to get us this far, for good and bad, was and is still being developed through practice. The majority of the historical artefacts to which we look in awe across countries and continents, the ancient buildings and constructions at which we marvel, and the foundations for current occupational practices were all developed in and through practice. Hence, it is necessary to remind ourselves of the importance of learning through practice and practice settings, particularly in an era where provisions of education are taken for granted, and seen as the orthodox and legitimate means through which worthwhile and demanding learning occur. Ironically, it is largely the perceived or demonstrated shortcomings of the learning of occupational practices within educational institutions that is leading to a re-evaluation of the potential of practice settings as places to learn skilful occupational knowledge. Even now, because of the orthodoxies and preconceptions about what constitutes effective and legitimate learning environments for developing occupational knowledge, practice settings likely remain being seen primarily as merely sites to rehearse and refine what has been learnt in education institutions or to augment that learning, and not legitimate and worthwhile learning environments in their own right (Billett, 2009). However, in spite of these preconceptions the settings in which people practice their occupational skills and those practices themselves stand as being the principal sources of the learning and further development of those capacities that are essential for human existence and continuity.

Therefore, in considering issues associated with the qualities of practice settings as learning environments, it is necessary to firstly make a case for their legitimacy, because the orthodoxy is such that what is believed to constitutes an effective learning environment likely remains that offered by an educational institution, and conceptions of curriculum and pedagogy are also primarily

associated with those institutions as sites of learning. Hence, when advancing concepts such as a practice curriculum or practice pedagogies, it is necessary to not only identify those that are particularly suited to practice settings and particular occupational practices, but also to assert them as being worthwhile and valid even though they are enacted outside of educational institutions. It follows that, in this chapter, and in many of the contributions within this volume, precepts associated with learning occupational practice through educational institutions are put to one side. Instead, the focus here is upon concepts, practices, and traditions that arise from practices themselves and how that learning for and through occupations can best be understood and promoted. In focusing on these issues this chapter commences by discussing some historical precedents from Europe and China about learning through practice, and seeks to identify the kinds of curriculum and pedagogic practices that support this learning process. Following this discussion, the chapter identifies the premises that explain learning through practice settings and thereby renders these settings as legitimate and worthwhile sites for developing occupational knowledge. However, this discussion does not proceed without highlighting the limitations as well as the possibilities of learning through practice, particularly when considering the kinds of knowledge required for contemporary occupational practices. So, there is no attempt here to overly inflate and boost the case for learning through practice, because it is well understood that there are both strengths and limitations when learning through processes such as observation, imitation, and rehearsal (Billett, 2001). These limitations likely extend to the learning of knowledge that is symbolic and hard to observe and access. However, there is evidence that effective practice-based strategies have been used to develop these forms of knowledge (Lave, Murtaugh, & de la Roche, 1984; Rogoff & Gauvain, 1984; Scribner, 1984). It follows, therefore, that the chapter progresses with an intent to understand the norms and practices and traditions that explain learning through practice, but also with a consideration of the learning of kinds and forms of knowledge that need to be learnt for contemporary work.

## 4.2 Historical Conceptions of Learning through Practice and their Worth

There are accounts of learning through practice available from Mesopotamia and elsewhere (Finch & Crunkilton, 1992). But, perhaps one of the earliest, and most impressive, accounts of skill development through practice in terms of the extent and profoundness of that learning and knowledge can be found in ancient China. Here, the development of mass-produced items commenced far earlier than in Europe. The needs here were to sustain a massive population that was well organised, often concentrated in large cities with amenities such as running water and sewerage disposal, and with organised forms of government, sometimes

centrally across an Empire that was geographically expansive. All of these needs required considerable qualities of skilful practitioners. To make a comparison, consider that in 1086, the Doomsday book was prepared by the Normans as an audit of what they had secured through conquering Britain. This audit estimated the British population to be between 1.75 million and 2 million people. However, at this time, there were 100 million people living within the Chinese Empire and, for instance, in 1085, the Song government's mint was producing over 6 billion coins a year (Ebrey, 1996). The mint's production process used stone moulds into which molten metal was poured to form the coins. This coin production required high levels of organisation for the production and use of these moulds, the securing of metal ore and fuel to melt the metal, and a distribution system to transport coins across the Empire. Doubtless, also there was quality control and associated mechanisms to protect the currency of the coins. Yet, even long before this era in China there is evidence of the development of significant skilfulness and mass production of artefacts, the capacities for which would be learnt through practice. In the Shang dynasty (1600 BC), large and highly decorative copper vats were manufactured and required a range of skills, and also the bringing together of different sets of skills. In the Zhou dynasty (1050-250BC) stone moulds were used to make knives on mass. In the Quin dynasty (221-206 BC) quite intricate bronze trigger mechanisms for crossbows were mass manufactured. These triggers comprised three separate parts that had to be precisely cast in order to function effectively. Moreover, at this time coins, drainage pipes, arrow heads, tiles, et cetera were all mass produced. The Tang dynasty (618-906 AD) became renowned for its production of highly intricate porcelain items, many of which feature complex shapes and many layers of glazes. All these examples indicate that, more than the mass production of artefacts, there is also the development of artefacts requiring high levels of skill and also processes that require understandings and practices dependent upon significant knowledge and the coordination of a range of skills artisans. All of this skilful knowledge was learnt through practice.

Unfortunately, relatively little appears now to be known or can be found about the practices that were used to produce these artefacts or how these skills were developed and passed on to successive generations of artisans. There are some accounts from the production of the Terra Cotta Warriors in the Quin dynasty (221-206 BC) that hint at the organisation and development of skilful practices (Ebrey, 1996). These accounts indicate that there was a very high level of work organisation. The composition of the clay used to produce these warriors was highly consistent. Moreover, each warrior was unique in some way and great differences in these warriors are evident across the entire cohort. Yet, only eight different moulds were probably used to make these warriors, obviously with great skill and adaptability. There are also characters marked on the warriors that identified the workshop where the figure was made as part of a quality-control regime. It seems that in these workshops, these warriors were constructed by a team of artisans working together to mould and form each warrior in a production

line-like process. The process of production was controlled by foremen who were responsible for the quality of individual figures; the foremen were in turn controlled by supervisors. Foremen also marked their name and office or place of provenance on the warriors they produced, thereby making themselves accountable if the sculpture proved faulty in any way (Ebrey, 1996).

From these accounts, it is possible to conclude that in such a highly organised form of production there was considerable learning ordered through practice, which included the organisation of labour and the conduct of tasks, and that these activities were supervised by skilled workers who were directly accountable for the quality of their products. Further evidence is available later about these kinds of processes from witness accounts of the production of porcelain, which indicate that tasks were divided and subdivided and workers became very highly skilled in quite specific tasks and, through practice, came to hone and refine their craft skills. For instance, during the Ming dynasty (1368-1644AD), the Jingdezhen Kilns produced large amounts of high-quality porcelain for the imperial palace. In 1577, orders for 96,500 small pieces and 56,000 large ones and 21,600 items for sacrificial ceremonies were completed. This output indicates not only the ongoing capacity for mass production, but also that the artefacts had to be of very high quality, because the imperial palace only accepted goods of the highest quality. Some time later, in the early 18th century, a French missionary reported watching a cup pass through more than a dozen hands, one worker giving it an initial shaping on the wheel in a matter of seconds, another setting it on a base, another pressing it into a mould to make sure its size was uniform, another polishing it with a chisel, and so on. He reported that as many as 70 people could be involved in the production of a single item. At about this time, the division of labour employed in the decoration of a large set of dishes was described as follows:

> If the painted decoration on each piece is not exactly alike, the set will be spoiled. For this reason the man who sketched the line will learn sketching, but not painting; those who painted study only painting, no sketching; by this means the hands acquire skills in their own speciality and their minds not distracted. In order to secure a certain uniformity in their work, the sketches and painters, although kept distinct occupy the same house. (Ebrey 1996, p. 217)

Here, the processes of the development and enactment of skills through honing and refining of highly specific skills are evident. Likely, these skills were developed through processes of observation, imitation, and practice, as has been reported elsewhere in accounts from anthropology (Pelissier, 1991), and also contemporary accounts of how people learn through work activities (Billett, 2001). However, it is difficult for this assumption to be ratified, as there appear to be few accessible accounts of how artisans learnt their practices in these places. So, although there are drawing of the life and work of such artisans, there are no written accounts available to English speakers.

However, slightly more detailed accounts about learning through practice are available from ancient Greece. Here again, the societal organisation of work had much to do with occupational practice and its learning. Plato discusses these

matters extensively, in particular with reference to how opportunities for learning were to be distributed (Elias, 1995). Following Socrates, he distinguished amongst three classes: rulers, military, and artisans/artists. Importantly, the belief amongst the ruling elite was that people should stay for their entire life in the class into which they were born. Hence, the development of occupational capacities was assigned and constrained by individuals' birthright. Equally, it needs to be remembered that as well as a society premised upon the efforts of slaves, the lowly standing of women also constrained their options. For free-born Greeks, that is, the ruling class, leisure was seen as a key virtue and a worthwhile pursuit, and engaging in most forms of paid occupations was quite inappropriate for individuals in this class. There was a possibility of the ruling class being educated in the professions, if they had to be, and also for the military. However, for artisans and artists, including musicians, their occupational preparation was through apprenticeship, usually within their family. A family would have a specific occupation and those born into that family would be expected to engage in and support that occupation. Consequently, the occupational practices were learnt through association, imitation, and the rule of thumb: that is, experience. Certainly, there were no schools or technical institutes where individuals could learn artisans' skills (Lodge, 1947). As noted, craft and trades work was seen to be hereditary, and passed on from father to son. Indeed, Plato considered this to be the lowest form of preparation, but quite appropriate for those who worked with their hands, and, so he claimed, not with their minds (Elias, 1995, p. 166). It was suggested by Plato, using Aristotle's kinds of knowing, that the only form of knowledge required for such activities was techne or technical capacity. Hence, Plato would never have described this kind of learning activity as education. Consequently, the family into which individuals were born did much to shape their choice of occupation. Moreover, it shaped how this occupation was learnt through family activities. Lodge (1947) describes the process of learning an occupational practice in the family as follows:

> The son learned his trade by growing up in his father's family, in participating in family activities, imitating what he saw his father doing. At first, the imitation would be playful and childish, carried out with such toy tools as a child could handle. Later, it would become more deliberately purposive. Practice produced technical proficiency in details and a growing boy would act first as his father's 'helper', then as his associate, and would eventually himself become the head of a family, and the centre from which further training in the family craft would radiate. (1947, p. 17)

Lodge (1947) suggests that, in these family-based processes of learning, play was used as a pedagogic device. For instance, with building, the boys would build children's houses, learn to measure, and apply other techniques in play. This provision of support for learning might be extended to adopted sons and also members of other families whose boys were invited to participate. This process was not restricted to artisans' work, as the same process was extended to artists. Yet, like those growing up in families with a particular trade, those in families engaged in music and artistic occupations of different kinds would learn by

association, imitation, and practice. However, despite making distinctions between levels of occupations and the kinds of experiences and pedagogies that are appropriate for them, Plato in *Republic* referred explicitly to the importance of practice in the learning of medicine; one of the occupations that was held to be deserving of an educational provision. He stated that:

> The best physicians are those who have treated the greatest number of constitutions, good and bad. From you, they have combined it with that knowledge of the art, the greatest experience of disease. It is better for them not to be robust of health themselves but to have all manner of diseases in their own persons. For it is not with the body, but with the mind that they cure the body. And thus they infer the bodily diseases of others from the knowledge of what has taken place in their own bodies. (p. 42)

Plato appears to be proposing here that because of the kinds of knowledge required for artists' and artisans' work, a more sophisticated provision of preparation was not required. Arguably, this, and his assertion that such workers only required a knowledge Aristotle and he described as 'techne' - techniques to make have done much to generate a legacy that lasts until today that many occupations are held to have low skill requirements, and, therefore, can easily be learnt. Also, the idea that ways of knowing now referred to as 'rules of thumb' or heuristics are alone quite sufficient for this kind of work, added to this estimation. Even quite recent discussions about the building of cathedrals in mediaeval Europe proposed that much of the knowledge used was of this kind, rather than guided by scientifically proven principles (Turnbull, 1993). Yet, such claims are contestable. That is, the processes required to produce these artefacts, particularly consistently, referred to above in reference to ancient China, as well as those of ancient Greece and from thereon, were often highly demanding and required high levels of skill and understanding.

Moreover, advancement in understandings about practice most likely arose through experiences in practice, rather than scientific enquiry, which was likely to be the exception. That is, the knowledge for the occupation and higher-order knowledge to organise work, including strategic capacities, arose through and was shaped by these practices. Of course, there are limitations to the knowledge available within a domain of activity, such as building cathedrals, at a particular time (Gimpel, 1961). So, flying buttresses were a practice-based response to maintaining the structural integrity of buildings, which were becoming larger, and this construction had to be premised upon the engineering principles that were known to these practitioners at that time. Yet, this limitation is not restricted to those who worked as artists and artisans. Clearly, the knowledge about medicine, for instance, has grown and developed and, in each era, the work of physicians is shaped by the bounds of that knowledge at that time. Often, the bounds of this knowledge were shaped and extended by processes of practice within the given knowledge available to all kinds of practitioners, and this knowledge was a product of artisans building and reflecting upon their practice. Indeed, much of that knowledge was likely to be learnt through practice and benefited from the opportunity to test, apply, adapt, and evaluate that knowledge. The great European

cathedrals were built by generations of stonemasons who passed, from father to son, their knowledge not only of stone masonry techniques (Gimpel, 1961), but also of the principles and practices of making enormous buildings from stone and wood. These artisans worked on these projects, often across their entire working lives, and had recourse only to relatively simple drawings and diagrams to guide their life's work. Yet, rather than assume that their knowledge was ad hoc and piecemeal per se, it seems likely that they had rich understandings, within their domain knowledge, about their crafts. And, it was these understandings that permitted them to complete these massive projects in the absence of the kinds of knowledge that was highly codified in manuals, intricate drawings, and designs developed by experts, and would be seen as being indispensable by practitioners today.

In addition to learning through practice, individual artisans were required to engage in the ongoing process of remaking occupational knowledge through practice. In this way, societal change and development arose through practice and was not merely a process of reproduction. Instead, learning through practice also brought about significant change in techniques, strategies, and understandings that were then taken up across generations as cultural practices, yet also in ways that contributed to phylogenesis: the knowledge that arises through the species (Scribner, 1985).

Of course, it is tempting to dismiss the processes of learning described above as being something of the past, and not applicable for contemporary times. Indeed, Lave warns us of this possibility (Lave & Wenger, 1991). However, these kind of processes were those being exercised across many different forms of work practice as individuals engaged in either initial learning or continued to develop the occupational knowledge through their engagement with practice. The association between modern accounts and what occurred in earlier practice still suggests that to be effective in supporting learning in practice settings it is worthwhile considering these practices. Yet, clearly some things have changed. The requirement for more deliberate forms of supporting learning was also identified as being practiced in these accounts.

Indeed, anthropological studies provide more detailed accounts of how cultural practices, including occupations, are developed in communities and outside of intentional programmes of instruction within educational institutions. There is a rich heritage here of evidence and accounts of the ways in which participation in work processes (i.e., practice) is used to develop the kinds of knowledge and capacity that are required for effective practice. Many of these accounts relate to what was proposed earlier: associations, imitation, and learning arising from undertaking tasks. In particular, observation, listening, and participation feature within this literature, perhaps most famously within Lave's account of the learning of tailoring (Lave, 1990). Moreover, her earlier work on learning through everyday activities (Rogoff & Lave, 1984) provides rich examples of these processes of learning, as does Rogoff's (1990) later book on learning as apprenticeship, which reports on learning associated with a range of cultural

practices, including parenting, occurring through these kinds of means. Certainly, my findings on how people learn through their work activities are quite consistent across a range of occupational practices. In particular, workers referred to learning through engagement in tasks, and the contributions of the physical and social setting of the workplace that were engaged with through processes of observation, listening, and undertaking tasks (Billett, 2001). These accounts emphasise the contributions provided by social settings, but not always through explicit teaching. Instead, processes of observation, listening, and participation feature far more strongly. Indeed, all these processes emphasise an active role on the part of the learner, sometimes albeit apparently passively. So, they emphasise processes of learning rather than being taught. Yet, from the same literature, there are also considerations of being guided or even being taught by more expert partners, which arises in some of these accounts. That is, the practice setting provides a activities and interactions that can be observed, and, as such, serve as clues and queues, models and premises for earning through practice. These artefacts provide bases from which novices may proceed, goals against which to compare their performance, and benchmarks to which they might aspire. They also provide devices to assist the actual everyday practice through which novices might learn.

However, while much of the interaction between novices and experienced practitioners comprises indirect guidance, rather than teaching, there are also instances when direct teaching is practiced. For instance, Micronesian fishermen teach novices during the day in huts and using instructional artefacts about the star patterns by which they need to navigate at night (Pelissier, 1991). This form of instruction uses shells and sticks as instructional devices. It has been concluded that this knowledge is important to know and cannot be best learnt through processes of association and imitation. Therefore, more direct forms of instruction are required to generate these forms of knowledge. The important point here is that not all of learning through practice can proceed on the basis of a pedagogy premised on the activities of learners alone (i.e., observation, listening, indirect modelling). Indeed, increasingly, forms of knowledge required to be learnt for occupational practice are those that are not so easily observable, nor easy to apprehend or understand (Billett, 2006b). Consequently, when considering the importance of the kind of symbolic knowledge that underpins the use of contemporary technologies, the opaque knowledge that sits behind computers and computerised systems, and the kinds of more remote interaction that constitutes so much of contemporary work, it is more likely that pedagogies of practice will need to include those initiated and enacted by a more expert practitioner.

Certainly, most of that learning, albeit through observation, listening, and hands-on activities, will be initiated, directed, and enacted by individuals' interests and capacities. More recent studies of how workers learn their working knowledge through everyday work activities consistently indicate that much, indeed most, of that learning occurs through processes that are analogous to those evidenced in the accounts from ancient China and Greece and reported in the anthropological literature. That is, workers across a range of occupations refer to engaging in

everyday work activities (e.g., 'just doing it'), including the opportunities to practise (i.e. engagement in goal-directed activities); the contributions of the physical and social settings secured through observation and listening (i.e., indirect guidance); and the contributions of more expert or experienced coworkers (i.e., direct guidance) (Billett, 2001). These finding suggests that across these different forms of work, there is a consistent reporting that the knowledge required to engage in new tasks is learnt through everyday work activities in practice settings. This process includes learner engagement and the affordances of the work setting in terms of its provision of activities, artefacts, and interactions with others and these artefacts. All this suggests a need for a curriculum, pedagogy, and personal epistemologies that can assist the development of this knowledge through practice.

One of the intended outcomes of this programme of research is to identify something of the kinds of knowledge that will likely need to be learnt through different kinds of activities and interactions in workplace settings: that is, through practice. A consideration of these kinds of knowledge, and how they might be learnt, is important for explaining the process of learning through practice and the development of practice-based curriculum and pedagogies, because it needs to be understood what kind of experiences are likely to generate what forms of knowledge.

## 4.3 Participatory Practice: A Conception of Learning through Practice

Given the above, it seems pertinent to now outline conceptions of learning through practice that have emerged from my theorising of them. In particular, the concept of participatory practices is advanced as a means to understand learning through practice. Participatory practices are dualistic. They comprise, on the one hand, how the workplace invites individuals to participate in workplace activities to learn through processes of observation and engagement, and, on the other, the access to the activities and interactions, including guidance, that are central to individuals' learning of knowledge in the practice setting (Billett, 2002). Yet, central to this process is the degree by which individuals' construal of their experience as invitational shapes their engagement in occupational goal-directed activities and how they engage with the guidance from others in the workplace settings. Both these kinds of contributions -- the personal and the situational -- have consequences for individuals' learning. For instance, and as noted, engagement in routine work activities may reinforce and refine existing knowledge, whereas engaging in new tasks may develop new knowledge. Hence, the degree by which workplaces afford these experiences is important for individuals' learning. Yet, it is also salient to understand that what constitutes routine or novel tasks is person-dependent. What for one individual will be a routine experience, for another will

be quite novel, hence, quite different kinds of learning will likely be secured through these distinct experiences (i.e., reinforcement for one and new knowledge for another). Certainly, the access to guidance by more experienced coworkers is likely to be important for the development of understanding and procedures that would otherwise not be easily learnt or discovered alone. This guidance can extend to the sequencing of access to activities and monitoring performance and progression. It can also extend to the use of intentional guided learning strategies that aim to develop procedural capacities (e.g., modelling, coaching) as well as those associated with conceptual development (e.g., use of questioning, diagrams, analogies) (Billett, 2001). It follows that individuals who are only able to access routine activities and/or who are denied support may have more limited learning outcomes than those able to participate in new activities supported directly and enthusiastically by experienced coworkers. However, the capacity to access particular kinds of experiences is subject to workplace affordances. Moreover, rather than being benign, workplaces can be highly contested environments in which to participate and learn (e.g., Darrah, 1996; Hull, 1997).

Indeed, workplace practices may be aimed at limiting or regulating access to prized work, for pragmatic reasons of avoiding the need for everyone to learn (and be paid) to perform prized activities. Also, judgments about individuals' competence or readiness to engage in activities may shape how they are invited to participate in workplaces. Moreover, the participation and guidance afforded individuals is also shaped by work hierarchies, group affiliations, personal relations, workplace cliques, and cultural practices, as well as the kinds of activities in which individuals are able to engage (Billett, 2002). This local constituting of occupational activities is a product of historical and cultural practices (Rogoff, 1990; Scribner, 1997/1990) shaped by the microsocial factors at the situational level. These factors include the local orderings (Engestrom & Middleton, 1996) and localised negotiations (Suchman, 1996) of work settings. These local factors can also shape and privilege the requirements for what constitutes effective performance in the particular setting, as well as relations in the workplace. For instance, it has been shown that employers prefer providing opportunities for younger and well-educated employees at the cost of affordances for older workers (Brunello & Medio, 2001; Giraud, 2002). Then, there are discriminatory practices on the basis of gender and race, and between different kinds of workers (Bernhardt, Morris, Handcock, & Scott, 1998). Consequently, opportunities to participate in and access support and guidance are distributed in ways that reflect workplace norms and practices, which will be discriminatory in particular ways.

Accordingly, individuals and cohorts of individuals may be advanced and experience quite different workplace affordances depending upon their standing, means of employment, status, or degree of inclusion in workplace affiliations or cliques. For instance, in a large manufacturing plant (Billett & Boud, 2001), quite different affordances were identified across the three work areas that were the focus of a study. The diverse bases of these affordances were the product of a

complex of situational factors. In one work area -- a consumer advisory centre -- there were very close relations between staff founded in part on their shared concerns and their working on the same shift together, and relationships that were formed in collaborative workplace ventures. While there were some tensions among staff, overall it was a supportive environment for participating and learning the skills required to be an effective team member. However, in one section of the manufacturing plant, the affordances were construed to be less invitational. This work area was subject to fluctuations in production levels that incited concerns about the continuity of ongoing employment. Workers began to position themselves to secure employment in other sections of the plant. During the study, the manufacturing plant's management announced a cessation of funds for training and overtime. This action merely reinforced these workers' perception that the workplace was not very invitational (i.e., supportive of their learning). It also reinforced cynicism about the company's practices, including enhancing productivity through training. In the packaging area, workers initially reported the work environment as being highly invitational. There were opportunities for advancement premised on the demonstration of individual performance, opportunities to train, and access to information in the workplace. Like the customer service centre, there was a strong sense of working collegiately in this area. In each of the three shift teams, there was a concern and even competitiveness for the team to meet its production goals and to solve any production problems before the next shift took over. However, it would be wrong to infer that these workers were 'socialised' through these experiences and were engaging in an uncritical and non-reflective way, and that these settings were benign. Instead, individuals will elect how they participate with more expert partners, as has been shown across a variety of workplaces (Billett, 2001). Moreover, there is another dimension to the contested nature of workplace participatory practices. That is, beyond the contestations that will occur between old timers and new comers, full and part-time workers, those with different occupational and workplace hierarchical affiliations, there will be those between the contributions of the immediate social setting and the personal (Hodges, 1998).

Yet, these affordances and bases for engagement are subject to change, which then leads to different negotiations. Because of the dynamic qualities of work practice, these affordances and indeed work place tasks, goals, interactions, participants, and relations are likely to be changing frequently. In the food-processing workplace described above, the customer service staff took over corporate-wide responsibilities for consumer advice. They also acquired new equipment and software, and an expanded team of workers. In the packaging area, the impact of the curtailment of overtime and funds for training did much to transform the workers' perception of the invitational qualities of the workplace. Like the production workers, they became more cynical about the workplace and its affordances, which became viewed as less invitational. So in different ways, the participatory practices changed across the three work areas.

However, not only the participatory practices, but also the requirements for performance, can change, as with the consumer call centre. For instance, in studies that examined the work and participatory practices of workers over a six-month and twelve month period, each of the workers experienced considerable changes in their work activities and the requirements for work place performance (Billett, Barker, & Hernon-Tinning, 2004; Billett, Smith, & Barker, 2005). These changes included the transformation of a work practice, a shift in the strategic significance of work, and changes to the bases for workplace decision-making. So over the duration of the 6-month and 12-month periods, key goals for work requirements changed, as did the kinds and forms of the participatory practices. Therefore, and importantly, rather than being a once-off source of knowing, individuals' participation needs to be understood as being constantly negotiated in changing circumstances in order to remain current with the requirements for practice. Hence, the participatory practice that comprises individuals' working lives are likely to involve constant change, including negotiation and re-negotiation with the work practice (Billett & Somerville, 2004). Consequently, the kinds of experiences and support for learning that individuals' experience throughout their working lives will be central to their capacity to participate, learn, and maintain the currency of their vocational knowledge.

## 4.4 Individuals' Engagement, Agency, and Subjectivity

While the contributions of workplaces are important for learning through work and can be gauged in terms of their invitational qualities, the agency of individuals is also an important basis for engagement with and learning through work (Smith, 2004; Taylor, 1985). In particular, the bases of their engagement, the exercise of their personal agency, and their subjectivity does much to shape their learning. Importantly, individuals' learning is not a process of socialisation or enculturation determined by historical, cultural, and situational factors, because they actively interpret and construct knowledge from what they experience. Therefore, despite the solid contributions arising from participation in workplaces, including those that can be exercised quite forcefully and with great social press, individuals make meaning and personally mediate the deployment and construction of knowledge (Billett, 2003; Valsiner, 2000). Individuals' agency determines how individuals engage in work practice, which then has consequences for individuals' learning. There are many dimensions to this engagement and subsequent learning. One is the interest or effort that an individual directs towards learning something. Effortful engagement is probably required for learning something that is complex and demanding to learn, yet it is directed and sustained by individuals' interests. Superficial engagement in workplace activities likely leads to shallow or less rich outcomes. There are also more foundational issues, such as basic cognition. Not all individuals comprehend and understand in the same way, and nor should they.

Hence, the kind of discourses of which individuals have knowledge and to which they have access, and their knowledge of a particular domain of occupational activities, shape how they construe and construct what they experience.

Moreover, the bases for individuals' engagement in social practices are likely to be differentiated and overlapping, and in particular personal ways. Firstly, individuals participate simultaneously in a number of social practices (Lave & Wenger, 1991). However, the quality of their engagement in these practices is unlikely to be uniform. Individuals' interests and priorities temper participation (Glassman, 2001). Full-bodied participation in one social practice (e.g., workplace) may be mirrored by reluctance in another (e.g., school tuck shop roster), at a particular point in time. Secondly, individuals' engagement with what is to be learnt is likely influenced by their values and beliefs. This is evidenced by workers of South Vietnamese heritage rejecting team work in an American manufacturing plant, as they believed this kind of work organisation reflected communistic values and practices (Darrah, 1996). Similarly, coal miners and aged-care workers engaged in practices in ways that reflect a gendered identity (Somerville & Bernoth, 2001). This identity permitted them to accept workplace injury and accidents as an inevitable consequence of their participation in their work. So individuals' engagement at work is premised on and can be understood by their personal histories or ontogenies (Scribner, 1985), which result in particular ways of understanding and engaging with the social world (Billett, 1998) and are shaped by their subjectivities --- sense of identity and purpose --- that arise through social experience (e.g. Somerville & Bernoth, 2001). It follows that individuals' subjectivities shape what is invitational, not what is afforded. Hodges (1998) rejected the approach to teaching children that she encountered in a university teacher education course, for example, because these views clashed with her views on how children should be treated. So more than her values being subject to the social practice, her agency and subjectivity served to reject what was being afforded. In sum, individuals use their subjectivities, not some objective view of workplace affordances, to construe what is invitational, and these same subjectivities shape how and what individuals learn through their engagement in workplace activities and interactions.

These subjectivities are social in origin. They arise through personal histories from societal facts, such as conceptions of masculinity or femininity, the standing of particular vocational practice, et cetera. But, they are constructed as a personally unique outcome through individuals' personal histories (Billett, 1998), as we engage in different and overlapping ways in social practice throughout our lives. Hence, dualities between the personal and the social experience should not be taken as making distinctions between the individual and the social. Instead, the individual here is seen as being a social product that arises through a socially derived personal history (i.e., ontogeny) that is shaped in personally particular ways across a life history (i.e., ontogenetic development) or, as Harré (1995) suggests, the individual is born a potential person and the personal is generated through interactions with the social world. So, individuals, and their subjectivities

and sense of engaging with the world et cetera represents personally and possibly unique sets of social geneses. It is the uniquely social person that encounters, makes sense of, responds to, and enacts their occupational practice in particular circumstances and at that particular moment in time. And, it is the individual's agency that arises through these subjectivities that shapes how they work and learn ontogenetically.

So in regards to the process and outcomes of learning through practice experiences, the duality comprising a negotiated and relational reciprocity between social practice and individuals' agency is a central explanatory concept. Interpsychological processes --- those between/among social partners, artefacts, symbols, and the physical environment --- are reciprocal, with individuals making judgments about, and potentially transforming their perceptions of, the source of learning. Valsiner (1994) describes this process of knowledge construction as the co-construction of knowledge --- the reciprocal act of knowledge construction through which both the object and the subject are transformed. That is, learning is not the mere acceptance of knowledge from an external source. Instead, individuals are active and discerning in how they deploy their cognitive experience and processes, making judgments about what they encounter and how they respond to what they experience. Analogously, the relations between individuals and social practice are also held to be reciprocal and interdependent between how the work settings afford participation and how individuals elects to engage in and learn from the work practice. Therefore, engagement in work is relationally constituted between the affordance of the setting's practice and how individuals elect to engage with what is afforded them. In describing the relations between the social and cognitive experience, Valsiner (1994) refers to the degree of 'relatedness' between the individuals' values and the norms of the social practice as a consideration of the kinds of interactions, and the learning that will likely arise through these interactions. When considering the qualities of learning that are products of these reciprocal interpsychological processes, Wertsch (1998) proposes distinguishing between the intrapsychological attributes described as 'mastery' --- that is, knowledge constructed without commitment or enthusiasm, and 'appropriation' --- in which the learner constructs knowledge, 'taking it as their own' as Luria (1976) proposes. So there can be no situationally determined or uniform outcome to interpsychological processes or intrapsychological attributes. These are negotiated reciprocally between individuals' subjectivities and the social practices in which they participate, as a sociopersonal process.

This dualistic and relational basis for learning underscores the point that what a social practice (regardless of whether it is an educational institution or a workplace) affords an individual can only ever be an intention or invitation. Learners ultimately shape how and what they construct from the situation, based upon their cognitive experience. The degree to which what is afforded is viewed as being invitational is not a given. Individuals construe it through an interaction between their cognitive and social experiences (Valsiner & van der Veer, 2000). Figure 4.1 depicts these dualistic participatory practices. On the left-hand side is

the evolving social practice of the work setting, and on the right hand side the evolving personal history of the individual, that is, their ontogeny. The intersections that constitute the interactions in workplaces are those encountered through participation in work. Changes in occupational practice are brought about by historical factors (e.g., changes in tools and technologies), cultural factors (e.g., needs for particular products and services), and situational factors (e.g., the goals, practices, and participants in the workplace).

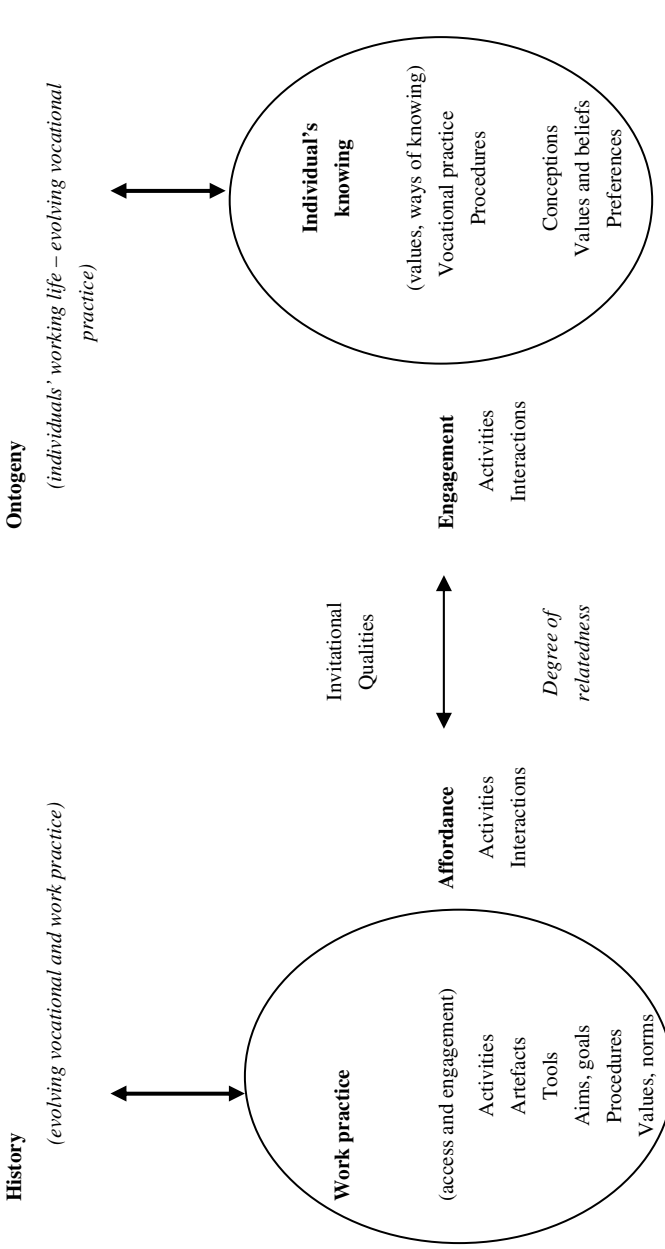


**Fig. 4.1** Affordances and engagement in learning through work

The duality, referred to here as participatory practices and as relational interdependence between the personal and social (Billett, 2006a) is conceptually significant. It can be seen as illuminating relations between the social world and the mind at intersections between the trajectories of the transforming social practice comprising the work setting and individuals' evolving ontogenetic development, including their subjectivities as they engage in work activities. This duality also infers that to understand relations between social practice and individuals' thinking and acting requires delineating and identifying the invitational qualities of the work setting, from both a social practice and also personal perspectives and, then, how individuals elect to engage in social practice.

These kinds of conceptual and methodological issues stand to make potentially important contributions to current debates about human cognition. Having proposed that there are relations between the mind and society, (Cole, 1998; Wertsch, 1998), it is important to understand further these relationships. Central to these are the origin and sourcing of knowledge that has historical and cultural geneses, yet is required to be taken up by each generation and be purposeful for social and cultural purposes for which it is being enacted (Scribner, 1985; Rogoff, 2003). Another issue that needs to be understood is the degree of social embeddedness of knowledge (Hutchins, 1991; Pea, 1993; Resnick, Pontecorvo, Säljö, & Burge, 1997). This embeddedness has several components: the degree to which learning is embedded in its source and, therefore, the relationship between individuals' thinking and social practice (e.g. Cobb, 1998) and the consequences of those relations (e.g. Billett, 2006a). Therefore, through understanding: (a) the affordance of social practice, and (b) how individuals' engagement influences knowing and the negotiated and dualistic interdependence between (a) and (b) can make useful contributions to understanding the relations between social practice and individuals' knowing (thinking, acting, and learning). Central to these concerns are the kinds of learning or intrapsychological outcomes that arise through participation in social practices and socially derived activities, such as those in workplaces. Illustrating the kind of contributions that might arise, the next section briefly discusses how these relationships inform conceptions of shared understanding (intersubjectivity), and the kinds of learning that occur through participation in occupational practice are briefly discussed.

## 4.5 Intersubjectivity, Appropriation, and Extending Knowledge

Within sociocultural constructivism, a key goal for learning in social practices is intersubjectivity -- shared understanding between the learner and the more experienced partner. The concern here is that the historically derived, culturally purposeful, and situationally pertinent knowledge needs to be learnt, and in a common way, by those who are to practice that knowledge. Shared understanding is seen as a basis for having a common focus of attention and some shared

presuppositions that form the ground for communication and working towards shared goals (Rogoff, 1990). Newman, Griffin, and Cole (1989) propose that because humans construct meaning idiosyncratically, the key purpose of communication is to develop shared understanding. They argue that if humans developed understandings in a uniform way, there would be no need to communicate. However, we do not construct meaning in consistent ways and, therefore, there is need to work towards achieving intersubjectivity or shared understanding because it is quite central to the conduct of everyday human activity and human interaction in processes such as living and working. In terms of learning an occupational practice that is historically and culturally constituted, intersubjectivity is seen as means of achieving shared understanding and as a capacity to perform those practices through interactions with experienced coworkers and accessing an understanding of the requirements of particular instances of that setting. This is a purposeful goal for learning in workplaces and for the development of much of the vocational competence and the expertise required for work performance. Yet, given the discussions above it would clearly be wrong to consider that intersubjectivity will necessarily arise from individuals' construction of knowledge in a socially rich milieu.

Moreover, such an approach to learning and indeed intersubjectivity can be seen as being largely reproductive. That is, it merely reproduces what is already known. Yet, as noted above, in Wertsch's concepts of mastery and appropriation (1998) and in empirical work (Billett, 2003), even when faced with a strong social pressure to conform, individuals' learning will not be wholly or uncritically intersubjective, because of the centrality of their perspectives or subjectivities. Indeed, it may be necessary to use intentional guided learning strategies to achieve the level of intersubjectivity required for effective work practice (e.g., safe work practices). This is because much of what is required to be learnt (e.g., understanding and procedures) cannot be learnt alone through engagement, trial and error, observation, and imitation. Also, individuals' subjectivities may direct learning in inappropriate ways (e.g., wishing to identify with peers, leading to a rejection of concepts and practices that are important for effective practice). So the concept of appropriation, as defined by Wertsch (1998) and others, should be treated problematically, rather than as an unquestioned good. Appropriation is seen as desirable in so far as individuals making that new learning 'their own' do so because they agree with and understand it. Yet, such a conception of learning outcomes is also problematic. For instance, practitioners might appropriate bad or dangerous practices, because they seem to be efficient by saving time or effort. Hence, intentional close guidance by more expert partners might be required to assist the development of individuals' procedures and concepts required for shared practice.

However, beyond these goals, there is a need to consider the development of novel solutions to problems not yet encountered. So, there is a need to consider approaches to learning and goals for participation in workplaces that extend knowledge and attempt to be generative of occupational practice that is robust

enough to transfer elsewhere. In the study of the manufacturing plant, strategies of questioning dialogues and group discussion were used to intentionally extend learning arising from workplace activities and interactions (experiences). The key role that the workplace's affordances play in assisting and supporting the development of these kinds of attributes, as the frequency of the strategy usage was highest in the work area that had the most invitational qualities, as an objective and observable measure (e.g., support, sharing, common concerns, opportunities to engage and discuss). In all, this hints at the need to consider critically the dual, negotiated, and relational nature of interpsychological processes and the kinds of intrapsychological outcomes (i.e., learning and the remaking of work practices) that arise through these processes.

## 4.6 Participation and Learning

In conclusion, a consideration of participatory practices can assist explain the processes of learning through practice and inform how they might be improved. Central here it is the need to elaborate further the nature and consequences of relations between the personal and the practice setting. It has been proposed that these relations are structured by the participatory practices that comprise, on the one hand, the affordances of the practice setting, and on the other hand how individuals elect to engage with what is afforded them. It is through these dualistic, but negotiated processes that individuals construe and make judgments about the invitational qualities of what they experience, and hence how they participate in and learn from these experiences. The outcomes of learning, as much as the processes themselves, are socially shaped. This is not a negotiation between the individual and social, but between individuals, who have construed and constructed knowledge in personal ways throughout their life history, participating in a further negotiation of that knowledge while they engage in work. This learning can be seen as being directed towards promoting intersubjectivity within the knowledge required for workplace tasks and interactions. However, central to all these debates is the significance of the relationship between the social practice and the socially derived person. Whether referring to the construal of affordances (the setting's invitational qualities), the kinds of interactions that occur, and the learning processes and outcomes that arise, the dualistic, interdependent, yet negotiated relations between individuals as workers and the social practice that comprises that work setting remain a predominate consideration. Understanding these relations in terms of reciprocal participatory practices is central to understanding learning through work, yet also extends to learning more generally. Here, a way of illuminating those relations has been advanced here as participatory practices in explaining the process of learning through practice.

## References


Bernhardt, A., Morris, M., Handcock, M., & Scott, M. (1998). *Work and opportunity in the post-industrial labor market* (No. IEE Brief No. 19): Institute on Education and the Economy.

Billett, S. (1998). Ontogeny and participation in communities of practice: A socio-cognitive view of adult development. *Studies in the Education of Adults, 30*(1), 21-34.

Billett, S. (2001). *Learning in the workplace: Strategies for effective practice.* Sydney: Allen and Unwin.

Billett, S. (2002). Workplace pedagogic practices: Co-participation and learning. *British Journal of Educational Studies, 50*(4), 457-481.

Billett, S. (2003). Sociogeneses, activity and ontogeny. *Culture and psychology, 9*(2), 133-169.

Billett, S. (2006a). Relational interdependence between social and individual agency in work and working life. *Mind, Culture, and Activity, 13*(1), 53-69.

Billett, S. (2006b). *Work, change and workers*. Dordrecht, The Netherlands: Springer.

Billett, S. (2009). Conceptualising learning experiences: Contributions and mediations of the social, personal and brute. *Mind, Culture and Activity, 16*(1), 32-47.

Billett, S., Barker, M., & Hernon-Tinning, B. (2004). Participatory practices at work. *Pedagogy, culture and society, 12*(2), 233-257.

Billett, S., & Boud, D. (2001, July). *Participation in and guided engagement at work: Workplace pedagogic practices.* Paper presented at the 2nd International Conference on Learning and Work, Calgary.

Billett, S., Smith, R., & Barker, M. (2005). Understanding work, learning and the remaking of cultural practices. *Studies in Continuing Education, 27*(3), 219-237.

Billett, S., & Somerville, M. (2004). Transformations at work: Identity and learning. *Studies in Continuing Education, 26*(2), 309-326.

Brunello, G., & Medio, A. (2001). An explanation of international differences in education and workplace training. *European Economic Review, 45*(2), 307-322.

Cobb, P. (1998). Learning from distributed theories of intelligence. *Mind, Culture, and Activity, 5*(3), 187-204.

Cole, M. (1998). Can cultural psychology help us think about diversity? *Mind, Culture, and Activity, 5*(4), 291-304.

Darrah, C. N. (1996). *Learning and work: An exploration in industrial ethnography.* New York: Garland Publishing.

Ebrey, P. B. (1996). *China: Illustrated history*. Cambridge, UK: Cambridge University Press.

Elias, J. L. (1995). *Philosophy of education: Classical and contemporary.* Malabar, Florida: Krieger Publishing.

Engestrom, Y., & Middleton, D. (1996). Introduction: Studying work as mindful practice. In In Y Engestrom & D. Middleton (Eds.) (Ed.), *Cognition and communication at work* (pp. 1-15). Cambridge, UK: Cambridge University Press.

Finch, C. R., & Crunkilton, J. R. (1992). *Curriculum development in vocational and technical education: Planning, content and implementation* (5th ed.). Boston: Allyn and Bacon.

Gimpel, J. (1961). *The cathedral builders*. New York: Grove Press.

Giraud, O. (2002). Firms' further training practices and social exclusion: Can industrial relations systems provide greater equality? Theoretical and empirical evidence from Germany and France. In K. Schoman & P. J. Connell (Eds.), *Education, training and employment dynamics: Transitional labour markets in the European Union* (pp. 303-330). Cheltenham: Edward Elgar.

Glassman, M. (2001). Dewey and Vygotsky: Society, experience, and inquiry in educational practice. *Educational Researcher, 30*(4), 3-14.

Gonon, Ph. (2005). *Challenges in the Swiss vocational education and training system*. Retrieved 22 December, 2009, from http://www.bwpat.de/7eu/gonon_ch_bwpat7.shtml

Harré, R. (1995). The necessity of personhood as embedded being. *Theory and Psychology, 5*, 369-373.

Hodges, D. C. (1998). Participation as dis-identification with/in a community of practice. *Mind, Culture, and Activity, 5*(4), 272-290.

Hull, G. (1997). Preface and introduction. In G. Hull (Ed.), *Changing work, changing workers: Critical perspectives on language, literacy and skills.* (pp. 3-39). New York: State University of New York Press.

Hutchins, E. (1991). The social organization of distributed cognition. In L B Resnick, J. M. Levine & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 283-307). Washington DC: American Psychological Association.

Lave, J. (1990). The culture of acquisition and the practice of understanding. In J. W. Stigler, R. A. Shweder & G. Herdt (Eds.), *Cultural psychology* (pp. 259-286). Cambridge, UK: Cambridge University Press.

Lave, J., Murtaugh, M., & de la Roche, O. (1984). The dialectic of arithmetic in grocery shopping. In B. Rogoff & J. Lave (Eds.), *Everyday cognition: Its development in social context* (pp. 76-94). Cambridge, Mass: Harvard University Press.

Lave, J., & Wenger, E. (1991). *Situated learning - legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.

Lodge, R. C. (1947). *Plato's theory of education*. London: Kegan Paul, Trench, Trubner.

Luria, A. R. (1976). *Cognitive development: Its cultural and social foundations*. Cambridge, Mass: Harvard University Press.

Newman, D., Griffin, P., & Cole, M. (1989). *The construction zone: Working for cognitive change in schools*. Cambridge, UK: Cambridge University Press.

Pea, R. D. (1993). Learning scientific concepts through material and social activities: Conversational analysis meets conceptual change. *Educational Psychologist, 28*(3), 265-277.

Pelissier, C. (1991). The anthropology of teaching and learning. *Annual Review of Anthropology, 20*, 75-95.

Resnick, L. B., Pontecorvo, C., Säljö, R., & Burge, B. (1997). Introduction. In L. B. Resnick, C. Pontecorvo, R. Säljö & B. Burge (Eds.), *Discourse, tools and reasoning: Essays on situated cognition* (pp. 1-20). Berlin: Springer.

Rogoff, B. (1990). *Apprenticeship in thinking - cognitive development in social context*. New York: Oxford University Press.

Rogoff, B., & Gauvain, M. (1984). The cognitive consequences of specific experiences - weaving versus schooling among the Navajo. *Journal of Cross-Cultural Psychology, 15*(4), 453-475.

Rogoff, B., & Lave, J. (Eds.). (1984). *Everyday cognition: Its development in social context.* Cambridge, Mass: Harvard University Press.

Scribner, S. (1984). Studying working intelligence. In B. Rogoff & J. Lave (Eds.), *Everyday cognition: Its development in social context* (pp. 9-40). Cambridge, Mass: Harvard University Press.

Scribner, S. (1985). Vygostky's use of history. In J. V. Wertsch (Ed.), *Culture, communication and cognition: Vygotskian perspectives* (pp. 119-145). Cambridge, UK: Cambridge University Press.

Scribner, S. (1997/1990). A sociocultural approach to the study of mind. In E. Tobah, R.J. Falmagne, M.B. Parlee, L.M. Martin & A.S. Kapelman (Eds.), *Mind and social practice: Selected writings of Sylvia Scribner* (pp. 266-280.). Cambridge, UK: Cambridge University Press.

Smith, E. (2004). Vocational education and training in schools in Australia: What are the consequences of moving from margins to mainstream? *Journal of Vocational Education and Training, 56*(4), 559-578.

Somerville, M., & Bernoth, M. (2001). *Safe bodies: Solving a dilemma in workplace*. Paper presented at the Knowledge Demands for the New Economy. 9th Annual International Conference on Post-compulsory Education and Training., Gold Coast, Queensland.

Suchman, L. (1996). Constituting shared workspaces. In Y. Engestrom & D. Middleton (Eds.), *Cognition and communication at work* (pp. 35-60). Cambridge, UK: Cambridge University Press.

Taylor, C. (1985). *Human agency and language: Philosophical papers 1*. Cambridge, UK: Cambridge University Press.

Turnbull, D. (1993). The ad hoc collective work of building Gothic cathedrals with templates, string, and geometry. *Science, Technology, & Human Values, 18*, 315-340.

Valsiner, J. (1994). Bi-directional cultural transmission and constructive sociogenesis. In W. de Graaf & R. Maier (Eds.), *Sociogenesis re-examined* (pp. 101-134). New York: Springer.

Valsiner, J. (2000). *Culture and human development.* London: Sage Publications.

Valsiner, J., & van der Veer, R. (2000). *The social mind: The construction of an idea.* Cambridge, UK: Cambridge University Press.

Wertsch, J. V. (1998). *Mind as action*. New York: Oxford University Press.

.

# Chapter 5
# Objectual Practice and Learning in Professional Work

**Monika Nerland & Karen Jensen**

University of Oslo, Norway

**Abstract** This chapter focuses on one aspect of learning through practice in the context of professional work, namely on how engagement with complex artefacts and objects may involve practitioners in wider circuits of knowledge advancement and serve as a vehicle for learning when explored in situated problem solving. As a point of departure we argue that the permeation of epistemic cultures and practices in society has created a new context for professional work and contributed to transform collective knowledge resources as well as the institutional boundaries of professional communities of practice. As knowledge increasingly is mediated by abstract and symbolic inputs, and more advanced knowledge objects are introduced into the realm of professional practice, a creative and explorative dimension is brought to the fore. By introducing Karin Knorr Cetina's notion of *objectual practice* as an analytical perspective, the chapter draws attention to the unfolding and question-generating character of knowledge objects and to how these qualities may generate explorative and expansive forms of engagement among professionals that serve to link everyday work with wider circuits of advancements in knowledge and practice. The group of computer engineers is selected for elaborating and illustrating this perspective.

## 5.1 Professional Work and Learning

Professional work rests on institutionalised and established ways of doing certain types of work in certain types of work communities. This work is related to the need of shared understandings and patterns of action. Doctors need to understand what other doctors do in order to carry out their work in efficient ways and accountants need to relate to a shared set of rules and procedures to perform auditing acts and secure the trustworthiness of their work in society. Learning in and through professional practice has thus been an important area for educational research and also a site for the development of practice-oriented theories. The concept of practice has, as this book reveals, been the subject of considerable discussion and given rise to different and partly contrasting lines of theoretical development (e.g., Pickering, 1995; Schatzki, Knorr Cetina, & von Savigny, 2001; Chaiklin & Lave, 1996). Many conceptualisations within the social sciences emphasise the regulative power of rules and habits, embodied repertoires of

S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2_5, 

action, and common values and identities that constitute communities of practice - that is, they take the constitution and continuation of communities as a core interest. Within the area of professional and vocational learning, researchers have paid more attention to individuals' participation and their ways of navigating as members of communities of practice. This strand of research has proposed a need for recognising the constructive role of individuals and the ways in which social practices are shaped in distinct ways by practitioners' ways of understanding their activities, forming identities, and making choices on a continual basis (Billett, Smith, & Barker, 2005; Mäkitalo & Säljö, 2009; Wenger, 1998). However, while emphasising different aspects, most practice theorists seems to recognise these dimensions of practice as mutually constitutive. The social and the individual are basically intertwined and the ways these dimensions influence each other are mediated by artefacts and objects embedded in the given practice. Thus, a core premise for understanding learning through practice is that human actions, at social as well as individual levels, are mediated by cultural tools and objects (Wertsch, 1993).

During recent decades, the mediating role of artefacts and objects in social practices has gained increased attention. The so-called 'post humanist' branch of practice theory directs attention to encounters between human and non-human entities, claiming their interrelationship to be essential. Following a Marxist line of reasoning, the relationship between materiality and human agency constitutes a core premise to understanding the social world, and a prime site for exploring these relations is processes of labour and production. As stated by Grundrisse (quoted in Pickering, 2001, p. 163): 'Production not only creates an object for the subject but also a subject for the object.' This interrelationship forms the basis for development of practice at the micro-level in terms of both continuity and change. Objects need to be approached, utilised and circulated in social practices to be 'kept alive,' and the different ways in which they are interpreted by individuals and inserted in practical activities give meaning to the ongoing practice and provides a basis for refinement and change. Thus, from this perspective, work is seen as potentially essential for human vitality in which creation and self-creation are intertwined. However, as Pickering (2001) notes, the Marxian description of the agency of both subjects and objects may be too weak to grasp interactions in today's society. Rather, he suggests, there is a mutual tuning of social and material agency taking place over time. The message of recent studies of science practice and knowledge-intensive work suggests this (e.g., Akrich, 1992; Bruni, 2005; Callon, 2002). What is highlighted in these studies is not an 'either or' thinking, but the need for studies and conceptualisations that focus on the agency and performativity, the power to do things in conjuncture.

In this chapter we suggest that Knorr Cetina's (1999, 2006) perspectives on 'epistemic cultures' stands as a helpful contribution in this regard. The transfer into the 'knowledge society' paves the way for a new definition of object relations, where agency and initiative between subjects and objects keep shifting. These shifts sustain and enhance object relations as forms of binding self and

other. The subject-object separation characteristic of our times, paves the way for a dialectic relationship between, on one side, the unboundedness or 'unfolding' character of knowledge and expertise in a complex world, and, on the other, its embeddedness in a symbolic and material infrastructure or system of artefacts that stabilise practices.

In Knorr Cetina's (2001, 2006) perspective, the constructive relationship between a collective subject (e.g., professionals with a licence and mandate) and knowledge is not a direct one, but is mediated by materiality and semiotic objects. In other words, cultural tools are change agents and intervene in processes where humans interact. Knowledge objects are relational along several dimensions. They mediate between the professional and her work and are themselves transformed in this process of articulation. We are not speaking of stand-alone (material) objects, but sets of objects that refer to each other and come together in different shapes. They 'make relational demands and offer relational opportunities to those who deal with them' (Knorr Cetina, 2006, p. 32), and, thus, transform our definition of ourselves. New object relations are created through the mobilisation of expertise to handle emergent and complex problems.

In her studies of how 'machineries of knowledge construction' are coming into being, Knorr Cetina (1999) describes how practitioners enter into unfolding or explorative loops when they are attracted by a problem that engages a 'heterogeneous amalgam' of material and symbolic resources or in our vocabulary – a complexity of knowledge sources. A new awareness is created that reframes the task at hand and turns it into something different (and analogous). This awareness adds to previous actions, but diversification is paralleled by integrative moves in the process of putting together resources with different origins. New tasks, knowledge, and, hence, epistemic wants, trigger new framings and unfolding loops, which potentially involve learning and stimulate change.

Drawing on the perspectives of Knorr Cetina (1999, 2001, 2006), this chapter focuses on how professionals' engagement with complex artefacts and material devices in the workplace may serve as a vehicle for their continuous learning and professional development. As a point of departure, we discuss how the general emphasis on scientific knowledge and practice in today's society is creating a new context for professional work by producing objects that allow for explorative as well as expansive forms of participation. We have selected the profession of computing engineering for elaborating and illustrating this discussion, as it provides an interesting case. Firstly, as a domain of expertise that echoes core descriptions of the network society, new technological advancements are circulated and changes in knowledge practices may manifest themselves earlier in this field than in many other professions. Secondly, practitioners in this field are involved in activities that extend the boundaries of local communities and that cross traditional distinctions between knowledge creation and knowledge application. Their practice hinges on artefacts and objects originating from other sites and communities, at the same time as their work to a large extent is about exploring and applying knowledge mediated by these objects in local tasks. Thus,

their work exceeds the boundaries of local production in ways that may have a 'trans-epistemic' character (Saari, 2003; Knorr Cetina, 2007). The object-rich domain and the high technological turnover make computer engineering an interesting case for exploring the relation of knowledge objects to learning in professional work.

The chapter commences by providing a conceptual background for the notion of knowledge cultures and objects as mediators of learning. Then, the empirical basis for the discussion is outlined, followed by an examination of the object relations of computer engineers and their role as facilitators in work-based learning. In all, it is proposed that the unfolding and question-generating character of knowledge objects may generate explorative and expansive forms of engagement among professionals and link everyday work with wider circuits of knowledge and practice developments. These dynamic aspects of practitioners' knowledge practices need to be accounted for in contemporary perspectives on professional work and learning.

## 5.2 New Contexts for Professional Work: The Diffusion of Epistemic Culture

Descriptions of today's society are often concerned with the role of knowledge and knowledge production in the formation of society. One argument put forward is that knowledge is taking over the historical role of industrial products and goods to feed the dynamics of economic growth and development, as often emphasised in the narratives on the knowledge economy. More important in our case, however, is that the 'logics of practice' inherent to knowledge production and validation diffuse into other areas in society and affect the way in which people live and manage their lives. Expert systems spread and their presence in personal and institutional life contributes to an overall epistemification in society (Giddens, 1990; Lash & Urry, 1994; Stutt & Motta, 1998; Knorr Cetina, 2006; Jensen, 2007b). The concept of epistemification is used to describe the developments in which the general significance of expert knowledge is increasing, as is the prevalence of science-generated knowledge in the organisation of everyday life.

Processes of epistemification manifest themselves in different ways in working life. One aspect is that knowledge more often is represented in abstract and symbolic forms. Following the line of Wartofsky (1973), the production and use of what he terms tertiary artefacts is more prevalent, that is, social practices are more often organised around concepts, ideas, and objects that represent a high level of abstraction and that constitute dynamics of engagement that are detached from direct application of knowledge in practical settings. Moreover, in conjunction with the emergence of new technologies, the abstract and symbolic modes of representation give rise to modes of knowledge distribution that cut across institutional space and time frames. Depictions of knowledge circulate

quickly in information networks and take a myriad of expressions whose operation and use require learning. For example, depictions of 'best practices' in engineering and health services may be provided to practitioners by way of inter- or intranet structures in a universal way, which needs recontextualisation and specification to be utilised effectively in particular settings. Another facet of the epistemification processes is that traditional boundaries between areas of knowledge production and application are blurred, leading to a hybridisation of forms of knowledge and their related agencies. As described by Gibbons and his colleagues (Gibbons et al., 1994; Nowotny, Scott, & Gibbons, 2001), there is a shift in paradigms of knowledge production from the 'Mode 1' paradigm in which science was regarded distinct from other areas of society and developed by way of discipline-specific advancements, to a 'Mode 2' paradigm in which knowledge production is socially distributed, transdisciplinary, and located in practices where the production and application of knowledge are intertwined. For computer engineers, this implies that their work context is part of a larger production context in which the development of new technologies more often takes place in the intersection between product development in research-oriented communities and the continuous testing and use of these products in work settings (Fischer, 2009).

Knorr Cetina (1999, 2002, 2006) adds a cultural dimension to these propositions by pointing to how different areas of social life are increasingly influenced by a 'spill over' of epistemic culture. She describes epistemic cultures as 'cultures that create and warrant knowledge,' usually found in universities or research institutions. Today, we witness a diffusion not only of the products of epistemic cultures to other areas of social life, but also of their characteristic modes of practice - that is, their ways of understanding and relating to knowledge. People within different areas of work are more often engaging with knowledge in ways that historically were restricted to science communities, for instance by exploring knowledge issues beyond what is already known, by questioning its validity and testing out its feasibility, and by systematically investigating and describing the environments in which they operate. As Knorr Cetina (2002, p. 614) describes it:

> The infusion of expert systems into daily life and the increased dependence of production systems on expert systems can be described on a more general level as the dehiscence of knowledge processes into society. The latter suggests the unboundedness of the process and the uncertainty of its outcomes.

Yet, despite the proposed ubiquity of this epistemification, how these processes influence professional work remains unclear, and it seems these processes are likely to take different forms and degrees of intensity in different communities. In general, however, three distinct but often interlinked trends are identifiable. Firstly, there is a tendency that professional communities establish closer links to science and to more abstract forms of knowledge. This may take the form of initiatives to establish profession-specific research communities, as illustrated by the founding of nursing science as a new academic discipline in Norwegian universities. Another example is the increasing emphasis given to evidence-based

practice in the health professions and other domains. This emphasis comprises a trend that, on the one hand, may invite practitioners to connect with scientific communities, but that also may lead to a sense of deskilling, if the knowledge resources generated are turned into detailed rules and standards that regulate professional practice in a strict manner. Second, professionals today are often asked to engage actively in documenting their practice and its knowledge-based foundation (e.g., Callon 2002; Eklund, Mäkitalo, & Säljö, 2010). This documentation requires critical engagement with knowledge as well as analysis of recently performed tasks. Third, and at the core of this chapter, professional work is increasingly characterised by engagements with complex artefacts and objects. Professionals perform their work in environments that are mediated by symbolic and material objects, such as texts, graphs, records, and technological devices. New advancements in their domain of expertise are often distributed by way of textual or technological means. A core relationship in professional practice is therefore the interplay between human beings and their non-human material. We will continue by exploring this relation as a vehicle for work-based learning.

## 5.3 Object-related Learning

From the perspective of sociocultural learning theories, ways of knowing and performing practical work are both embedded in and constituted by cultural artefacts and tools (Wertsch, 1993). Two types of tools are highlighted in this respect: semiotic tools, in which language is crucial, and material tools, such as models, instruments, and physical devices. In many ways, these tools influence the kind of problem in which it becomes possible to engage, and contribute to shape the logics of participation. Among those calling for more attention towards the constitutive role of materiality is Østerlund (2008). He points to how artefacts can serve several functions. They can: (i) comprise objects that evolve through elaborative and specifying practices; (ii) serve as an expressive media through which other tasks and practices are realised; and (iii) be the indexical ground to which other problems and concepts are referred, and by which they are described (Østerlund, 2008).

In professional work, artefacts and tools are inevitably interlinked with knowledge. The objects and artefacts at disposal for professional practitioners incorporate central features of their knowledge domain and serve to mediate historical and recognised ways of doing professional work. At the same time, knowledge resources are not stable but in transition, and they are interpreted, used, and brought forward in different ways relative to the explorative practice in which they are embedded. This brings the epistemic dimension of practice to the fore in which the use of artefacts both transforms the social practice and is transformed by it. Knowledge constitutes a dynamic of change and further advancements, and forms what may be called an epistemic genesis of practice (Guile, 2009).

Knowledge may constitute an arena for exploration within professional practice as well as providing an infrastructure for wider participation. Rather than being passive elements for use in professional communities, knowledge resources contribute actively in the production of social practices (Nespor, 1994). Thus, these resources have the potential to stimulate learning and guide the direction of further inquiries (Jensen, 2007a).

In considering these artefacts and tools, Knorr Cetina (1997, 2001) advocates the concept of *knowledge object* to reveal how knowledge may constitute objects of investigation and turn into objects of attachment for individuals. In contrast to definitive things, knowledge objects are characterised by their question-generating character and their lack of completeness of being,[8] as described by Knorr Cetina (2001, p. 181): 'Since epistemic objects are always in the process of being materially defined, they continually acquire new properties and change the ones they have.'

Knowledge objects are thus characteristically open, and when individuals attempt to reveal them they typically do so by increasing rather than reducing their complexity. This again feeds into the need for knowledge objects to have the capacity to propel further investigations by providing a sense of excitement and signalling ways to explore their not-yet-fulfilled potential (Knorr Cetina, 1997; Jensen, 2007a). As one example, Knorr Cetina (2001) points to how computer programs typically give advices for how they might be used to solve present tasks at the same time as they display directions for possible advancements and not-yet-realised opportunities. In this way, these programs both provide resources for practice and form an arena for explorative engagement. To illustrate how object-related learning might play out in professional work, we draw on data from an empirical study of early-career learning in Norway.

## 5.4 The Study

The elaboration of the concepts introduced and discussed above is premised on data and analyses that have been generated in the Norwegian research project *Professional learning in a changing society* (ProLearn). This project is a comparative study of learning in the transition from education to work among nurses, teachers, accountants and computer engineers, carried out in the period 2004-2008. This chapter, however, deals with the group of computer engineers only. The ProLearn project took the relationship between individuals and

[8] Knorr Cetina uses both the concepts 'knowledge object' and 'epistemic object' in different texts, but refers to the same characteristics and qualities. In this paper we use the term 'knowledge objects' to emphasise their role in professional practice rather than in the context of scientific communities. The objects are however often originated in innovative communities external to the local work practice, and embody central features of the epistemic cultures from which they derive.

knowledge as its main focus of interest and paid special attention to how early career professionals orient themselves to knowledge and engage in learning on a discretionary basis during their first years in working life. A central concern in this regard was to examine the role of abstract and object-mediated knowledge in their work-based learning. A qualitative approach was selected to gain insights into how individuals studying and working in these professions experience demands for learning and knowledge development and how they engage in such activities.

A survey of students graduating from Oslo University College in 2002 – Studies of Recruitment and Qualifications in the Professions, 'StudData' – was used as a basis for selection of participants. Ten persons from each of the professional fields were chosen to participate, based on the following criteria. They were to have been working for approximately 2 years, their age was to be maximum 32 years, and the gendered sample was to correspond to the group's profile in the survey, still ensuring that the sample comprised minimum two participants from the gender in minority. These criteria were used to ensure participants with some work experience and to secure comparable samples within the respective groups, which reflected characteristics of their broader population. Of those who met these criteria, the persons with the longer work experience were invited to participate in the study. As a result, our sample comprised three female and seven male computer engineers. They all hold a bachelor's degree in computer engineering; are trained within the same professional programme, and share the history of being a member of this educational community. The participants' work and working life represented an array of working sites, including workplaces in the public as well as the private sector.

Semistructured in-depth interviews were conducted with each of the engineers. Key focuses for these interviews were on how informants perceived demands for knowledge development and learning at work, and coped with the demands by accessing and engaging with knowledge resources available in local as well as extended communities. In addition, learning logs were utilised, in which the same participants recorded their experiences of learning needs during work over two periods of 2 weeks, and their ways of addressing these needs on a discretionary basis. About a year after the individual interviews were conducted, three participants were invited to a group interview. This interview was organised as a facilitated discussion about the characteristics of participants' knowledge domain and working field as regards dominant ways of distributing knowledge, mechanisms for bringing new knowledge in contact with professional practice, approaches to learning in working life, and opportunities for career movements.

The individual interviews were normally of 45-60 minutes' duration and the group interview of about 90 minutes. All interviews were recorded and transcribed verbatim, and subjected to an inductive analysis facilitated by the scientific software ATLAS.ti. For this chapter, as a means to investigate the dynamics of objectual practice as described above, the data was also examined with special attention paid to the ways of engaging with knowledge for explorative as well as stabilising purposes. The learning logs were used to concretise themes from the

interviews, in terms of identifying what kinds of questions or knowledge demands the engineers faced during work, and what types of knowledge resources they turned to in their efforts to deal with problems that were experienced.

The next section draws on data from the interviews and learning logs to discuss computer engineers' learning relative to the characteristics of knowledge objects and objectual practice discussed earlier.

## 5.5 Dynamics of Objectual Practice in Computer Engineering

The empirical frame for the discussion is the working domain of engineers whose main tasks and functions are related to software development or to system administrations. Although the division of labour in this professional field comprises a range of specialities both where expertise and working tasks are concerned, the ubiquitous presence of and interaction with technological objects form a common frame for this group. Such objects are, however, not fixed and stable, but are often rather ambiguous and open-ended. Computer systems, programs, and codes can always be improved to be more efficient, more widely applicable, or more complex in their functionalities. When engaged in resolving a technical problem by means of applying distributed codes or patterns of practice, new possibilities and untried functionalities may arise. The professional domain is thus characterised by a richness of objects that simultaneously are ready to be used and marked by their unfolding and question-generating qualities (Nerland, 2008). That is, they often embody core qualities of a knowledge object.

The relationship between knowledge objects and learning is manifold and may be explored along several lines. However, two core dimensions are, first, that they serve to constitute practice and ways of thinking in specific ways. As Knorr Cetina (2007) states, objects of knowledge tend to be 'doers': 'They have powers, produce effects; they may have their own internal environments, mould perception, and shape the course of an experiment.' Secondly, they serve as vehicle for change and contribute to develop practice beyond what is given or known. The chapter continues by exploring the interplay between these dimensions along four interrelated sets of object-related dynamics: (i) the objects' ways of stimulating interchanging modes of experimental and confirmative practice during work; (ii) the ways in which local practice is linked with other knowledge worlds; (iii) the objects' ways of allowing for involvement along short and long timescales simultaneously; and (iv) the ways objects facilitate reflexive use of learning strategies.

### *5.5.1 Interplay between Explorative and Confirmative Practice*

Our informants describe their working days as largely characterised by problem-solving activities, in which they as engineers are engaged in correcting malfunctions or in developing new functionalities. At first sight, this kind of work seems to be marked by an instrumental rationality and rather restricted in its form. The knowledge world of computer engineering is characterised by an extensive availability of standards and codified procedures, which are given the character of information structures and distributed in widespread networks, particularly by means of the Internet. Our informants describe that they often utilise such resources when they face technical problems during work. For instance, as proposed by David:

> When problems occur… you will find most solutions on the internet. By reading knowledge bases and FAQs (i.e., frequently asked questions), and eventually user manuals and books.
>
> *Can you tell me more about such knowledge bases, what they are like?*
>
> It is a knowledge base on the internet that either is published by a producer of technologies, or… well, you may compare it with a forum. A type of articles, which deals with technical solutions related to either failure messages or specific problems…
> (David, individual interview)

Correspondingly, a major part of the challenges reported in the learning logs have their origins in practical problems. One example, from Richard's learning log (reported information in italics):

> Knowledge-related questions and challenges you have faced during work today:
> *Uncertainty about the standard of our internal source code*
>
> What was the trigger for your questioning/inquisitiveness?
> *Practical problem – where a solution exists*
>
> Knowledge resources you have accessed to deal with your question:
> *Existing source code. I often use existing source codes as an example, to secure that I follow standard implementation. This will again make the maintenance of the source code easier, and contribute to develop a homogenous and standardised code…*
> (Report for period 1, day 4)

The modes of practice involved here are oriented towards closure and finding effective and stable solutions on practical problems. The underlying logic reflects what Schon (1987) describes as a *technical rationality*, in which practitioners are seen as 'technical problem solvers who select technical means best suited to particular purposes' (Schon, p. 3). However, this dimension of their work is only one aspect of their professional practice. Although this profession is characterised by a multitude of codified procedures, these resources need to be combined and adjusted in different ways relative to the problem in question. In such processes, the engineers are confronted with nonroutine problems that bring a creative

dimension to work. While the procedures and solutions available on the net are rather fixed and definite in their expression, they open up for different opportunities and patterns of use when applied as parts of larger activities. One example is provided by Martin, who describes the collaborative work of identifying standards and patterns of 'best practice' to be applied in a software project as a process of negotiation and inquiry:

> It's not that everybody always agree [on which practice is the better]. (…) But, to use the example of SUN again, they have a catalogue comprising the 24 most approved 'best practices,' that is, for how you build a computer program. And this is an official catalogue with patterns, as we call it… but you will also find an array of other patterns… for very small problems, of the kind that is not that official, but where you discover that 'hey, this is really good stuff.' And then you decide, within a project, that these patterns from SUN and these smaller patterns are what we are going to use, and together they form our 'best practice.' (Peter, group interview)

Thus, the general resources provided are recontextualised, re-embedded, and recreated when utilised in specific settings. During these processes, the fixed and stable generate new objects of investigation. Related processes occur in the work of individual practitioners, for instance, when they are challenged to find new ways of combining technologies to perform a given task, which implies explorative activities:

> In some cases, you have a customer who has a hybrid server park, and who, due to e.g. new ownership structures, has received the message that no more money will be spent on that equipment. Then, you have to make sure that what you do is compatible between the different systems, which may not speak the same language. Such situations require a lot more creativity than just depending upon logic reasoning. You have to think broader and to think more freely than you would have done in a homogeneous technological environment. (Martin, group interview)

As pointed out by Knorr Cetina (2001, p. 175), 'creative and constructive practice – the kind of practice that obtains when we confront non routine problems – is internally more differentiated than current conceptions of practice as skill or habitual task performance suggest.' In computer engineering, the ways to decide how resources at hand can be inserted and used in given tasks may involve other actions that have an epistemic character, for instance related to testing and to documentation. Richard, who works in a larger software firm where the employers are organised in teams and allocated specialised tasks, describes the operation of his 'user interface team' as an assemblage of specialised tasks, comprising one leader who specifies the requests of the task; three code developers; one tester; and one person who is responsible for securing documentation (individual interview). In this way, core functions inherent to epistemic practice are distributed across the team and turned into specialised functions. Other engineers in small enterprises may, however, shift between these tasks during work. Ina gives one example in her learning log, which elaborates the knowledge resources she accessed when she faced problems while installing new servers:

> I have used Google and Novell's support pages. I have also used a simulation program to test different scenarios. To better understand what goes wrong, and how I can make it work. (Period 2, day 1)

In this way, the technologies in computer engineering tend to function as both tools and objects of inquiry. They allow for an externalisation of learning and knowledge engagements, which take form as interplay between exploring the objects' material fixedness and their more liquid and opaque form. These processes also coexist in interesting ways. On the one hand, engineering work such as programming is heavily commodified and objectified in terms of standards, software, and platforms that are defined and materialised as physical things. On the other hand, the technology and its enactment are continuously changing, thus resisting commodification. As Mackenzie (2005, p. 75) notes, an operating system is not 'reducible to a conventional commodified object if it constantly modulates as it moves through a distributed collective of programmers and system administrators.' In a similar vein, writing codes within a programming language implies both to move within conventional constraints and to make innovations based on them (Bowker & Star, 2000, p. 159). This interplay between the stable and the precarious corresponds to general descriptions of engineering work. As noted by Bucciarelli and Kuhn (1997, p. 211), engineers typically 'go about making up scenarios about things and principles, physical concepts and variables and how they relate.' However, while such activities require creativity, the aim of the scenario-making is to achieve a closure by arriving at a solution that is 'fixed, repeatable, stable, unambiguous, and internally consistent' (Bucciarelli & Kuhn, p. 212). Thus, there is a paradox between the specified and the ambiguous in this knowledge domain, where the practitioner becomes involved in learning by constantly moving between the unfulfilled and the temporarily fixed. This is also valid for engineers who mainly do system administration. One of our interviewees describes how an operating system functions as a knowledge object:

> You have to continuously read about the systems you use, and then you discover something untried that could be of interest. (Ina, individual interview)

She continues by expressing an interest in the unfulfilled that reflects Knorr Cetina's (2001) notion of how knowledge objects themselves display their unrealised potential in ways that encourage further inquiries:

> In fact the most important thing is to realise the potential of the system you are working with. As you learn more about it you also see many new opportunities. (Ina, individual interview)

For the engineers, the relationships to objects thus stimulate an experimental attitude in which the practitioner needs to be sensitive to the unfulfilled potential of the technology in question. That is, they need to be sufficiently familiar with the field of knowledge to be able to interpret objects in terms of their ways of displaying lack and to see their inherent potential for change (Knorr Cetina & Bruegger, 2002). At the same time, the objects provide the learner with directions for further investigations and in this way also with an energy and a 'binding force'

that may propel learning forward (Jensen & Lahn, 2005; Lahn & Jensen, 2006). To use Ina as an example again, she describes how new insights gradually create a general pleasure in her to engage in explorative activities and a desire to probe issues further.

> I was a little overwhelmed a while ago; I thought 'God, working with IT is tiring'. You never feel you are caught up. But lately I have had a lot of time to read, and then I realise how fun it really is. Then it is fun. (Ina, individual interview)

The mechanisms involved here take elements of what Gherardi (1999) describes as 'mystery-driven learning.' However in Gherardi's perspective, the mystery-driven is contrasted with problem-driven learning, the first of which involves emotionality, creativity, and willingness to 'give oneself over' to the object in question. Mystery-driven learning is described as less intentional and instrumental than the other form, as the 'mover' is located in the object or 'mystery.' Furthermore, it is contextualised in a process-oriented and 'proximal' epistemology, characterised by an orientation towards the 'incomplete, continuous, ambiguous, unfulfilled, partial and precarious' (Gherardi, p. 110). In engineering practice, this dichotomy is less valid, as the 'mystery' seems to be generated by way of the 'problem.' The restrictions of the technologies and the restricted tasks may serve as facilitators rather than barriers to experimental activities. Moreover, as noted by Miettinen and Virkunnen (2005), the well-defined and established interpretations shape the realm of possible and not-yet-realised representations, thus enhancing further inquiries. Hence, instead of undermining explorative practice, the technical may inspire and spur critical investigations beyond what is given. In this perspective, Knorr Cetina's (2001, 2006) notion of the simultaneously present and absent, of objects that are both ready-at-hand and in process of information, seems to capture this practice in a better way. Nevertheless the qualities suggested by Gherardi (1999) may be useful as sensitising means to explore the symbolic and aesthetic dimensions of knowledge and learning.

However, compared with Knorr Cetina's (1999) examples from scientific practices, the engineers' opportunities for creating ties to certain knowledge objects seems to be more restricted and fragile. While the emphasis given to problem-solving may spur critical inquiries and further exploration, it also implies that the given problem definition or task is given priority over more personal interests. The informant Martin explicitly conveys the difference between his situation and that of professionals in more academic institutions:

> It is probably the privileged engineers that are in position to state clear preferences and express a 'football-team-like feeling' for systems. And they are perhaps located in [higher] educational institutions, where you find the guys wearing Penguin T-shirts and… you know? There you may have such an atmosphere. But, like in my kind of work, you could never express such an attitude. (Martin, group interview)

Martin explains this by the shifting demands of work relative to different customers and available technologies. Moreover, in a rapidly changing labour market there is a general concern that strong identification with certain technologies may serve to limit practitioners' opportunities for career mobility (see also Loogma, Ümarik, & Vilu, 2004).

### *5.5.2 Linking Practitioners with Wider Knowledge Communities*

In addition to facilitating explorative practice, the technological objects in computer engineering serve to link local work practices with other sites and arenas for knowledge development. This is partly due to the ways in which knowledge is distributed by way of information structures, which provide a medium of transaction that cuts across institutional spaces and simultaneously allows for local embeddedness and global outreach (Knorr Cetina, 2006). Moreover, these information structures provide opportunities for engaging in learning and critical inquiries across sites.

One facet in this regard is that the engineers get acquainted with new advancements in their fields of knowledge by approaching authorised websites and support services. As described above, advancements in, for example, systems or software are made available on the producer's websites and accessed by professional engineers as well as by others. This accessibility implies that connections are created between the general advancements of the knowledge domain and the work of individual practitioners. Another aspect of this accessibility is that the websites often facilitate forums and discussion groups directed towards specific themes and challenges. By participating in these groups, the engineers get access not only to codified knowledge but also to the experiences and practice-generated knowledge of others who have engaged in related problem-solving activities. Peter states that he often makes use of such opportunities and finds it rather efficient:

> You find new knowledge on different websites where people have had the same problem as you before and where many have posted their solutions. I often look at the IRC chat program - the people who hang there know their stuff. It doesn't take long before you get an answer. (Peter, individual interview)

In this way, the engineers are linked to extended communities while performing local tasks, and invited to participate in expansive forms of practice. Related patterns of action are described in the learning logs, for instance as reported by Martin (period 2 day 1, informant's answers in italics):

> Knowledge-related questions and challenges you have faced during work today:
> *Programming: How to read a text string to a XML tree (DOM)?*
> *Database: How to change the name of a column in an already made table?*
> *Subversion controlling system: How to dissolve a situation with failure messages when something is to be uploaded?*

What was the trigger for your questioning/inquisitiveness?
*Practical problems*

Knowledge resources you have accessed to deal with your question:
*Google led me to discussion groups/forums which provided the answers. Colleagues have also assisted me.*

What is noteworthy in this report is that the entry to the discussion group is identified by means of the communal search engine *Google*. This is a tool that is frequently mentioned among our informants, and it is useful due to the extensive codification and standardisation of software and technologies. The approach employed is simply to enter the actual question in the search field, and - provided that the posed question is specific and formed in accordance with the relevant language game – the results will lead to appropriate forums and discussion groups. Asking the right questions and knowing the terminology therefore becomes a central competency in order to activate objectual dynamics and make possible further inquiries into the knowledge objects. Although the search for answers itself may have a restricted character, the use of resources in new contexts and the interchange between the general and the specific keep knowledge in motion in ways that may stimulate learning.

Another aspect of the cross-site forms of engagement is that the relationships with objects may branch off to arenas off work and to other types of investigation. The fact that the engineers often take their work home in ways that blur the boundaries between work and leisure time is neither extraordinary for this professional group, nor intimately object-related. Of greater interest is that the emotional bindings and the pleasure of explorative practice seems to branch off to other tasks and sideline activities. The interview with Peter provides an example of these mechanisms:

I: Is your curiosity for new technologies typically related to things that may be utilized in concrete situations … in your everyday work?

Peter: Not only in work contexts, as I engage myself quite a lot in graphic programming for… just for fun. That is not something I expect to make use of at work. At least not in my present workplace.

I: What makes it fun then?

Peter: Well, it happens that you create something that… where the code needs to be very fast to make it work. Like demo-programming and… if you know what I mean (…) Like it is cool, to make something that doesn't have any value of use at all [laughs]

I: Is it the process itself you find interesting, or..?

Peter: Well, that as well… And just to write a code that must be fast and efficient. You must do a lot to make it work… more than you would have done in other settings

The example illustrates how the practitioners are stimulated to stretch oneself further, possibly beyond their current know-how and 'comfort zone,' in order to

reach greater satisfaction. When the object relations have manifested themselves as continuing relations a more permanent 'wanting structure' may emerge, which in turn facilitates and spurs further explorations. In short, it paves the way for a desire to learn (Jensen, 2007a).

### *5.5.3 Mediating Participation along Multiple Timescales*

The object relations in computer engineering allow for expansive participation not only in space but also in time. A characteristic feature of epistemic settings is that they are 'geared towards the future,' in the sense that they 'continually open up new questions and determine new frameworks of knowing' (Knorr Cetina, 2007). Our data indicate that these qualities are recognised by the engineers and accounted for in their ways of accomplishing everyday tasks. While securing that their work is efficient for the current challenge or task, they engage themselves in future scenarios and incorporate thoughts and ideas of what might happen on the technological scene in the next months and years. This topic came up in our group interview:

> Peter: When you build the program, you keep in mind that changes will occur. So, you make sure not to build it solely in accordance with the given specifications
>
> I: You need to continually reflect on what might happen in the future?
>
> Peter: Yes. Not only that you are aware of what's coming, but… that you secure the possibilities for adding new functionalities
>
> I: Yes…
>
> Martin: You will think *generic*. That it should be of general value, instead of… the banal mistake is that you incorporate lots of static values in your code. You should never do that. The code should just spit through all kinds of values, within the legal frames, of course. And the specific value may be given another place, which is not part of what is compiled…

The 'generic' way of thinking is thus related to standards for good work and forms a central competency in this profession. In this way, prospective scenarios become both a basis for engagement with objects and incorporated in their materiality, thus contributing to shape the realms of future practices. The heterochrony of practice in object-rich environments is acknowledged and explored more in detail by Lemke (2000) and Ludvigsen, Rasumussen, Krange, Moen, and Middleton (2010). However, while Lemke (2000) elucidates how the longer timescale processes related to human history produces effects in shorter timescale activities, the objectual practice of computer engineering – as in more epistemic settings – seems to include effects also in another direction, that is, the ideas and hypotheses of the future influence real-time activities in a quite concrete manner.

Furthermore, the objectual dynamics in this profession generate an orientation towards the future in which the engineers turn themselves into objects. Their everyday experiences with objects are continually considered and deliberatively utilised in future career movements. When the practitioners come in touch with new stuff as part of their problem-solving activities, they simultaneously employ techniques for staying informed on what is happening and for involving themselves in future scenarios. One engineer describes how he acts when new technological opportunities present themselves during work:

> It is extremely important to… have an idea of what's happening. So, you keep an eye on it, but you don't really go into it. Perhaps you try it out for ten minutes or so, just to see what it is, and then you put it aside. But then you know that the next time I face this kind of question I will have a closer look at it. (…) So, very often, at least as I experience it, you try to see what's coming up in say the next 6 months. And after a while, when you have finished what you were working on and stand in front of new tasks you may take it into use. (Peter, group interview)

These kinds of objectual practice encompass engagements in learning with an eye to delayed realisations of the not-yet-fulfilled. Moreover, while the engineers are offered opportunities for expansive participation in space and time, the reference points for such participation lie in local working tasks and specific problem-solving. In this regard, different dynamics of objectual practice coexist in interesting ways. Two dimensions of simultaneity come to the fore: For one, the knowledge objects in this profession often have the dual character of being both ready at hand and in process of transformation. Second, they may take a dual position as partakers in short-term cycles of problem solving at the same time as they lead into long-term series of career movement.

These dynamics offer opportunities for expansive inquiries and may contribute to establishing permanent structures of wanting among the practitioners (Jensen, 2007a). However, the different objects may also come in conflict and create tensions between different needs and requests. As one of our interviewees expressed:

> I regard my career as consisting of at least two tracks… one in the [name of firm] where I am currently employed… and one more lifelong career. And the two of them do not always have shared interests. (Martin, group interview)

Thus, the knowledge culture of computer engineering is also marked by an individualisation of responsibilities for negotiating between the different concerns. Professionals within this field of expertise need to develop strategies for navigating in the landscape of multiple and ambiguous object relations. While the perspectives of Knorr Cetina (2001) highlight how knowledge objects may encourage inquiries beyond the present and provide individuals with opportunities for 'looping their desire through the object and back,' her theories are less helpful in describing how the engineers decide upon what 'desire' should be given priority when conflicts arise.

### *5.5.4 Facilitating Reflexive Learning*

Multiple object relations seem to generate reflexivity and provide opportunities for a deliberate conduct of learning approaches. The tension between the requests for devoting oneself to current problems and at the same time keeping an eye on future career opportunities is manifested in the ways in which the engineers go about attaining new knowledge. The dual demands engender a double set of strategies, which seem to be subjected to deliberate conduct. As one of our interviewees explain, 'you learn in a completely different way if you just intend to get something to work, compared with situations where you need to know it well' (Peter, group interview). 'Surface learning' is related to direct implementation of information-like knowledge or to situations where the knowledge is not expected to maintain its validity in a longer perspective. Such learning is described as a matter of knowledge replacement:

> …what you learn is more like a method for achieving new knowledge, for in the next turn to erase it…or, for not to imprint it in your 'hard disk' [brain] for ever. You learn it, use it, and when you don't use it anymore you put it aside. And then the knowledge dies after a short while, and is replaced with new knowledge when you need it. (David, group interview)

Further, the replacement of knowledge is related to conducting skills in cognitive information processing. One engineer describes how he is aware when he tries to learn something that he would have to relearn it after a short period, and relates this to core skills acquired during education. As he puts it:

> I believe we are able to learn within extremely short time perspectives. More than the factual knowledge you learn a certain way of engaging in learning. In a way you learn to create units or shelves where you can store knowledge rather quickly. (Martin, group interview)

When the engagements in learning are related to in-depth knowledge that is expected to have more permanent relevance the efforts take a different character. In such situations, it is considered important to gain knowledge not only about what works, but also about how it works and about the general principles underpinning the technology. Thus, the learning strategies are much more systematic, comprising such activities as reading academic literature, working on purposely composed exercises, and testing possible solutions in offline environments. Our interviewees seem to be reflexive about which strategies should be enacted in different situations. An important dimension in their ways of relating to knowledge objects is thus related to deciding what should be investigated or learned for which purposes, and to matching the strategies employed to the character of the given challenge.

## 5.6 Concluding Remarks

This chapter has explored how continuous learning in professional work can be conceptualised and explored as objectual practice. Utilising computer engineering as an illustrative case, we have pointed to how engagement with complex artefacts and objects in the workplace may involve practitioners in wider circuits of knowledge advancement and serve as a vehicle for learning. Four interrelated sets of object-related dynamics were identified and discussed: (i) the objects' ways of stimulating interchanging modes of experimental and confirmative practice during work; (ii) the ways in which object relations serve to link local practice with wider knowledge worlds; (iii) the ways in which explorative engagement with knowledge objects allows for involvement along short and long timescales simultaneously; and (iv) the ways objects facilitate reflexive learning approaches among professionals.

The objectual dynamics pointed to in this chapter are fuelled by the technological objects' capacity to be simultaneously ready-to-be-used and in-a-process-of-transformation. These qualities provide rich opportunities for the practitioners to be involved in series of object relations that move between confirming and experimental modes of practice. Moreover, the interplay between the fixed and the open-ended contributes to this flow and questions the general tendency within debates about professional learning to see technical rationality as obstructive and contradictory to experimental modes of practice. In this professional field, engagement with objects that are 'ready to be used' seems to provide a basis for learning in terms of inviting and encouraging experimental practice**.** An interesting point in this regard is that the expansive practices of our informants typically are rooted in local, problem-solving activities that comprise objects and infrastructures that simultaneously allow for extended participation. Thus, instead of seeing technical problem-solving as restrictive, upon explorative practice it seems to provide a stepping stone for explorative activities.

The notion of objectual practice proposed by Knorr Cetina (2001) is productive for exploring explorative and expansive dimensions of work-based learning in object-rich domains. Compared with conceptualisations of objects and artefacts generated in sociocultural learning theories (e.g., Engeström & Blackler, 2005; Wertsch, 1993) Knorr Cetina shares with these perspectives a notion of objects as open-ended, dynamic, and productive upon the professional practice. However, by conceptualising knowledge objects as complex artefacts that play the role of both tool and object of inquiry in a given knowledge practice, she calls attention to how such objects have both explorative and instrumental uses and thus also to the interplay between the experimental and confirming dimensions in individuals' engagement with knowledge. This may sensitise us towards how individuals go about exploiting the dynamic qualities of knowledge and keeping issues open for investigation as a way of facilitating further learning, while at the same time solving current problems and securing the quality of work.

Moreover, the notion of knowledge objects as generated in epistemic practices may sensitise us to the role of objects in linking up different sites and 'levels' of knowledge development. The perspectives of Knorr Cetina (1999, 2001) highlight the interdependency between knowledge cultures and their practices, the knowledge objects created by and offered in these practices, and the role of knowledge objects in connecting individuals to the field of expertise. In this way, she provides a framework for theorising knowledge practices and learning beyond the boundaries of local communities or work organisations, which is increasingly important in a complex society based on a multiplicity of network structures and where individuals' patterns of action only partly may follow the patterns of their team or co-present colleagues. By conceiving the backbone of professional practice in terms of a relational dynamics that extends itself into the future, Knorr Cetina provides an understanding of professional work as creative but also as stabilised by collective conceptions of what constitutes good work.

What this perspective does not sufficiently address however is the role of contradictions incorporated in social practices, the significance of collective negotiations in the knowledge practices of professionals, or the role of bodily routines and discursive interaction for the enactment and realization of knowledge objects. Thus, rather than founding conceptualisations of professional practice and learning on this perspective alone, it may be combined with other perspectives to highlight the epistemic dimension of such activities.

## References

Akrich, M. (1992). The de-scription of technical objects. In J. Law & W. Bijker (Eds.), *Shaping technology/building society* (pp. 205-224). Cambridge, MA: MIT Press.

Billett, S., Smith, S., & Barker, M. (2005).Understanding work, learning and the remaking of cultural practices. *Studies in Continuing Education*, *27*(3), 219-237.

Bowker, G., & Star, S. L. (2000). Invisible mediators of action: Classification and the ubiquity of standards. *Mind, Culture, and Activity*, *7*(1&2), 147-163.

Bruni, A. (2005). Shadowing software and clinical records: On the ethnography of non-humans and heterogeneous contexts. *Organization*, *12*(3), 357-378.

Bucciarelli, L. L., & Kuhn, S. (1997). Engineering education and engineering practice: Improving the fit. In S. Barley & J. Orr (Eds.), *Between craft and science: Technical work in U.S. setting* (pp. 210-229). Ithaca/London: Cornell University Press.

Callon, M. (2002). Writing and (re)writing devices as tools for managing complexity. In J. Law & A. Mol (Eds.), *Complexities: Social studies of knowledge practices* (pp. 191-217). Durham, NC: Duke University Press.

Chaiklin, S., & Lave, J. (Eds.). (1996). *Understanding practice. Perspectives on activity and context*. Cambridge: Cambridge University Press.

Eklund, A.-C., Mäkitalo, Å., & Säljö, R. (2010). Noticing the past to manage the future. On the organization of shared knowing in IT-support practices. In S.Ludvigsen, A. Lund, I. Rasmussen, & R. Säljö (Eds.), *Learning across sites: New tools, infrastructures and practices.* Oxford, U.K.: Pergamon Press.

Engeström, Y., & Blackler, F. (2005). On the life of the object. *Organization*, *12*(3), 307-330.

Fischer, G. (2009) End-user development and meta-design: Foundations for cultures of participation. In V. Pipek, M.-B. Rosson, B. De Ruyter, V. Wulf (Eds.), *IS-EUD 2009*, LNCS 5435 (pp. 3-14). Berlin: Springer-Verlag.

Gherardi, S. (1999). Learning as problem-driven or learning in the face of mystery? *Organization Studies*, *20*(1), 101-123.

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., Trow, M. (1994). *The new production of knowledge*. London: Thousand Oaks.

Giddens, A. (1990). *The consequences of modernity.* Cambridge: Polity Press.

Guile, D. (2009). Conceptualizing the transition from education to work as vocational practice: Lessons from the UK's creative and cultural sector. *British Educational Research Journal*, *35*(3) , 259-270.

Jensen, K. (2007a). The desire to learn: An analysis of knowledge-seeking practices among professionals. *Oxford Review of Education*, *33*(4), 489-502.

Jensen, K. (2007b). Knowledge in post-traditional society. *Nordisk pedagogik*, *27*(1), 54-58.

Jensen, K., & Lahn, L. (2005). The binding role of knowledge: An analysis of nursing students' knowledge ties. *Journal of Education and Work*, *18*(3), 305-320.

Knorr Cetina, K. (1997). Sociality with objects: Social relations in post-social knowledge societies. *Theory, Culture and Society, 14*(4), 1-30.

Knorr Cetina, K. (1999). *Epistemic cultures.* Cambridge, MA: Harvard University Press.

Knorr Cetina, K. (2001). Objectual practice. In T. Schatzki, K. Knorr Cetina, & E. von Savigny (Eds.), *The practice turn in contemporary theory* (pp. 175-188). London: Routledge.

Knorr Cetina, K. (2002). Transitions in post-social knowledge societies. In E. Ben Rafael & Y. Sternberg (Eds.), *Identity, culture, and globalization* (pp. 611-628). Leiden: Brill Academic Publishers.

Knorr Cetina, K. (2006). Knowledge in a knowledge society: Five transitions. *Knowledge, Work and Society*, *4*(3), 23-41.

Knorr Cetina, K. (2007). Culture in global knowledge societies: Knowledge cultures and epistemic cultures. *Interdisciplinary Science Reviews*, *32*(4), 361-375.

Knorr Cetina, K., & Bruegger, U. (2002). Traders' engagement with marketsa postsocial relationship. *Theory, Culture & Society*, *19*, 161-185.

Lahn, L., & Jensen, K. (2006). Models of professional learning. Exploring the epistemic tool perspective. *Knowledge, Work and Society*, *4*(3), 63-82.

Lash, S., & Urry, J. (1994). *Economies of signs & space.* London: SAGE Publications.

Lemke, J. (2000). Across the scales of time. Artifacts, activities, and meanings in ecosocial systems. *Mind, Culture and Activity, 7*(4), 273-290.

Loogma, K., Ümarik. M., & Vilu, R. (2004). Identification-flexibility dilemma of IT specialists. *Career Development International*, *9*(3), 323-348.

Ludvigsen, S., Rasmussen, I., Krange, I., Moen, A., & Middleton, D. (2010). Temporalities of learning in intersecting trajectories of participation. In S. Ludvigsen, A. Lund, I. Rasmussen, & R. Säljö (Eds.), *Learning across sites. New tools, infrastructures and practices*. Oxford, UK: Pergamon Press.

Mackenzie, A. (2005). The performativity of code: Software and cultures of circulation. *Theory, Culture & Society*, *22*(1), 71-92.

Mäkitalo, Å., & Säljö, R. (2009). Contextualizing social dilemmas in institutional practices: Negotiating objects of activity in labour market organizations. In A. Sannino, H. Daniels, & K. Gutierrez (Eds.), *Learning and expanding with activity theory* (pp.112-127). New York, NY: Cambridge University Press.

Miettinen, R., & Virkkunen, J. (2005). Epistemic objects, artefacts and organizational change. *Organization*, *12*(3), 437-456.

Nerland, M. (2008) Knowledge cultures and the shaping of work-based learning: The case of computer engineering. *Vocations and Learning: Studies in Vocational and Professional Education, 1*, 49-69.

Nespor, J. (1994). *Knowledge in motion. Space, time and curriculum in undergraduate physics and management*. London: Falmer Press.

Nowotny, H., Scott, P., & Gibbons, M. (2001). *Re-thinking science. Knowledge and the public in an age of uncertainty*. Cambridge: Polity.

Østerlund, C. (2008).The materiality of communicative practices. *Scandinavian Journal of Information Systems*, *20*(1), 7-40.

Pickering, A. (1995) *The mangle of practice: Time, agency & science.* Chicago: University of Chicago Press.

Pickering, A. (2001) Practice and posthumanism: Social theory and a history of agency. In T. Schatzki, K. Knorr Cetina, & E. von Savigny (Eds.), *The practice turn in contemporary theory* (pp. 163-174). London: Routledge.

Saari, E. (2003). *The pulse of change in research work.* Unpublished PhD dissertation. Helsinki University.

Schatzki, T., Knorr Cetina, K., & von Savigny, E. (Eds.). (2001). *The practice turn in contemporary theory* . London: Routledge.

Schon, D.A. (1987). *Educating the reflective practitioner*. San Francisco: Jossey-Bass.

Stutt, A., & Motta, E. (1998). Knowledge modelling: An organic technology for the knowledge age. In M. Eisenstadt & T. Vincent (Eds.), *The knowledge web. Learning and collaborating on the net* (pp. 211-224). London: Kogan Page.

Wenger, E. (1998). *Communities of practice: Learning, meaning, identity*. Cambridge: Cambridge University Press.

Wertsch, J. (1993). *Voices of the mind. A sociocultural approach to mediated action.* Cambridge, MA: Harvard University Press.

Wartofsky, M. (1973). *Models*. Dordrecht: Reidel.

# Chapter 6
# Learning through and about Practice: A Lifeworld Perspective

**Gloria Dall'Alba & Jörgen Sandberg**

The University of Queensland, Australia

**Abstract** A diverse range of practice-based approaches has increased our understanding of learning in preparation for work and in the workplace. While these approaches are rich and varied, they generally conceptualise practice as a singular, relational whole, thereby overlooking the multiplicity of practice. Moreover, practice-based approaches commonly adopt an epistemological focus that neglects the ontological dimension central to learning. In other words, these approaches emphasise the knowledge or activities that are learned, at the expense of attention to who learners are becoming and what this process of becoming involves. We adopt a lifeworld perspective in proposing an alternative approach that focuses on development of 'ways of being,' such as ways of teaching or managing. Ways of being guide and direct our activities, giving meaning to what we do and who we are. We outline the historical development and key features of this alternative approach. We use empirical material from our research on learning in higher education and the workplace in demonstrating how a lifeworld perspective can provide a new and innovative approach to practice-based learning.

## 6.1 A Need to Reexamine Learning through Practice

In recent years, a range of research approaches has focused on the performance and situatedness of practice in attempts to explain learning through practice. Common practice-based approaches are communities of practice (Wenger, 1998), sociocultural theory (Vygotsky, 1978), activity theory (Engeström, 2005) and actor-network theory (Law & Hassard, 1999). Practice-based approaches such as these have increased our understanding of learning in preparation for work and in the workplace. While these approaches acknowledge the importance of knowledge and learning for work performance, to varying extents they also highlight the broader social, historical context in which this performance occurs. As Nicolini, Gherardi, and Yanow (2003) assert, adopting a practice approach allows us to 'recognize the inherent social, processual, and historical nature of knowledge processes' that are constitutive of work performance and its development (p. 25). For instance, the knowledge that is developed and used in professional practice over time is influenced by organisational settings, clients and professional associations (Gherardi, 2006). When practice becomes the locus, knowing and

S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2_6, 

learning are seen as relations between persons and world, which are integral to practice. As Lave (1993) argues, knowing cannot be isolated to the head or the bodies of individuals or to 'assigned tasks or to external tools or to the environment, but lie instead in the relations among them' (p. 9).

While practice-based approaches are rich and varied, they generally conceptualise practice as a singular, relational whole. Moreover, they often assume that learning to engage in practice involves achieving sufficient mastery of this whole. For instance, Lave and Wenger's (1991) notion of entry into a practice community through 'legitimate peripheral participation' (LPP) involves learning progressively to participate in the activities of a community, so that movement occurs from periphery to full participation in practice. Participation in practice is typically presented in terms of a singular form of practice. Vygotsky's (1978) concept of the zone of proximal development (ZPD) is similar in this respect. However, as Fuller and Unwin (2004) observe, both newcomers and experienced practitioners report learning from each other. Engeström and Miettinen (1999) also argue that Lave and Wenger's model does not adequately account for movement outwards and in unexpected directions, as well as objections to existing practice. Not only can these challenges be made to the notion of practice as a singular, relational whole, but also practice is carried out in a multiplicity of ways within and across diverse settings (for example, see Billett, 2001; Dall'Alba, 2009; Mol, 2002; Sandberg & Pinnington, 2009; Schutz, 1945).

When learning to engage in practice is seen in terms of unidirectional mastery of a singular practice, not only is the multiplicity of practice overlooked but also what is learned is not problematised (see also Dall'Alba & Sandberg, 2006). It is possible to 'learn' to perform routines and activities with a limited, or even inappropriate, understanding of what the practice in question entails (see, for example, Dall'Alba, 2004, 2009; Sandberg & Pinnington, 2009). This is one of the potential risks associated with highlighting learning through practice where similar emphasis is not given to learning about practice (Dall'Alba, 2009). Learning through practice and learning about practice are both necessary to skilful performance of practice and should be considered in relation to each other.

In exploring learning and participation in practice, practice-based approaches commonly adopt an epistemological focus that emphasises the knowledge or activities that are learned or used in preparing for, or engaging in, practice. For example, Engeström (2005) adopted such an epistemological focus in describing an intervention involving health professionals and families of children with health problems, which sought to improve medical care for children in Helsinki. He argues that through this intervention, the health professionals and families learned a new pattern of activity that included a struggle between old and new concepts relating to care of the children, leading to an expanded network of care that incorporated the various health professionals whom the children and their families consulted. In adopting a focus on knowledge or activities that are learned, many practice approaches overlook or downplay the ontological dimension central to learning or, in other words, attention to who learners are becoming, both

individually and collectively. How this process of becoming occurs is also commonly overlooked (see also Lee & Anderson, 2009). While there is some practice-based research on identity (for example, Gherardi, 2006; Wenger, 1998), this research typically assumes that practice is a singular, relational whole, albeit with interaction with other practices. Moreover, there is generally not adequate recognition that 'learning entails both personal and social transformation – in short, ontological change' (Packer & Goicoechea, 2000, p. 235).

In this chapter, we elaborate a *lifeworld perspective* on learning through and about practice. This perspective features both the multiplicity of practice and integration of epistemological with ontological dimensions of learning to engage in practice, thereby extending current practice approaches. Although several concepts from a lifeworld perspective have previously featured in various practice-based approaches, they have not necessarily been used consistently throughout the research (Sandberg & Dall'Alba, 2009). We argue that a more systematic, integrated utilisation of a lifeworld perspective has the potential to substantially advance our understanding of what constitutes learning through and about practice.

## 6.2 Historical Development of Lifeworld Perspective

The notion of the lifeworld is attributed to Husserl's phenomenology (see, for example, Husserl, 1936/1970) and has been modified and extended by phenomenological philosophers such as Heidegger (1927/1962), Sartre (1943/1957), Merleau-Ponty (1962/1945), Gadamer (1960/1994) and Schutz (1945). As these scholars developed the notion of the lifeworld in line with their own specific knowledge interests, there are commonalities as well as some tensions in their various conceptualisations. In this chapter, we briefly outline the origins of the concept of the lifeworld and identify some related concepts that are relevant to learning through and about practice, drawing primarily on the work of Heidegger (1927/1962) and Merleau-Ponty (1945/1962). We recognise that our analysis could be extended through incorporating additional concepts from other scholars, but in the interests of brevity we limit ourselves to a small number of key concepts (see Sandberg & Dall'Alba, 2009, for a more elaborated treatment of related concepts). The concepts we outline here should not be understood in isolation, but together highlight central dimensions of learning through and about practice.

Husserl's concept of the lifeworld (for example, Husserl, 1936/1970) was a reaction to an idea gaining ground within the natural sciences at the time, that human beings can adopt an objective, 'outsider' stance towards the world. In contrast, Husserl described the lifeworld as the everyday world we share with others and things, and with which we are inextricably intertwined through lived experience. The lifeworld precedes reflection and scientific investigation;

distancing ourselves from our observations or experience presupposes this lived experience. Through our lived experience in engaging with our world, we can come to know. For instance, as we move about our world, we encounter both physical objects and patterns of social behaviour, which we learn to negotiate as part of making our way in the world.

While acknowledging the importance of Husserl's notion of the lifeworld, Heidegger (1927/1962) was dissatisfied with its epistemological focus, as his interest was ontological or, in other words, he was interested in exploring the being of beings. More specifically, Heidegger was concerned with exploring what it means for something to be, which he considered a prior question to how we come to know (1927/1962, p. 31). In contrast to Husserl's notion that consciousness is directed to others and things in the world, Heidegger argues that our primary relation to our world is 'being-in-the-world' (Heidegger, 1927/1962, pp. 49-58). His concept of being-in-the-world highlights that we are continually engaged with various activities, concerns, equipment and other people through a range of ways of being-in-the-world, such as parenting, teaching, managing, nursing and so on. Lifeworld ontology regards our *entwinement with others and things* as our primary form of being, in contrast to traditional ontology that assumes we are separate from the world but become connected to it during our various activities. Hence, from a lifeworld perspective, learning is made possible through our entwinement with our world, rather than in terms of a subject in relation to an object. Indeed, phenomenology is a radical departure from separation of subject and object.

In entwining us with our world, our *ways of being* provide a sense of purposiveness and agency that guides and directs our activities. For example, when we teach, we do what teachers do and we also understand ourselves as teachers. This means our knowing extends beyond what we know or can do to who we are. Through our ways of being, we understand ourselves as practitioners, practice as consisting of particular activities in which we engage with others, and things as equipment we use in carrying out our activities. These ways of being give meaning, then, to what we do and who we are.

Our ways of being are not only imbued with meaning, but they are also embodied and enacted in social practice. Merleau-Ponty's (1945/1962) notion of the *lived body* – which has influenced Bourdieu's (1977) concept of 'habitus' and Giddens's (1984) 'practical consciousness' – provides insight into embodiment. Merleau-Ponty's (1945/1962) concept of the lived body is not limited to the individual, physical body, but is the body as lived. Nor is the lived body limited to the bounds of our own body, but it can be extended by incorporating equipment, such as when we drive a car or use a computer to access the internet. As the lived body is the means by which we are entwined with, and have access to, our world, it enables us to learn. Through the lived body, we can take over others' ways of being during socialisation, education and work, as we learn to engage in forms of practice that are unfamiliar to us. So our ways of being are personal-social (Dall'Alba, 2009; Sandberg & Pinnington, 2009) in the sense that we take over

ways of being from others in social practice, embodying and making these ways of being our own.

As our learning incorporates not only what we know and can do, but also who we are, learning can transform us. For example, as we learn new forms of practice, we *become* teachers, architects, lawyers or social workers (Dall'Alba, 2009). This process of becoming is always open and incomplete, as well as constrained by our own understanding, and our entwinement with others and things. This transformation is assumed, but taken for granted, in most research on learning from a practice perspective.

Below we explore learning through and about practice, using the notion of developing ways of being. This allows us to incorporate both the multiplicity of practice and integration of epistemological with ontological dimensions of learning to engage in practice. We illustrate empirically how the notion of ways of being provides a means of exploring both learning in preparation for practice and learning in practice. We begin by using the notion of ways of being to explore the practice of corporate law and thereafter investigate how learning through and about practice takes place among students learning to be medical practitioners.

## 6.3 Ways of Being in Workplace Contexts

The multiplicity of practice is evident in a study of competence in corporate law in a large international law firm (Sandberg & Pinnington, 2009). Thirty lawyers from all levels of the firm were interviewed, including junior lawyers, senior lawyers, senior associates and partners, with supplementary observations of the lawyers during interviews and in the vicinity of the offices in which they practised corporate law. The main task of corporate lawyers is to assist corporations with various business transactions, such as privatisation of organisations, mergers and acquisitions, and joint venture agreements. Although the lawyers performed the 'same' work, their ways of practising corporate law differed. Four different ways of practising corporate law were identified, each one forming a distinct competence in corporate law. Moreover, in each way of practising, specific understanding of what the practice of corporate law involves (that is, an epistemological dimension) was interwoven with specific understanding of what it means to be a corporate lawyer, including self-understanding (that is, an ontological dimension). Below we illustrate these features in describing two of the four different ways of practising corporate law, namely, *minimising legal risks* so corporate clients can achieve what they want to achieve and *managing commercially important legal risks* so clients can achieve what they want to achieve.

Lawyers who practised corporate law by *minimising legal risks* endeavoured to identify and minimise legal risks throughout each step of the business transaction,

such as in taking instructions from clients, conducting legal analysis, and documenting and negotiating the deal:

> Remember we were talking about a lawyer is just someone who helps a company with their transactions from a legal perspective. When they come to you with a transaction you have to say, 'What could go wrong?' That's what I mean when I say a risk, what could go wrong with that from a legal point of view? If you can do that [identify risks] successfully, then what can we do to mitigate that risk?... To use an example that we've already spoken about, the acquisition, what could go wrong for a purchaser? Well, they buy something and it is a 'dog.' What can we do? … and merger & acquisition is just one example but a lot of the things we do it's, 'What could go wrong?' (Male Senior Associate no. 12)

As the quote above displays, minimising legal risks involves adopting a strong legal perspective that demands legal rigour throughout the transaction to uncover potential legal risks. It is especially significant in the initial phase of the transaction to ensure all the important problems are identified and addressed:

> What's most critical is the legal rigour you apply to the initial analysis of legal issues … because if you miss a point at that stage, then the documents you prepare are not going to include that problem, or include a way of addressing that problem.… It will piss your client off because they thought that they had all the points covered…. So it is a lawyer's greatest fear, I think, that they have actually missed a particularly important point. (Male Senior Associate no. 22)

The strong legal perspective is not only embedded in the activities used by the lawyers for minimising legal risks, but is also interwoven with an understanding of themselves as *legal services providers*:

> You're trying to protect your client's interests, you know, from a legal perspective … in the context of them performing some transaction, you know, and what those transactions are could be that they are buying or selling a business like we've talked about. Could be they want to raise capital. Could be they want to enter into an agreement that is important to them. But you're trying to protect their interests and help them do it too sometimes … and you are trying to help them in all steps of the process.… My role then is a provider of legal services. (Male Senior Associate 12)

In contrast to the lawyers above who practised corporate law by minimising legal risks, the lawyers *managing commercially important legal risks* did not set out to identify all legal risks and then minimise them. Instead, they identified those legal risks that may have a substantial impact on the client's business and then managed those risks as efficiently as possible throughout the transaction. In particular, this way of practising corporate law means managing the legal risks that are *commercially* important to clients. The strong commercial focus inherent in managing commercially important legal risks as a way of practising corporate law is exemplified by a lawyer who described the significance of the industry environment for working with a client from the electricity industry:

> I think you need first of all to understand the industry in which your client is functioning. You need to understand the physicality of it. What it takes to generate electricity. You need to understand the economics around the physicalities. What is the demand for electricity, in this case? Where do you get coal from? Where do you get fuel from? And

> over that you need to understand the regulatory and policy overlay. Are we going to burn more coal or less coal or are we going to burn gas instead of coal? Then you need to understand the people. Who are the decision-makers and what are the particular pressures on them? And if you sort of pull all those things and bake it, the cake is the client's situation or problem and that is the environment that you have to work on to give them advice. (Male Partner no. 23)

The strong commercial focus in managing commercially important legal risks that is exemplified above means the lawyers' most central activity is not applying legal rigour throughout the transaction, but gaining a good understanding of the company's commercial situation: 'The critical part is keeping focused on what it is that the client is trying to achieve and not becoming, you know, too legalistic. So keeping commercially focused in that sense through the whole process' (Female Senior Associate no. 5). In particular, adopting a commercial focus meant 'understanding the commercial impact of what you are saying to them. Not just saying the law says x, that's just a given. It's like the law says x but we could do x, y and z to improve your commercial position' (Male Senior Associate no. 7).

The strong commercial focus shown above was not only evident in the activities used for managing commercially important legal risks as a way of practising corporate law, but is also intertwined with self-understanding as a *business advisor*. As business advisors, they advise the client legally from a business perspective and understand themselves as part of the industries in which their clients operate:

> I like to see myself as a part of those industries and … a person who operates in one of those industries can call up at any stage of the project, on whatever part of the job that they do, and say, 'Look we have a problem, could you help us sort it out?' So, as a person who doesn't particularly specialise in one particular area of the law but who is able to assist in all aspects of the practice of an industry. (Male Senior Lawyer no. 21)

This study of corporate law illustrates that in each way of practising corporate law, a specific understanding of what it means to be a corporate lawyer (the ontological dimension) is entwined with a specific understanding of what corporate law involves (the epistemological dimension). For instance, in minimising legal risks, lawyers see themselves as legal services providers who apply legal rigour throughout the business transaction. In contrast, in managing commercially important legal risks, lawyers understand themselves as business advisors who strive to develop a sound understanding of the commercial situation of the client's company. Moreover, this study also shows that practice is not made up of one relational system, but includes multiple ways of being corporate lawyers (see Sandberg & Pinnington, 2009, for further elaboration).

## 6.4 Learning Ways of Being in Higher Education Contexts

Differences in ways of being such as those outlined above, as well as the integration of epistemological with ontological dimensions, are evident not only among experienced practitioners, but also among aspiring practitioners. In longitudinal research involving Swedish students from a single cohort who were learning to be medical practitioners (Dall'Alba, 2009), the students were observed in consultations with patients, and interviewed about their practice of medicine and the medical programme. In this research, it was evident that threads from the past were carried forward into the present, such that issues of concern in contemporary medical programmes often 'echo the historic tensions' (Bonner, 1995, p. 348), while also reflecting issues in the broader society. For example, the medical students experienced challenges in creating constructive, ethical relationships with patients, which has been a recurrent issue in practitioner-client interactions.

As the development of ways of being is embedded within particular social, historical, cultural, material contexts, it is not surprising that learning is coloured by context (Dall'Alba, 2009; Säljö, 1991). This is clearly evident when we consider what aspiring medical practitioners learn today compared with what they learnt during the early 20th century, when bloodletting was one of the few treatments available. In the historical development of medicine, early healers and diviners who sought to appease supernatural forces gave way to the technologised, institutionalised and bureaucratised practice of contemporary medicine. This historical development has parallels in other kinds of practice and demonstrates that there is not one, singular practice, but practice continues to evolve over time and in various directions (Dall'Alba, 2009; Engeström, 2005). At any point in time, threads from the past manifest themselves in diverse ways and to varying extents in contemporary practice. The historical is interwoven with the new (see also Engeström, 2005), although often in modified form.

Not only is the multiple, social nature of practice evident through historical development, but also practice is enacted and embodied in a range of ways within and across settings (for example, see Billett, 2001; Dall'Alba, 2009; Mol, 2002; Sandberg & Pinnington, 2009; Schutz, 1945). The medical students had to learn to deal with differences of this kind as they sought to enter medicine. Although the students were enrolled in the same medical programme, they did not all learn to practise medicine in the same way. For instance, in their practice of medicine, some of the students gave prominence to the part they themselves played in diagnosing and treating symptoms of disease, as well as informing the patient. In this form of medical practice, the reference point was what the medical practitioner could do for the patient:

> People who seek help from health care or come in due to other causes, [we have] to make a judgement about their, I mean are they sick or healthy? It's a difficult judgement. I mean it's there you, should the patient be admitted to hospital or not? And so the patient is admitted and then you have to decide: is this something that can be treated or can we only,

> I mean can we ease it? And so you put in place different measures. Can we operate on this or not? And you make these kinds of judgements. That's the central thing, to make some sort of risk assessment. To get, collect a lot of information, what the patient remembers from investigations that have been done and then make a judgement, come up with a diagnosis, treatment. And then take care of it all, yeah, not least important to take care of contact with the patient and surroundings and then get it to work in the context of others, other health staff.

> It's important to establish good contact [with the patient] right from the start because if you don't, if you get completely, if you don't get the right information there, then it's, then it can go really wrong…. But if you get a good medical history at the start then, then it's really important. At the same time, you can already build up some kind of trust maybe….

> It used to be the case that the doctor said you should take this tablet and people did as they [laughing] were told. But it doesn't really seem to be like that today. But then you have to sell your message to the patient somehow, that this is good for you in some way…. But, I think those who are appreciated by patients are the ones who take their time to explain a bit extra, you might say…. I mean they've been unwell in some way so they've come, but maybe they've never really had explained to them why they're, what the problem is and what you're going to do to make things better. So I think that's an important, and that's the reason there are more and more formal complaints made and things like that, because the patients aren't informed. If you, if you, it's that, I don't know if it's true but some people say that if you establish good contact then you can make mistakes, not incredibly clumsy, but you can make mistakes that happen and there's some understanding for that, if you have good contact [with the patient]. (Lennart, 2nd semester of 5th year, pp. 20-25)[9]

In contrast to the example above, other medical students in the study gave less prominence to the part the medical practitioner plays in the practice of medicine. Instead, they practised medicine through collaborating with the patient on a health problem that was embedded within the patient's life, which had implications both for diagnosis and coming to an agreement about treatment. The frame of reference for this way of practising medicine was the patient's needs and broader life situation:

> The task is first of all to find out what the patient wants, then diagnose any sicknesses there might be and investigate them, and treat what's possible to treat and see to it that the patient is satisfied…. So that's the main task, as much as possible to cure or ease, if that's what the patient wants. But I also think that you have to leave a lot up to the patient to decide about what you do or don't do, that whatever they decide is OK. If they say, 'No, I don't want to have an operation, I think it's completely OK to be incontinent'. And even if I can't understand and say that this is a simple operation, you'll feel much better afterwards or you'll function much better, then a bit of the challenge lies in being able to respect their decision. Even if I've explained how it is, then it must be up to them to decide….

> So then my task is more or less to help the patient work this out. To work out what their problems are due to, is it serious, can anything be done about it and to present the options and help the patient…. And guide them through this process…. That's the challenge. So it

[9] Names of students have been changed for anonymity and extracts in this section translated from Swedish.

> ends up being different for different patients and what's important varies in different situations. (Lotta, 2nd semester of 5th year, pp. 84-87)

The differences in ways of being medical practitioners that are displayed in these quotes are not simply variations in personality or style, but resulted in different health care for patients. Differences of this kind were evident across the student cohort and also at the end of the medical programme (Dall'Alba, 2004, 2009), as well as among experienced medical practitioners (Stålsby Lundborg, Wahlström, & Dall'Alba, 1999).

The students' learning was not only an individual matter, but can be described as personal-social. In learning the practice of medicine, the students took over others' ways of being medical practitioners, although not always in an unproblematic or uncontested way. In addition to encountering different ways of practising medicine, the students were sometimes instructed to carry out an activity or procedure in dissimilar ways in different settings: 'In one hospital something is done in a particular way, and it works there. Then you come somewhere else: "You can't do that…. We do it this way." Then you see, ah ha, presumably it works both ways' (Karl, final semester, p. 45). In attempting to take over others' ways of being medical practitioners, there is a risk that activities or procedures are mastered with limited understanding of their importance for practice. For instance, the medical students were instructed in communication techniques. Some of the students used these techniques in a question-and-answer interchange with patients during consultations as a means of reaching a diagnosis. Others placed greater emphasis on listening to identify what patients were seeking help with, discussing patients' illnesses with them as part of collaborating to promote their health and well-being.

The development trajectories for the medical students over time were also diverse, leading to distinctly different ways of being medical practitioners. This diversity in trajectories challenges the notion of unidirectional development towards mastery of a singular form of practice, as well as an additive accumulation of knowledge or skills (see also Dall'Alba & Sandberg, 2006). Transformation and continuity were evident in the students' unfolding ways of being medical practitioners, which included shifting awareness of the self as medical practitioner. In the students' accounts of their learning, the epistemological dimension is interwoven with the ontological: What they learned is intertwined with who they were becoming, as we see in the interview extracts above and below. In the example that follows, one of the medical students, Eva, illustrates some of the complexity of this entwinement through her experience of doing a locum in an X-ray section of a regional hospital in the summer immediately before her final semester. She describes the way in which she was made aware of her existing medical knowledge through learning something completely new. Eva also describes the personal demands of making judgements and providing information that are significant for patients' health, the process of taking over appropriate ways of being from an experienced medical practitioner

and the uncertainty of asserting herself in relation to other health staff as she learned to become a medical practitioner:

> When you start as a medical intern in X-rays, I didn't know this really, but you get to do these investigations using contrast media where you inject contrast dye into one of the body's openings or into an opening that's been created somewhere. So it's, like the large intestine and the small intestine and into the kidneys you can inject it. And if there's a connection somewhere, I mean if the intestine has been [surgically] attached to the stomach, then you can see if there's a leak in the connection and things like that. Most of all, the big thing is taking X-rays of the colon where you look at the large intestine to look for cancer, above all. That's what you really have to look carefully for. So that's what I did and I learnt how to do it…. And the senior doctor would look at my analysis and also sign the result if it was OK…. And just this colon X-ray where you look for signs of cancer, it's really important. It's really unnerving to write a report that says 'No suspected malignancy', like. So it was a real relief [to have it checked]….
>
> And especially the last two weeks were incredible because I had, there was an old, retired senior doctor who was there doing a locum. Well, he'd only been retired six months but he came in to do a locum during the summer. And he really looked after me because he was there the last two weeks and I could come out from my contrast dye investigations and he'd say, 'Listen Eva, look in cupboard 3, I saved an interesting lung for you. I'll be there soon, I just have to finish writing this'. And then he'd ask, 'What do you see now?'…. He was a wonderful support when I, because the longer I'd been there the more contrast dye investigations I did, because they were short of interns towards the end, or they were short of staff altogether, so I had to look after that. And that meant I got into curly situations sometimes and inquiries I hadn't seen so many of at all, there were maybe three of that kind the whole summer so it wasn't easy to develop a routine for them. And he was there the whole time, a fantastic help….
>
> I learnt a heap and it was really fun to do something completely new, in fact. So you could go in without preconceptions and at the same time you were aware you knew a whole lot, because you understood a whole lot and that. And you can reason around it and that, so there's clearly a difference from just coming in without ever having the medical program behind you….
>
> Yeah, then you learnt about interacting with patients and I felt you were in quite a difficult situation there because they often, yeah, they were referred because you were looking for something. But you didn't want to stand there and say what you'd seen because I'd only done the investigation that, actually, when I did the investigation I concentrated mostly on getting good pictures…. And there was someone who'd found out from another investigation that he had cancer and he asked me how large it was and what would be done now. And how do you respond? We only had small changing cubicles with just a curtain you pulled across, and you had to stand there and talk with someone about his recently discovered cancer. And I felt, you got some of that as well, to meet them in their anxiety and fear about the investigations and, yeah.
>
> And then the collaboration gave so much, you worked really closely with a nurse and an assistant in nursing in a way you almost never had before, I think…. And I can also say I was a bit nervous about this, about how it would go when you come out [after the medical program], this collaboration with the nurses. And you don't have, you definitely don't have, yeah no real grip on it, and you have an enormous respect for all those older, very skilled nurses and you come out completely green. And you've heard stories about how they put you in your place and, yeah, you haven't really had any help in dealing with this.

> And I don't really know who I am and what I have a right to, how much I can assert myself and how, and things like that. And it was actually such a relief, really, and I had it confirmed that it worked really well. It wasn't a problem at all.
>
> Yeah, it was such a relief because a weight fell from my shoulders that will make it easier to go out [after the medical program]. Actually to have shown that, yeah, and it was really clear in this type of work that you're a team. Because there were, like, three people in the room who helped to make it work … but we were a team and it was really fun. (Eva, final semester, pp. 1-7)

While the students learnt from experienced medical practitioners and other health personnel as Eva describes above, at times some students questioned the way in which these practitioners engaged in practice:

> [On a surgical ward during a hospital placement] I was standing beside a really sick patient – who had admittedly improved a bit – and managed to make contact with the patient in a way that actually maybe the doctors don't so often make time for. And I can feel, yeah, it can irritate me, that they rush over this, in fact. And then I thought, that ahh, these moments are worth so much. The brief moment of eye contact and maybe just silence and, yeah, contact. And so I really felt that you can't forget this, when I'm standing there as a doctor….
>
> But you maybe can say that the surgical specialties maybe are more like that…. Now we've operated on you, so you'll see it will be fine. [Pause, then laughs] Well I suppose, it's, it's true. I mean they've done what they need to do and that's fine. But if you think this other [contact with the patient] is important, too … it's confirmation of the trust that I'm after…. But there isn't so much room for it in the medical program. That's why these little flashes come sometimes like this: Yes, that's right, exactly. This is something I don't want to forget. (Eva, 2nd semester of 4th year, pp. 16-17)

Eva and the remaining students in the study used their observations of a range of ways of being medical practitioners that they encountered in clarifying the kind of medical practitioner they strived to become:

> [During the medical program] I get to see different doctors and to work in different ways, and see that this is a good role model and this is someone who can teach me—you have to choose your teachers a bit—and this is someone who can be an appalling example [laughing]. (Lotta, 2nd semester of 5th year, p. 88)

So taking over others' ways of being was not necessarily an unquestioned or unreflected process, although it proved to be a central aspect of learning to be medical practitioners.

As noted above, although the students in this study were enrolled in the same medical programme, they learnt distinctly different ways of being medical practitioners, as Lennart and Lotta demonstrate through their different frames of reference for the practice of medicine (see Dall'Alba, 2009, for elaboration of how these differing frames of reference played out in their practice of medicine). Moreover, learning to be medical practitioners is personal-social, as evident in the way Eva takes over ways of being a medical practitioner from experienced colleagues, while making these ways of being her own and clarifying for herself the kind of medical practitioner she wants to be. In the students' accounts of

learning to be medical practitioners, the epistemological is intertwined with the ontological dimension; what they learn is interwoven with who they are becoming.

## 6.5 Learning from a Lifeworld Perspective: Developing Ways of Being

In this chapter, we have discussed and illustrated how a lifeworld perspective provides a basis for a new and innovative approach to practice-based learning, which offers advancements over previous approaches. In particular, we have explored how a lifeworld perspective and its notion of ways of being enables us to investigate both the multiplicity of practice and the integration of epistemological dimensions (that is, the knowledge that is learned) with ontological dimensions (that is, who learners are becoming) of learning through and about practice. We have demonstrated the relevance and importance of these features in empirical research on learning in higher education and in the workplace.

Against the background of the historical development of a lifeworld perspective, we have primarily utilised the notion of ways of being for exploring practice-based learning in educational programmes and at work. We have illustrated empirically how the notion of ways of being provides a means of exploring both learning in preparation for practice and learning in practice. Other concepts within a lifeworld perspective, such as 'equipment' and 'being with others,' can be used to further explore the enactment of practice and learning to engage in practice. Below we identify some features of a lifeworld perspective on learning that most closely relate to the key concepts we have discussed in this chapter. More elaborated treatments of learning from a lifeworld perspective can be found elsewhere (see, for example, Dall'Alba, 2009; Dall'Alba & Barnacle, 2007; Dall'Alba & Sandberg, 2006; Heidegger, 1998/1967; Thomson, 2001).

Similar to other practice approaches, a lifeworld perspective confirms the need for close investigation of the performance of practice within the social, historical, cultural, material contexts in which learning to engage in practice takes place. Not only is learning embedded in such contexts, but a lifeworld perspective also highlights the importance for learning of our entwinement with world. From a lifeworld perspective, learning is made possible through this entwinement. In other words, while we inhabit our world, it also contributes to making us who and what we are through encounters with others and things, as the study on medical students demonstrates.

As we bodily engage in learning through and about practice, our embodiment provides a means by which we learn to engage in practice. We learn to extend our bodies through incorporating equipment that is necessary for practice, such as when Eva used contrast dye and X-ray equipment in examining patients' internal organs. We also learn through taking over others' ways of being during socialisation, education and work. In other words, we take over ways of being

from others in social practice, embodying and making these ways of being our own, as Eva did when learning from a retired senior medical practitioner. However, both Eva and Lotta remarked that observing different ways of practising medicine enabled them to clarify the kind of medical practitioner they wanted to be. They did not simply unquestioningly take over others' ways of being medical practitioners.

The ways of being we encounter and develop give meaning, then, to what we do and who we are. In doing so, our learning can transform us in a process of becoming engineers, forensic scientists, historians or visual artists. This process of becoming is always open and incomplete, while also constrained by our understanding of the practice in question and by entwinement with our world. Constraints on understanding are evident among the corporate lawyers and medical students quoted above, especially when we compare different ways of being corporate lawyers or medical practitioners.

As we note above, these features of a lifeworld perspective on learning draw attention to the multiplicity of practice, in contrast to a prevalent view of practice as a singular, relational whole. A lifeworld perspective also highlights the centrality of the integration of epistemological with ontological dimensions for learning to engage in practice. Our learning extends beyond what we know and can do to who we are, as shown in our empirical examples about the practice of corporate law and medicine.

The notion of ways of being we have discussed in this chapter also has implications for educational and workplace practice. The multiple ways in which practice is enacted, including threads of the historical and the new alongside each other, can be a source of confusion for practitioners, as Karl noted above. But the multiplicity of practice can also open possibilities for renewing practice. In supporting professional development in formal education and the workplace, this multiplicity can provide rich opportunities for critically reflecting upon existing forms of practice and how they can be improved.

Similar to research on learning, the personal and social transformations that are expected to occur through learning to engage in practice are assumed, but largely taken for granted, in educational programmes and in the workplace. The complexity of these processes and the integration of epistemological with ontological dimensions demand close attention in both practice and in research on practice.

Further theoretical and empirical research, drawing upon insights gained from educational and workplace practice, is needed to extend and elaborate the approach we have outlined in this chapter. In describing and illustrating a lifeworld perspective on practice-based learning, we have sought to demonstrate that this perspective and its concepts open new ways of inquiring into learning through and about practice.

## References


Billett, S. (2001). Knowing in practice: Reconceptualising vocational expertise. *Learning and Instruction, 11,* 431-452.

Bonner, T. N. (1995). *Becoming a physician: Medical education in Britain, France, Germany, and the United States, 1750-1945*. New York & Oxford: Oxford University Press.

Bourdieu, P. (1977). *Outline of a theory of practice*. Cambridge, UK: Cambridge University Press.

Dall'Alba, G. (2004). Understanding professional practice: Investigations before and after an educational program. *Studies in Higher Education, 29*, 679-692.

Dall'Alba, G. (2009). *Learning to be professionals.* Dordrecht, The Netherlands: Springer.

Dall'Alba, G., & Barnacle, R. (2007). An ontological turn for higher education. *Studies in Higher Education, 32*, 679-691.

Dall'Alba, G., & Sandberg, J. (2006). Unveiling professional development: A critical review of stage models. *Review of Educational Research, 76*, 383-412.

Engeström, Y. (2005). *Developmental work research: Expanding activity theory in practice*. Berlin: Lehmanns Media.

Engeström, Y., & Miettinen, R. (1999). Introduction. In Y. Engeström, R. Miettinen, & R. Punamäki (Eds.), *Perspectives on activity theory* (pp. 1-16). Cambridge, UK: Cambridge University Press.

Fuller, A., & Unwin, L. (2004). Young people as teachers and learners in the workplace: Challenging the novice-expert dichotomy. *International Journal of Training and Development, 8*, 32-42.

Gadamer, H. G. (1994). *Truth and method* (2nd ed.) (Sheed & Ward, Trans.). New York: Continuum. (Original work published 1960)

Gherardi, S. (2006). *Organizational knowledge: The texture of workplace learning*. Oxford: Blackwell.

Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration.* Cambridge: Polity Press.

Heidegger, M. (1962). *Being and time* (J. Macquarrie & E. Robinson, Trans.). New York: SCM Press. (Original work published 1927)

Heidegger, M. (1998). Plato's doctrine of truth (T. Sheehan, Trans.). In W. McNeill (Ed.), *Pathmarks* (pp. 155-182). Cambridge, UK: Cambridge University Press. (Original work published 1967)

Husserl, E. (1970). *The crisis of the European sciences* (D. Carr, Trans.). Evanston: Northwestern University Press. (Original work published 1936)

Lave, J. (1993). The practice of learning. In S. Chaiklin & J. Lave (Eds.), *Understanding practice: Perspectives on activity and context* (pp. 3-32). Cambridge, UK: Cambridge University Press.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.

Law, J., & Hassard, J. (Eds.). (1999). *Actor network theory and after*. Boston, Mass: Blackwell.

Lee, J. S., & Anderson, K. T. (2009). Negotiating linguistic and cultural identities: Theorizing and constructing opportunities and risks in education. *Review of Research in Education*, *33*, 181-211.

Merleau-Ponty, M. (1962). *Phenomenology of perception* (C. Smith, Trans.). London: Routledge & Kegan Paul. (Original work published 1945)

Mol, A. (2002). *The body multiple: Ontology in medical practice*. Durham: Duke University Press.

Nicolini, D., Gherardi, S., & Yanow, D. (Eds.). (2003). *Knowing in organizations: A practice-based approach.* Arnmonk: M. E Sharpe.

Packer, M., & Goicoechea, J. (2000). Sociocultural and constructivist theories of learning: Ontology, not just epistemology. *Educational Psychologist*, *35*, 227-241.

Säljö, R. (1991). Learning and mediation: Fitting reality into a table. *Learning and Instruction, 1*, 261-272.

Sandberg, J., & Dall'Alba, G. (2009). Returning to practice anew: A life-world perspective. *Organization Studies*.

Sandberg, J., & Pinnington, A. (2009). Professional competence as ways of being: An existential phenomenological perspective. *Journal of Management Studies.*

Sartre, J. P. (1957). *Being and nothingness: An essay on phenomenological ontology* (H. E. Barnes, Trans.). London: Methuen. (Original work published 1943)

Schutz, A. (1945). On multiple realities. *Philosophy and Phenomenological Research, 5*, 533-575.

Stålsby Lundborg, C., Wahlstrom, R., & Dall'Alba, G. (1999). Ways of experiencing asthma management - Variations among general practitioners in Sweden. *Scandinavian Journal of Primary Health Care, 17*, 226-231.

Thomson, I. (2001). Heidegger on ontological education, or: How we become what we are. *Inquiry, 44*, 243-268.

Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Wenger, E. (1998). *Communities of practice: Learning, meaning and identity*. Cambridge, UK: Cambridge University Press.

# Chapter 7
# Conceptualising Professional Identification as Flexibility, Stability and Ambivalence

**Rose-Marie Axelsson, Madeleine Abrandt Dahlgren, Lars Owe Dahlgren**

Linköping University, Sweden

**Abstract** This chapter discusses physicians' and engineers' professional identity formation through engagement in practice. First, the concept of professional identification as the enactment of life politics is advanced. Professional identification is here viewed as an ongoing process in the context of lifelong learning, where learners' subjectivities and life trajectories are significant. Second, the concepts *flexibility, stability* and *ambivalence* are introduced and used dialectically as analytical tools for understanding physicians' and engineers' experiences of learning through their different practices. In discussing these concepts, we illustrate the conception of life-politics by means of empirical examples of how subjectivity, everyday life experiences, and conditions in different practices interplay in the process of professional identification. Third, we show how the processes of *becoming* an engineer or a physician stand as substantially different processes, seemingly more or less articulated and determined. Moreover, *being* an engineer or physician reflects additional aspects of learning through the process of identification with the professional role, including the impact of the work itself and of the personal self. In all, our findings suggest that the engineers identify with the content and nature of the work itself as a flexible strategy, thereby making the identification with the profession ambivalent. The physicians, on the other hand, seem to build a character as a doctor with which they identify permanently, thereby shaping a fragile boundary between their selves and the profession. Finally, an interpretive model is proposed, where the life-politics of the individuals is expressed through *flexibility*, *stability*, and *ambivalence.*

## 7.1 Learning and Professional Identification as Life Politics

The construction of knowledge and identities through work and everyday life are often described in contemporary research as lifewide or lifelong processes or in terms of personal learning projects.

At least two lines of reasoning representing different viewpoints on how these processes are enacted are discernible in the literature. One line of reasoning is that the reflexivity of human is emphasised – the possibility to reflect, revise, and make rational choices is substantial. The formation of identities can be understood

S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2_7, 

as a self-reflexive project (Giddens, 1991). Billett (2006) uses 'the enterprising self' to describe the idea of the individual's modelling of the identity in relation to roles in working life that are particularly attractive. The assumption is that human beings are capable of handling themselves and the possibilities of their lives in conscious and wise ways. Billett recognises the relational interdependence between individual and social agencies to understand learning throughout working life. He claims that the personal epistemologies of the individuals are shaping what individuals learn and how they go about their work and learning. Personal epistemologies are defined as the individuals' ways of knowing and acting formed by their individual capacities, their earlier experiences, and the ongoing negotiations with the social and brute world (Billet, 2009). Some researchers focus on the lifewide aspects of identity development as a learning project. Nyström (2008) claims that the process of personal identity development takes place as a dynamic relationship between different life spheres. In her study of student and novice professional psychologists' and political scientists' processes of professional identity formation in their transition from higher education to working life, three different forms of professional identity were discerned. These were (i) a non-differentiated identity, (ii) a compartmentalised identity, and (iii) an integrated identity, that exemplify different negotiated relationships between professional, personal, and private life spheres. Nyström's study suggests that these three forms of professional identities are sequential; from an individual focus to more relational and integrated ways of reasoning about one's profession. Nyström proposes that it is through the negotiations between personal and socially derived imperatives that identity formation progresses throughout working lives. Professional identification can also be described as learning processes in life histories (Salling Olesen, 2001a, 2001b, 2007), or connected to ideas of lifelong learning (see Blackmore, 1997; Brennan, Mills, Shah, & Woodley, 2000; Coffield, 1999; Crowther, 2004; Fenwick, 2004). Lifelong learning is also sometimes regarded as a project addressing the need for new competencies in working life. Hence, in this view, what people learn needs to correspond to demands in the labour market.

Another line of reasoning about knowledge construction and identity formation in the literature claims that these processes are not necessarily rational (Bauman, 2001, 2004). Decisions are influenced both by general ideas and by the actual conditions in everyday life, which sometimes de facto limits the possibility of choice. Bauman (2004) claims that these processes can be understood in relation as life politics: as an ongoing process that deals with identity and people's negotiation related to it. Individuals are expected to apply this kind of politics to themselves, to their identity, and to their entire life. To draw attention to this process Bauman prefers the word *identification*, which is referring to a shaping process rather than an essentialist meaning of identity. To a very small extent, identities are described as predestined – they are assumed to be open to constant alteration (Bauman, 2004, Jørgensen, 2002, 2004). Bauman also discusses the limits of this constant alteration, that is, life politics. Everything that happens in

life is not likely to be understood and explained in terms of choice or reflexivity. The reality and external conditions of life under which humans live, together with the extent to which individuals can have an impact on these conditions, and the extent to which we believe that we can change the situation, also place limits on our options and actions. The complexity of everyday life can also give rise to conflicting emotions or interests, which can put individuals in state of ambivalence. This ambivalence can be understood as subjective dynamics that also may impact on the learning and the development of professional identities at different work places (Salling Olesen, 2003, 2006a; Salling Olesen & Weber, 2001; Weber, 1995, 1996).

In this section, we have pointed out different ways of thinking about learning and identity development through work and everyday life. In particular, the life politics of the individual is relevant to the case we elaborate here. We interpret this life politics as an ongoing, forming process that deals with the individual's negotiation and constant alteration through flexibility, stability, and ambivalence.

### *7.1.1 Flexibility – Stability – Ambivalence*

The learning project that comprises the development of occupational identity can be understood through life politics and the three related concepts: flexibility, stability, and ambivalence. Taking a theoretical starting point in clarifying our analytical concepts, the notion of *flexibility* is a reoccurring concept in texts about today's working life. Sennett (1998) points to personal consequences of modern working life and the call for a more flexible work force. The flexibility of humans is associated with a 'corrosion of character,' in Sennett's point of view. Flexible workplaces, slim-fit organisations, and an unstable labour market have become parts of the normal discourse, and change the meaning of work. Human flexibility is also discussed by Salling Olesen (2001a, 2003) and his colleagues (Siig Andersen, 2001) in terms of subjective dynamics in learning processes, which includes an individual's ambiguity towards learning and flexibility.

Our second analytical concept, *stability*, is reflected through ideas of learning as long-term and sustainable processes (Swedish Governmental Official Reports, 2004). Becoming professional can also be seen as requiring particular values, attributes, and capabilities that are sustainable and part of the personal development of the individual. Sennett (1998) discusses the character of humans and ethical values in contemporary working life. The concept of character focuses on long-term aspects of emotional experiences connected to other people. We use these aspects of Sennett's 'character of man' to interpret stability related to professional identification through work.

Finally, *ambivalence* can be discussed in relation to discourses in society about how to structure and order the good life, and what we ought to be and ought to do. We are here influenced by Bauman's (1991, 2001) critique of individualisation in

society, and his reasoning about ambivalence associated with this individualisation. Our line of reasoning is also influenced by Weber's (1995, 1996) as well as of Salling Olesen's and Weber's (2001) ideas, which stress complex situations in everyday life always produce mixed emotions. In the context of work and working life, the structuring and ordering of the good life might be taken as what constitutes worthwhile work. Yet, individuals' responses to these discourses may be ambivalent.

In the further analysis of empirical data, we elaborate how engineers' and physicians' professional identification are shaped by life politics as ongoing processes. Particularly, professional identification is interpreted and discussed as life politics, and the concepts of *flexibility*, *stability*, and *ambivalence* are used as analytical tools to understand how these dynamics operates in professional practice.

## 7.2 Empirical Data

Our empirical data is the product of a longitudinal study comprising interviews with workers across the period between 2002 and 2006 (Axelsson, 2008). A selection of engineers and physicians were interviewed at two separate occasions. The first interview was with informants who had recently graduated from their professional educational programme. The second interviews were conducted when the informants had between 2 and 4 years of working-life experience within their profession.

Twenty-two physicians and 21 engineers in information and communication technology participated in the study. At the time of the first interview, most of the graduated engineers were about 24 to 29 years old. The engineer programme was usually their first higher educational experience; also previous working-life experiences were limited among the engineers. About a quarter of the interviewed engineers were females, that is, the most of the engineers were men. The group of physicians was slightly older then the group of engineers. At the time of the first interview, the physicians were between 25 and 40 years old. In contrast to the engineers, a number of the physicians had working experiences and/or another higher education background. In this group, there was an equal gender division. The informants had undertaken their professional education at four different universities in Sweden.

In all, the investigation sought to follow the informants' processes of knowledge development and professional identification. The relatively long periods of time between the interviews (approximately 3 years) enabled us to identify changes in their personal and working lives of importance for the individuals. The interview data were analysed qualitatively through a process of reflexive interpretation (Alvesson & Sköldberg, 1994, 2008), which means three things to the procedure – awareness of (i) interpretation in the analysis of the

empirical data, (ii) the researcher as a subject and interpreter, and (iii) necessity of theories and contextualisation for understanding phenomena. The approach permits richness in description through interpretations on the three levels pointed out in the analysis of the transcribed interviews. Altogether, the empirical material consists of transcriptions of 72 interviews. However, it is acknowledged that these data represent the account of 43 individuals, which to some extent limits the possibility to generalise the findings. Anyway, it is possible to recognise the described phenomena and in that way review the findings qualitatively.

As a means of advancing the analysis, findings, and deductions from these data, the following sections first report the process of *becoming*, before addressing the issue of *being*.

## 7.3 Becoming an Engineer or a Physician

The process of becoming is a significant learning project that is shaped by life politics. Here we illustrate this shaping by means of empirical examples of how subjectivity, everyday life experiences, and conditions in different practices interplay in the process of becoming a professional.

### *7.3.1 Becoming an Engineer*

When we examine the process of becoming from the engineers' perspective, the formal credentials through the educational programme seem not to bring about identification with the profession as such. The formal qualification and title are often deliberately downplayed. Instead, what constitutes the engineer is the nature of their work itself, and how they fit in with the corporate culture. Their position at work and the content of that work are important factors in the identification process, as well as their position in relation to other employees who are not engineers. The engineers also often make a clear demarcation between work and their lives outside work. In this section, we use Peter, Johan, and Anna as examples to illustrate this point. All three are computer engineers with between 6 months' and 2 years' experience of working life after graduation. Peter states that he almost never introduces himself as a computer engineer. Instead, he describes himself as a project leader, to distinguish himself from other colleagues with different positions and also to those with different educational backgrounds.

> I almost never introduce myself as a…computer engineer, no; I never introduce myself as a computer engineer. I call myself a project leader. At the work place where I work...there are quite a few computer engineers…and technicians as well, and then there are those who have made a career anyway, without having any kind of higher education. (Peter)

Peter relates to the corporate culture and the importance of not sounding 'stuck-up' to the colleagues at work when he explains why it does not work to use the title 'computer engineer' when talking about himself. The reference to the corporate culture is a reflection that is repeated in the accounts of the engineers in the study. This makes it clear that the information technology business has a significant influence on the processes of identification with the profession as a computer engineer. The engineering profession has a long tradition of being described as stable and safe with reference to the labour market. In spite of the fact that the labour market for engineers in information technology was not very good in the years around 2000, many of the engineers in the study see themselves as potentially employable – with good opportunities in the labour market in the future. Johan describes that this stability in becoming an engineer is linked to 'a certain pride, to know that you have a certain background that you can rely on.' Johan sees this adding to a feeling of safety, a guarantee for a stable knowledge that is respected in society. 'It is a kind of branding,' he explains, 'that you belong to the brand' of computer engineer. Johan's assumption can be seen as being typical of many of the interview accounts, referring to the general knowledge base and generic skills of the engineering profession. The study shows that the engineers in information technology are typical holders of general and marketable skills in particular; they are shaped as *flexible generalists* in working life. Anna summarises this typical characteristics of the engineers below:

> Well, as a computer engineer I am…yes my deepest knowledge is in information technology and computer science. And I am a generalist and I like to push things forward. Yes I …solve problems…or I don't see problems as obstacles, but it is something that you get through. A good engineer is a problem solver who is not afraid of the unknown…and can take new ways…can be innovative and flexible. You have to be able to cooperate and take in new information and develop yourself…all the time. (Anna)

The accounts of Peter, Johan, and Anna can be seen as illustrating a dialectical relationship between stability and flexibility in the professional identification process – a process that produces ambivalence. To be on the move, to learn new things to maintain the generalist competence is seen as a necessary feature of the profession of computer engineering. Anna describes how this ambivalence influenced her choice of work already as a graduate, 'I chose to join a consultancy company, because I feel I like to learn new things…And I have been lucky in that I haven't worked with the same things more than 2 years, then I have moved to other things.' She describes how she moves from becoming a leader for subprojects to becoming a team leader and managing internal projects, and has the aspiration of becoming a project leader. This ambivalent identification seems to remain also after several years in the profession. The identification with the work itself and the position at work in relation to others as described by Johan above is verified throughout the interviews.

In this way, a dialectical relationship between stability and flexibility is seen in the process of becoming a computer engineer. The stable nature of the knowledge base of the profession produces professionals with flexible and generic skills. If

we look at documents postulating the views on skills needed for the workforce of tomorrow, creativity, flexibility, communicative skills, social skills in establishing contacts and networks as attractive and marketable skills, are emphasised (see Brown, Green, & Launder, 2001**;** Jørgensen, 2002; Högskoleverket, 2003). The process of becoming seems in relation to this at a first scrutiny as matching the postulated view of the workforce of tomorrow. A closer scrutiny of the interviews, however, suggests that the feeling of stability and safety combined with the flexible generalist competencies results in an ambivalent identification process.

### *7.3.2 Becoming a Physician – Developing a Character and Putting Oneself at Stake*

Many of the physicians describe their reasons for their career choice as a combination of traditions and expectations from their families (i.e., in many cases the career choice as a physician was common in the family), a general and perhaps naive preference for working with people, and that their credentials were competitive enough. The informants also emphasise that their personality was a contributing reason for choosing the profession, and also an important part of their professional role – in fact, many of them claim that there are no differences between their personal and professional identification. In this section, we use stories told by Monika, Shora, Henrik, Kenneth, and Annika to illustrate the process of becoming a physician. Monika, a physician with 8 months of working-life experience after graduation, describes her identification with the profession like this: '… I'm very much the same as a doctor that I am in general. I don't have a professional role that differs much from the person. I am…I am like this privately as well. It has never come to my mind that I should change in a way…like taking a certain role when I go to work.' 'The way I am as a doctor is intimately connected to how I am as a person' is another typical statement. Looking more closely at the identification process through the first period of working-life experience reveals, however, that the personality of the physician is challenged through the experiences of clinical work, and the independence, the responsibility, and the numerous decision-makings connected to these experiences. All these features together seem to shape the professional physician. Moving between different clinical placements has brought about a need for repetitiously establishing legitimacy in the professional role in relation to patients and colleagues; some of the informants emphasise that this is particularly needed for young and female doctors:

> But I say, every time you introduce yourself – being female and young – you should tell the patient who you are, so that they understand. Cause they don't always do. Even though you say so, they don't believe you. There have been periods when I have felt that I begin to master this…Then you feel like a doctor. But during internship, when you change work place all the time, this feeling disappears when you come to a new place. Then when I had finished internship I began to feel like a real doctor. (Shora)

A male physician, Henrik, describes the professional identification as follows:

> I think I grew into it very much when I worked in the primary care. That's where I felt most clearly that I was a doctor for real. Because there you take decisions yourself…and work ever more independently/…/In primary care things were quite different. You couldn't ask about everything. You had to take your own decisions. And, I felt that as a great deal of what it means to be a doctor, the decision making. (Henrik)

The informants also make references to the importance of role models in this process, both at an early stage in the educational programme and at different clinical placements. These role models have been important for the informants' identification with the profession in terms of how to think, how to talk with patients, et cetera. Another physician, Kenneth, reflects on how the first period after graduation was particularly important for the influence of role models. 'During the first months after graduation you can be very susceptible in many ways…and that is when you are starting building a character'. People working in today's health and medical care need to handle the pressure to produce more and more care during their working hours and, together with constantly changing methods of treatment and a general public that is increasingly enlightened, this makes the work very demanding – not least for a recently graduated physician. When we met Annika for a first interview in 2002 she described how she thought of herself as a doctor. She says '…how I am as a doctor I think…to me it hangs together with who you are as a person. But that may also be my biggest problem that I have difficulties switching between professional and private'. The second interview, from 2005, continues to describe the difficulties in separating her working day from her private life:

> Yes, I have difficulties to switch off work when I leave for home. So if you see many difficult cases, a lot of very sick patients that feel bad and have a tragic social situation. I have difficulties forgetting that when I come home. I feel a need to talk myself out of it when I come home. (Annika)

The seemingly stable construction of the professional identification as uniform with the personal identity is instead very much a question of life politics (Bauman, 2001, 2004) and flexible negotiation with oneself, the real life expectations, and demands at work; thus, mixed emotions are produced. Ambivalence (Salling Olesen & Weber, 2001; Weber, 1995, 1996) appears when the physicians encounter the multiplicity of problems during their working day – failures are often perceived as personal. Physicians' professional identification can be interpreted as a formation of character, according to its relational and moral meaning as pointed out by Sennett (1998). The findings show that failures are perceived as personal when personal responsibility, continuous self-reflection, and flexible alteration associated with expectations and demands at work and life in general are strongly emphasised. The process of becoming a physician is like putting oneself at stake.

Consequently, when personality and professional identification is moulded in the same form, it does not necessarily bring about a stable construction. It is significant that the borderline between the personal and the professional identity is

particularly blurred for these physicians. Therefore, the physicians' professional identification could be interpreted as a brittle or unsustainable construction.

## 7.4 Being an Engineer or a Physician

So far, we have tried to make it visible that the professional identification occurs in different ways for engineers and physicians, which is not remarkable in itself. What we want to point out here is the personal consequences of the varying ways of developing a professional identity and being a computer engineer or a physician, in different practices.

### *7.4.1 Identification as a Flexible Strategy or a Permanent State*

Being a computer engineer is not usually described as a permanent state in the engineer stories. The informants report that they use their title only when necessary – if at all. It is significant that the engineers' identification with their title and profession is ambivalent. In this section, we illustrate this assumption through examples from the interviews with Peter, Linda, and Helena.

Previously, we referred to Peter who said 'I almost never introduce myself as a computer engineer.' Similar phrases emerge frequently in the interviews. Linda, an engineer with 11 months of working-life experience after graduation, tells us 'it is nothing special to be an engineer.' 'I don't know what it feels like to be an engineer' she continues in a humorous tone. It is obvious that Linda, similar to Peter, does not walk around telling people 'I am an engineer.' At work Linda talks about her self as a programer – there is 'no difference compared to anyone else who is a system person,' she clarifies. In addition to Peter and Linda's narratives, many of the engineers use their title as a flexible strategy. On the one hand, the interviews indicate that the computer engineers do not think or talk about themselves as engineers. On the other, it is clear that they use their title in a strategic way at work. The computer engineers tell other people that they are engineers only when they think it is of vital importance, such as in contacts with principals, customers, and other companies. It stands out as a flexible negotiation with the professional role in contacts with others. A quote from an interview with Helena, one of the respondents who explicitly express that she actually feels like an engineer, illustrates the strategic use of the title in practice:

> I'm glad that I choose to become an engineer, I feel like an engineer – and it feels good. If you are an engineer you know that they don't put you to test…they know what you have gone through. Sometime I say that I am an engineer in this area and I tell a bit about my background, *depending on who the listener is.* Or, when I think that…these *people really need to hear that I'm an engineer*, so, they will not ask the most difficult question, only to test basic things…its kind like that. (Helena)

Other engineers describe parallel work situations and a similar behaviour as Helena. Whether they use the title 'engineer' or tell other people something about their educational background depends on the circumstances and what impression they will make. For example, they may mention their qualification when a lack of respect for their competencies comes into sight.

In sum, the engineers' identification with the professional role is interpreted as ambivalent. Two lines of reasoning are discernible here. First, they do not usually identify themselves as engineers at work. However, *if* the engineers make use of their title at work they do so in a flexible and strategic way in relation to other people. It could be understood as if they are playing a game with the professional identity.

The physicians' professional identification is different from the engineers' flexible acting. Descriptions such as 'I am always a physician' or 'I never leave my role as a doctor' are common in the interviews. To be a physician is often understood as a permanent state. The informants tell that they are doctors all the time; many of them emphasise that they never leave their professional role completely. Said, Erik, and Shora are three of the physicians with that kind of experience. In this section, we use them as examples in discussing what the statement 'doctors all the time' could imply. With a first glance at their narratives, their experiences could be interpreted as examples of successful identification or integration – the personal and the professional identity melded together. After a closer look, however, it is obvious that being a physician and the constant association with the professional role can cause problems at work and in spare time. Said draws attention to some of the personal consequences:

> You have to be available all the time. You're expected to listen to anything all the time – you never leave the role as a doctor. You're always – if you go to a party you're still a doctor, and at work you're a doctor and when you have your car repaired you're a doctor I'm expected to write prescriptions in my spare time…people expect you to do that. (Said)

If you are a doctor, people expect you to 'listen to anything' and to 'do things' all the time, Said says. That kind of statement is not unusual. The interviews give a lot of examples like this one. Expectations from other people at work and in leisure hours are interpreted as a critical aspect of being a physician. It is evident from the interviews that patients, colleagues, friends, and relatives et cetera have many varying expectations of the physicians. After 3 to 4 years of working at different hospitals and primary health care centres some of the physicians are somewhat ambivalent regarding the solid identification with work and the professional role. 'Being a doctor and, at the same time, a human being' is not a matter of course, as Erik, one of the respondent states. The close connection between who they are as a professional and who they are as person is found to be a weak link. In addition to the fact that many physicians experience that they never leave their professional role, the study indicates that it could be complicated to be both a physician *and* a woman at work. Patients, colleagues, and other employees have different expectations of a female physician than of a male physician. The interviews describe young women's experiences of patients' lack

of confidence in them – because they are young women. Shora is one of the women with such experiences: 'You should tell the patient who you are, so that they understand. Cause they don't always do so, even though you say so, they don't believe you,' she clarifies. In addition to that, some examples imply that expectations from other colleagues are of a different kind – the female physicians state that they get less support than male physicians. This view is exemplified in the interview with Shora:

> I know that being a female physician patients and relatives expect more of you. Sometimes I feel that the expectations are impossible to stand up to. It's not only the medical parts but you are also expected to have an overview and be capable to assist in all matters like transportation after the consultation. Sometimes they have difficulties to differentiate me from what is a nurse's work. They are more restricted in contacts with a male physician. Patients are more emotional in contacts with a female doctor. It takes more time. I can also see that expectations from staff are different on me being a woman. I'm expected to do more things myself. I'm expected not to need as much assistance as my male colleagues. (Shora)

Being constantly available for consultation – even in spare time – is an expectation commonly faced by the physicians in this study. Hence, the data suggest that the physicians are always physicians, which is not always to their advantage.

### *7.4.2 Engineer – Confined to Workplace, Occupation, and Working Hours*

In contrast to those of physicians, the identification with the profession from the engineers' perspectives is typically confined to their workplaces. Spare time and private lives are influenced by work only to a small extent. Also, and in contrast to the physicians' experience, the engineers do not sense any expectations from others of what and how an engineer should be like – the vocation does not interfere with their social life. On the contrary, many of them explicitly point out the necessity of separating work and spare time, hence suggesting that the engineers do *not* identify themselves with their work in their leisure time. Johanna gives us an illustrative account of this at the time of the second interview, when she states that it is important to balance work and social life:

> I think it's important to find some kind of balance. I don't want to work too much. I don't have any children yet but I want to have in the future…I want to feel that work doesn't occupy all available time. (Johanna)

The engineers' data about what it is like to be a professional could be interpreted as their professional identification being weak. They emphasise that 'I don't think of myself as an engineer'; and their identification with their profession is confined to their place of work and their working hours. However, we are not suggesting that their 'weak' identification necessarily is a sign of weakness – our

interpretation is that they are not firmly rooted in their profession through a canonical knowledge or presupposed professional role. Today's working life offers technological solutions with good opportunities for flexibility, dispelling ideas of work as being confined to time and place. It is obvious that the engineers in this study do not, however, strive to expand their working outside the workplace through the use of technology, in spite of such opportunities. The demarcation between work life and life outside work is kept clear.

For instance, Filip describes at the time of the second interview that the work is important, because a lot of time of your life is spent there, but that there are other things in life that are even more important. 'I think that family is more important than making a career. I have realised that I'm not going to make a beautiful career and become a boss. They have to sacrifice their private life to get there.' In Filip's statement we can trace a similar logic as in Johanna's account about finding a balance through keeping work and life as a whole separated, thereby constructing a stable professional identity. Here, we are suggesting that the engineers' identification with the profession is typically confined to their workplaces and occupations. The computer engineers only to some extent associate their work and profession with their life as a whole. Instead, the professional career is conceptualised as parallel to their life trajectories.

### *7.4.3 Physician – Profession Associated with Personality*

The physicians tell a different story about what it is like to be a doctor. In contrast to the engineers, who emphasise the workplace as where the identification occurs, the physicians associate their profession with their personality. As has been mentioned above, the phrase 'I am always a physician' occurs frequently – the profession can be understood as a permanent companion, or state of being, even in the leisure time. The expectations from other people of physicians to always be on call for medical consultations, no matter when or where, are sometimes not easy to live up to. These expectations are sometimes experienced as being unreasonable, reducing the 'human being' doctor to the 'certificate' physician, always available. Erik contrasts the expectations of the physicians with those of a plumber 'You would not call a plumber at eleven o'clock in the evening to get your pipes fixed, even if he is a friend of yours, because you would not expect him to come running…but I am expected to do so.'

Our explanation of such phenomena is that physicians' professional identification can be indefensibly strong as a consequence of the vague boundary between themselves and the profession. A personal consequence of working conditions and general ideas of what a physician *is* or *ought to be* – the physician as an 'infallible person' or 'almost God' – is described. These expectations produce ambivalence as a more or less always present state of mind in many of the informants. The quotation from Hans's second interview, below, gives a good

example of how the physicians negotiate their profession in relation to themselves, and the difficulties in living up to the expectations of being infallible.

> I have two very different sides as a physician…I have one side when I'm with patients and then I'm listening and empathic and I'm quite good at that. I try to reason with the patient and I'm rather professional. I can tolerate almost anything. And then outside the patient I'm quite cynical and talk about them as problematic. Then I don't have this empathy/…) but it takes engagement and concentration to be listening/…./ and then I sort of have to react sometimes to be able to come back to them again. (Hans)

What we have shown through the physicians' accounts is almost an opposite picture compared to the one the engineers provide. The physicians indicate that the close connection between person and profession gives rise to difficulties in separating work from spare time – their profession is strongly connected to their selves.

Consequently, the physicians' career and life trajectories coincide and, thereby, create ambivalence. The 'indefensibly strong' identification with the profession might be seen as one way of the subjects' handling of contradictory expectations at work – a clear identification with professional knowledge, tools, and values can be helpful to reduce the complexities of the situations to a problem that the physician is capable of sorting out (see Salling Olesen, 2006b, 2007), and, hence, to make possible a sustainable life.

## 7.5 Flexibility, Stability, and Ambivalence in Practice

General ideas in society that emphasise the importance of flexibility, mobility, and people's prompt adaptation to changes are materialised in the informants' narratives. People strive to achieve these abilities and states – the wish to have a flexible life is strongly expressed.

The findings show that personal consequences follow from the physicians' working conditions in the field of health and medical care. Significant and frequent demands from others, as well as from themselves, are experienced as oppressive. The physicians encounter ideas such as 'diseases do not exist' or, at least, 'it is possible to find a cure for them.' Their stories tell us about insufficient management, lack of fellowship in their work, and restricted space for conversation between colleagues. The importance of social dimensions of work, such as cooperation and trust in relations, is emphasised by the informants. A counterbalance to the one-sided emphasis on the individual, human capital, and economy in working life (see Brown, 1995; Coffield, 1999, Sennett, 1998) is described. The physicians' efforts to balance the demands of their work and their private life are experienced as problematic. In spite of a stable labour market for physicians, employment is not guaranteed. For the graduated physicians, it is attractive to stay at the hospital where they have been students. The university hospitals cannot, however, guarantee the physicians an in-service training position or employment for specialisation. Because many individuals are interested and the

number of available positions is far lower there is considerable competition for these positions in the research hospitals. Some physicians state that 'you have to show your interest in what you are doing' – producing a thesis in medicine parallel with their education and the general training programme is one way of doing this. For others, showing interest involves moving out to other parts of the country and to smaller hospitals – with or without family and friends. In these cases, flexibility translates to mobility in practice.

During the course for this study, information technology was hit by a slowdown in business activity. Some of the consequences for these engineers were that short-term contracts became more the rule than the exception, and their mobility was more extensive than in the case of the physicians. Consequently, concepts such as flexibility and mobility in the labour market are given very specific meanings in the engineers' stories. The possibilities for mobility in the labour market, that were often mentioned in their stories about engineering work, were in reality restricted by the slow down in business activities. Flexibility in this case thus refers to the engineers strives to adjust to these changed circumstances. This has little in common with the general idea of the individual as a free mover on the labour market. The findings indicate that the engineers' work involves achieving results that are acceptable to themselves and others – everything at as low a cost as possible in order to uphold the company's good name, or simply their own honour as an ICT consultant. There are times when the engineers are dissatisfied with their own work and the products thereof. Satisfying customers is often achieved by not exceeding the estimated costs – this is often felt to be dissatisfying. Some engineers point to personal consequences caused by too much financial, legal, or social responsibility. Insufficient support from colleagues and supervisors during their first years in the profession is also described. Some of the engineers have been on sick leave several times. Nevertheless, the bright side of flexibility – the opportunities the individuals have to move in the labour market – is very much apparent in the engineers' own descriptions.

The findings indicate that both engineers and physicians consider their education as a solid ground and a platform for their respective careers in working life. The educational programmes can also be interpreted as qualification – an instrument to achieve social status or admission to a position in a field or a profession. A complete awareness that their education and work affect the possibilities of developing in working life as well as their position, social status, and private financial position is shown in both groups.

## 7.6 Work, Life Politics, and Sustainable Life

Knowledge and learning are essential components in the modern project of society, which strives to attain employment, wealth, and sustainable development (see Swedish Governmental Official Reports, 1999, 2004). Lifelong learning is the

main ingredient in these strategies. The findings indicate that the process of becoming a professional is a significant learning project that is shaped by life politics throughout life. We interpret these findings as an expression of individualised knowledge processes (see Bauman, 2001; Stehr, 1994, 2001); examples such as 'learning to learn' frequently occur in the texts written by social theorists. Learning to learn is not only a question of the professional identification and professional career – the whole life trajectory is deeply involved. Also, it is obvious that this concerns lifewide processes, especially in case of the physicians.

Being and working as a physician strongly influences other areas of their life – difficulties in separating work and other activities and time are reinforced by working conditions, for example, working hours. Working evenings, nights, on holidays, and over Christmas does not make it easier to order life during the weekdays – regularity is an exception for the physicians. Another complicating aspect found in data is that it is not unusual for the physicians to live together with another physician. During the course for the study, many of the physicians raised a family. Their descriptions show that it is not an easy matter to arrange their life – home is a place where they 'stand in for each other,' taking care of the children when they are off work. Some of the physicians give up full-time work. Here, the results indicate large differences between the two groups – few, if any, comparable descriptions by an engineer are found in the interview material. Hours of work do not encroach to any large degree on the computer engineers' private life. The results show that working life and leisure time are separated – the engineers' professional career runs parallel with their life trajectories. They strongly emphasise the importance of striving for 'balance in life.' After 2 or 3 years of working, many of them do not see it as a problem.

Consequently, the learning projects and the life politics we point out in our discussion are diverse, which also means different personal and professional consequences for the physicians and the engineers. One significant finding is that lifelong qualification could be understood as an example of exclusion.

### *7.6.1 Lifelong Qualification as Exclusion*

Physicians' informal qualification – especially concerning their choice of specialisation – may be a career obstacle. Many popular areas of specialisation involve irregular working hours with the physicians having to be on call/duty, and some professionals drop a certain specialisation for this reason; for the sake of their spare time, social life, friends, and family. Our interpretation is that this is a matter of an individual solution to a structural set of problems. When it was time for the physicians in the study to choose and do their practice for specialisation, many of them were at the age when it is usual to raise a family in Sweden. Women made up a significant proportion of the group that dropped out of popular specialisations for these reasons. In their descriptions, we found that both the

formal and informal qualifications in physicians' work are strongly excluding processes. Fenwick (2004) highlights this phenomenon when she asks what happens to the women in a lifelong learning era. Fenwick discusses in a fruitful way women's situation in working life and family life, together with the ambiguous interpretations of a lifelong learning policy and its consequences in different practices. From the physicians' narratives it is possible to suggest that their learning and identity development are gendered processes, shaped by life politics. A nearly equal number of men and women work as physicians. Our interpretation is that the prerequisites in the physicians' workplaces, the informal and vague processes of qualification together contribute to this exclusion. We did not identify the similar excluding processes in the engineers' stories of their work and qualification process, which might be explained by the fact that the engineers' workplaces were heavily dominated by men, and the womens' stories were not as clearly emphasised.

### *7.6.2 Learning and Professional Identification as Life Politics – Unsustainable Life?*

The concept of *sustainable development* refers to a goal for development in society that does not run counter to the needs and interests of a world possible to live in tomorrow. The concept involves economical, environmental, social, ethical, and humanitarian and health-related aspects (Swedish Government Official Reports, 2004). The study indicates the need to discuss these aspects further also in relation to the demands of working life and to life in general. Even if the engineers in this study describe periodically high workloads and taxing working conditions, it is unusual that they experience their work and its qualification processes as destructive for themselves or for their private life. The findings indicate, with a few exceptions, that the engineers interviewed in this project regard their work and qualification processes as personal challenges. The difference between the engineers and physicians in this study is striking on this point. The shortage of physicians in small hospitals and primary health care centres results in heavy workloads. The study shows that it is no easy matter to live up to people's expectations and at the same time realise political ambitions in everyday life as a physician. Social and ethical aspects of work run the risk of being minimised under such circumstances, which is something Sennett (1998) has stated. In our view, this is not only a danger – it is more than that for some of the physicians. The findings show that ambivalence in every day work not always implies learning, deeper insights, development, or generative solutions. The physicians talk about depression and anguish caused by their working conditions, responsibility and difficulties in separating work and life – an *unsustainable life* is a conceivable consequence. Our study suggests that ideas about long term life

projects and sustainability are a counterbalance to talk about lifelong learning and flexibility in working life.

## 7.7 Concluding Remarks

This chapter has highlighted and discussed the processes of learning and, in particular, professional identification through different practices. Figure 7.1 is built on the findings in our study and the model summarises our view of these phenomena and processes. Professional identification is depicted here as an ongoing process in the context of lifelong learning, where learners' subjectivities and life trajectories are significant.

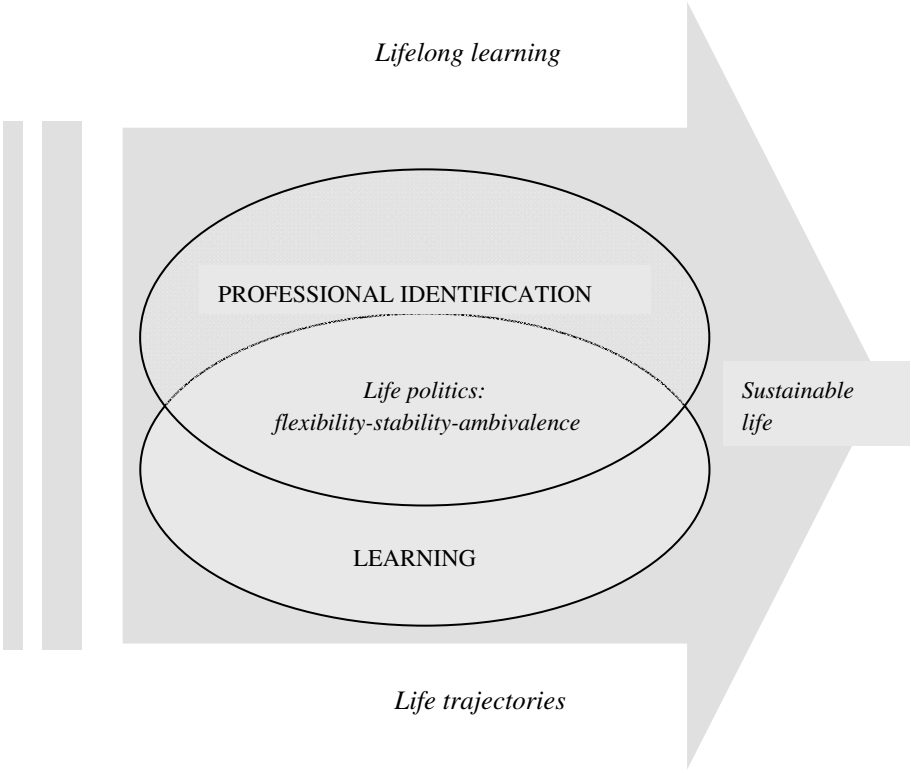


**Fig. 7.1** Professional identification and learning through work

We suggest this interpretive model (Fig. 7.1), where the life politics of the individual is expressed through flexibility, stability, and ambivalence. In our view, this model and these concepts can be used as analytical tools for understanding experiences of learning and professional identification through different practices.

In particular, if there is an interest in long-term learning projects or in sustainable aspects of work. Finally, the study indicates that there is a need to discuss these aspects further – in relation to the demands of working life and in relation to life in general.

## References


Alvesson, M., & Sköldberg, K. (1994). *Tolkning och reflektion. Vetenskapsfilosofi och kvalitativ metod*. Lund: Studentlitteratur.

Alvesson, M., & Sköldberg, K. (2008). *Tolkning och reflektion. Vetenskapsfilosofi och kvalitativ metod. (andra upplagan)*. Lund: Studentlitteratur.

Axelsson, R. (2008). *Formbara människor. Högre utbildning och arbete som utsnitt ur läkares och civilingenjörers levnadsbanor* [Flexible people. Higher education and work through physicians' and engineers' life-trajectories] [Thesis]. Linköping Studies in Behavioural Science, 132. Department of Behavioural Sciences and Learning, Linköping University. ISSN 1654-2029, ISBN 978-91-7393-868-6.

Bauman, Z. (1991). *Modernity and ambivalence*. Oxford: Polity Press.

Bauman, Z. (2001). *The individualized society*. Oxford: Polity Press.

Bauman, Z. (2004). *Identity. Conversations with BenedettoVecchi*. Cambridge, UK: Polity Press.

Billett, S. (2006). Work, subjectivity and Learning. In S. Billett, T. Fenwick, & M. Somerville (Eds.), *Work, subjectivity and learning: Understanding learning through working life* (pp. 1-20). Dordrecht: Springer.

Billett, S. (2009). Personal epistemologies, work and learning: Learning through work. *Educational Research Review, 4,* 210-219.

Blackmore, J. (1997). The gendering of skill and vocationalism in twentieth-century Australian education. In A. H. Halsey, H. Lauder, P. Brown, & A. S. Wells (Eds.), Education: Culture, economy and society (pp. 224-239). Oxford: Oxford University Press.

Brennan, J., Mills, J., Shah, T., & Woodley, A. (2000). Lifelong learning for employment and equity: The role of part-time degrees. *Higher Education Quarterly, 54*(4), 411-418.

Brown, J. N. (Ed.). (1995). The knowledge connection: The role of colleges and universities in workforce development. Washington DC: National University Continuing Education Association. (ERIC Document Reproduction Service No. ED446544)

Brown, P., Green, A., & Launder, H. (2001). *High skills: Globalization, competitiveness and skill formation*. Oxford: Oxford University Press.

Coffield, F. (1999). Breaking the consensus: Lifelong learning as social control. *British Educational Research Journal, 25*(4), 479-499.

Crowther, J. (2004). 'In and against' lifelong learning: Flexibility and the corrosion of character. *International Journal of Lifelong Education, 23*(2), 125-136.

Fenwick, T. (2004). What happens to the girls? Gender, work and learning in Canada's new economy. *Gender & Education, 16*(2), 169-185.

Giddens, A. (1991). Modernity and self-identity. Cambridge: Polity Press.

Högskoleverket (2003). *Arbetsmarknad och högskoleutbildning – En rapport från högskoleverkets arbetsmarknadsprogram 2003*. Stockholm: Högskoleverkets Informationsavdelning. [Swedish National Agency for Higher Education. 2003: Report no. 27R. Labour market and Higher Education – A report from the Swedish National Agency Labour Market Program 2003].

Jørgensen, C. H. (2002). *Uddannelsesplanlægning – samspil mellem uddannelse og arbejde. Forskningsprojektet: Arbejdsliv, læringsmiljøer og demokratisering*. Roskilde Universitetscenter: Institut for Uddanelsesforskning. [Educational planning – an Interplay between

Education and Work. The Research Project: Working life, Learning Environments and Democratisation].

Jørgensen, C. H. (2004). Connecting work and education: Should learning be useful, correct or meaningful? *The Journal of Workplace Learning, 16*(8), 455-465.

Nyström, S. (2008). The dynamics of professional identity formation: Graduates' transitions from higher education to working life. *Vocations and Learning: Studies in Vocational and Professional Education, 2*(1), 1-18.

Salling Olesen, H. (2001a). Professional identity as learning processes in life histories. *Journal of Workplace Learning, 13*(7/8), 290-297.

Salling Olesen, H. (2001b). Professional identity as learning processes in life histories. In K. Weber (Ed.), *Experience and discourse in professions: A life history perspective* (pp. 59-84). Roskilde: Roskilde University Press.

Salling Olesen, H. (2003). Kronik: 'Bøjelighed eller tilbøjelighed – træer og levende mennesker.' *Tidskrift for Arbejdsliv, 5*(3), 81-90.

Salling Olesen, H. (2006a). Learning and experience. In S. Billett, T. Fenwick, & M. Somerville (Eds.), *Work, subjectivity and learning: Understanding learning through working life* (pp. 53-67). Dordrecht: Springer.

Salling Olesen, H. (2006b). Diskurs og erfaring: Eksempler fra lægeprofessionen. *Nordisk Pedagogik, 4*, 358-371.

Salling Olesen, H. (2007). Professional identities, subjectivity, and learning: Be(com)ing a general practitioner. In L. West, P. Alheit, A. Siig Andersen, & B. Merrill (Eds.), *Using biographical and life history approaches in the study of adult and lifelong learning: European perspectives* (pp. 125-141). Frankfurt am Main: Peter Lang Verlag.

Salling Olesen, H., & Weber, K. (2001) Space for experience and learning: Theorizing the subjective side of work. In K. Weber (Ed.), *Experience and discourse in professions: A life history perspective* (pp. 27-58). Roskilde: Roskilde University Press.

Sennett, R. (1998). *The corrosion of character. The personal consequences of work in the new capitalism*. New York: Norton & Company.

Siig Andersen, A. (Ed.). (2001). *Bøjelighed og tilbøjelighed: Livshistoriske perspektiver på lærig og uddannelse*. Frederiksberg: Roskilde Universitetsförlag.

Swedish Government Official Reports. (1999). *Från kunskapslyft till strategi för livslång lärande.* Statens offentliga utredningar. Utbildningsdepartementet, Regeringskansliet. [Swedish Governmental Official Reports. Report no. 141].

Swedish Government Official Reports. (2004). *Att lära för hållbar utveckling.* Statens offentliga utredningar. Utbildningsdepartementet, Regeringskansliet. [Swedish Governmental Official Reports. Report no. 104].

Stehr, N. (1994). *Knowledge societies*. London: Sage.

Stehr, N. (2001). *The fragility of modern societies. Knowledge and risk in the information age*. London: Sage.

Weber, K. (1995). *Ambivalens og erfaring: Mod et kønsdifferentieret læringsbegreb*. Roskilde Universitetscenter: Adult Education Research Group.

Weber, K. (1996). Experiencing gender: A psychodynamic approach to adult learning – And a case of masculinity and social work. In H. Salling Olesen & P. Rasmussen (Eds.), *Theoretical issues in adult education: Danish research and experiences* (pp. 25-40). Frederiksberg: Roskilde University Press

# Chapter 8
# Developing Vocational Practice and Social Capital in the Jewellery Sector: A new Model of Practice-based Learning

**David Guile**

University of London, United Kingdom.

**Abstract** This chapter analyses a work placement scheme established to create the conditions to: (i) incubate new designs in the jewellery sector in Birmingham; (ii) support a jewellery company compete more effectively in the global market; and (iii) assist a newly qualified graduate jeweller to enter the jewellery sector. It uses concepts from: cultural-historical activity theory -'object'; workplace learning - 'vocational practice'; and philosophy of mind -'space of reasons' to analyse the strategies and tactics used by (i) the organisations involved with the scheme to facilitate the incubation of the new designs, and (b) an aspiring jewellery designer to create a new product range. The chapter concludes with a discussion of the implications of this conceptual framework for current debates about: (i) practice-based learning; and (ii) occupational competence.

## 8.1 Introduction

The creative industries, which encompass art and design, performing arts, film, television, and so on, have moved from the fringe to the mainstream of national economies in the last decade, because they are widely perceived as a major trigger for the further transformation of post-industrial economies (Bilton, 2006; Florida, 2004). All industries in the United Kingdom (UK), according to a recent Department of Trade and Industry (DTI) paper *UK competitiveness: Moving to the next stage* (Porter & Ketels, 2003), face the economic challenge of moving from an economic model based on increasing the level of labour force utilisation to an innovation-driven model based on the upgrading of productivity by competing on 'more unique and more innovative products and services.' This model requires new management behaviour, targeted investments, and the creation and strengthening of 'new ties between educational institutions and industry' (Porter & Ketels, 2003, p. 44).

The recommendations contained in the UK Treasury-commissioned review of the future skill needs of the UK economy from Lord Leitch (2006), however, fall firmly between the labour utilisation and innovation economic models. The report argues that productivity should be increased and skill levels raised, yet it

S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2_8, 

prioritises funding only basic skills (i.e., literacy and numeracy) and at UK Level 2 qualifications. There are two key problems with this strategy: First, these qualifications, as Delorenzi (2007, p. vi) points out, 'are often used as a way to certify existing skills rather than helping people to acquire new ones'; and second, increases in productivity are best achieved either by managing the labour force more effectively (Keep, 2006) or by supporting adults who already hold Level 3 qualifications to broaden the base of their expertise (Delorenzi, 2007, p. ix). Unfortunately, work organisation, job design, or funding for horizontal skill formation are not centre-stage in the post-Leitch policy debate in the UK, nor for that matter in European Union policies for education and training.

This circumstance suggests that if the government is to realise its vision of an innovation-driven economy, it faces an additional challenge, namely to supplement its skills agenda by developing strategies that explicitly integrate product and service innovation and education and training. One way to achieve this goal is to support the extension of schemes that offer companies a combination of human and financial resources to develop a more innovative approach to product and service development, and also offer adult entrants to or adult 'switchers' in the labour market opportunities to develop the forms of vocational practice that will support their employability in the global economy (Guile, 2009). Such schemes are, therefore, paradigmatic examples of the interface between individual and organisational contributions to workplace learning.

Drawing on research undertaken through the auspices of the European Union EQUAL Programme *The Last Mile* project (TLM),[10] the chapter analyses a new model of practice-based learning. This model was organised by a non-formal provider of bespoke education and training for the jewellery sector. Its main feature was a work placement scheme to create the conditions to incubate new designs in the jewellery sector in Birmingham. The chapter begins with a discussion of the theoretical framework employed to analyse individual and organisational contributions to workplace learning in this scheme. It then moves on to identify the specific strategies and tactics used by (a) the different organisations involved with the scheme to facilitate the incubation of the new designs, and (b) an aspiring jewellery designer, to create a new product range for the company. The chapter concludes with a discussion of the implications of this analysis for practice-based learning.

[10] TLM looks at inclusion in the creative industries in the following regions in the UK: Cumbria, London, Birmingham, Manchester, Sheffield, Slough, with special reference to the black and minority ethnic population. TLM focuses on aspirant and recent entrants' experiences of access and learning and development in the creative industries, as well as on the experience of intermediary agencies such as City Councils, who coordinate programs for those entrants.

## 8.2 Workplace and Practice-based Learning

The field of workplace learning has developed exponentially over the last two decades as writers have either reformulated existing concepts or generated new concepts to analyse learning at work in a wide variety of different settings. Broadly speaking, a number of different theoretical approaches can be identified. One is the post-Lave and Wenger sociocultural and social practice tradition, represented by writers such as Billett, Fuller, and Unwin. Billett (2003) has developed the notion of 'participation' in Lave and Wenger's (1991) work by formulating the concepts 'agentic activity,' 'participatory practices,' and 'invitational qualities' to analyse the way in which individuals continually 'remake' aspects of vocational practice. In contrast, Fuller and Unwin (2003b) have broadened the concept of participation by formulating the concepts 'expansive' and 'restrictive' environments in order to differentiate carefully between the way in which different types of organisational environments do or do not facilitate individuals to learn in apprenticeship schemes in modern work settings. Another approach is the social-cognitive tradition represented by Eraut. He has drawn on Reber's ideas about the structure of 'memory' and Polanyi's ideas about 'tacit knowledge' to identify the cognitive processes and organisational factors that facilitate the transfer of knowledge from education to workplaces (Eraut, 2003, 2004). A further approach is Engeström's (1987, 2001) work in the field of cultural-historical activity theory (CHAT). Over the last few years, Engeström has formulated a continuous stream of new concepts such as 'activity system,' 'boundary crossing,' and the 'cycle of expansive learning' to analyse the transformation of work and learning in different settings.

In some ways, all of the above are concerned with different forms of practice-based learning of a mix of experienced and less experienced people in different settings. What is distinctive about the focus of the model of practice-based learning in this chapter is that the model has been constructed especially to achieve two goals: employability and competitiveness in the jewellery sector. To do so, it has devised a bespoke work placement programme.

Work placements have a long history as a strategy to facilitate the development of vocational practice in most European countries and for that matter elsewhere in the world (Griffith & Guile, 2004). This is because the forms of knowledge, skill, and judgement characteristic of vocational practice are best developed in the workplace as people mediate the general principles, which they have learnt in education, in relation to the specifics of actual practice-based situations (Guile & Okumoto, 2007). Therefore, it is widely accepted that the field of workplace learning, with its focus on the processes that facilitate learning at work, is ideally suited to the analysis of vocational practice (Evans, Hodkinson, & Unwin, 2002; Evans, Hodkinson, Rainbird, & Unwin, 2006; Rainbird, Fuller, & Munro, 2004). The aim of a work placement is usually to introduce a novice to a vocational practice by allowing the novice to observe or participate in a small number of procedures and protocols associated with a specific vocational field. The type of

work placement described in this chapter, however, is rather different in two senses. Firstly, it had to be specially designed and embedded in a company and, secondly, it had to develop the newly qualified designer's vocational practice and participating company's product and/or service range.

The aforementioned writers have made significant contributions to the analysis of workplace learning. Nevertheless, given that the concepts of Billett, Eraut, Fuller, and Unwin are primarily concerned with the analysis of existing processes and environments that enable individuals to acquire or modify known forms of knowledge and skill, rather than the introduction of bespoke working and learning arrangements in work placements, they are not entirely compatible with the focus of the above programme. Neither was Engeström's (2001) theory of expansive learning because the methodology associated with his theory presupposes the establishment of a 'boundary-crossing laboratory' inside an organisation, where a cross-section of the workforce collaboratively re-thinks the 'object of activity' (i.e., that which is to be realised) and redesigns the organisation's community, rules, and division of labour so as to realise the new object, and this requirement fell outside the remit for the research.

The concept of the object of activity, which lies at the heart of Engeström's (2001) work, is nevertheless a useful way to analyse how the contributing parties agreed on the focus, process, and the intended outcomes of learning through work placements for companies and individuals. The concept of object offers a way to keep the contributing parties' different motives in view to analyse the 'formulation' (i.e., figuring out) and the 'instantiation' (i.e., the steps to realising) of a new product or service (Nardi, 2005), in this case, the contribution of individuals and organisations to the creation of a new range of jewellery.

To explain how the work placement supported the graduate jeweller to develop the knowledge, skill, judgement, and networks to move into the jewellery sector, the chapter uses Guile's idea that the new challenge for practice-based learning is to support people to develop 'vocational practice' and social capital (Guile, 2009, 2010). The gist of this argument is that only when people can operate in a 'space of reason' by inferring what follows from advice, suggestions and so forth, are they able to incorporate others' ideas and the experiences that are offered into a unified learning and working process.

## 8.3 The Development of a Work Placement Scheme in the Jewellery Industry

The idea that greater education/industry links are required to improve economic performance and support recently qualified graduates to supplement their qualifications by developing the forms of vocational expertise firms require is not entirely new in the UK. In recognition of this dual need, the Teaching Company Scheme (TCS) was set up in 1975 (Senker & Senker, 1994). The TCS was

intended to counteract shortcomings in engineering formation at postgraduate level by providing opportunities for academics in universities to work with companies to:

1. facilitate the transfer of technology and the spread of technical and management skills, and to encourage industrial investment in training, research, and development;
2. provide industry-based training, supervised jointly by academic and industrial staff, for young graduates intending to pursue careers in industry; and
3. enhance the levels of academic research and training relevant to business by stimulating collaborative research and development projects and forging lasting partnerships between academia and business.

The focus of the TCS has subsequently been broadened to reflect the government's desire to support UK companies in all industrial sectors to compete successfully in the global knowledge economy, and it was renamed the Knowledge Transfer Partnerships (KTPs) scheme in 2003 to reflect this broader goal (Momenta, 2007).

It is much easier to establish national schemes like the KTPs in industrial sectors such as engineering, finance, and pharmaceuticals, which are characterised by, on the one hand, a mix of multinational and large-scale national companies and, on the other hand, the 'traditional value chain' of partnerships and strategic alliances within firms (Porter, 1990). The long-standing relationship between higher education and the engineering, finance, and pharmaceutical industries provides a forum to persuade companies to participate in such schemes.

The jewellery industry, which is part of the creative and cultural sector, presents a very different kind of challenge. Much of this sector depends upon a value network of 'horizontal' collaboration between small- and medium-size enterprises (SMEs) and freelancers who create new products and services, and 'vertical' collaboration between large firms who act as suppliers and distributors (Bilton, 2006, p. 54). This generates a very different pattern of economic activity based on local ties where SMEs and freelancers are committed to the creation of new jewellery products and the larger firms are concerned with their manufacture and distribution. Government intervention in such contexts, if it occurs, is difficult because policy measures rarely articulate the actual needs of the relatively invisible SMEs, freelancers, and/or local agencies that serve the needs of jewellery industry.

One of the most effective strategies for fostering education-industry collaboration in the creative and cultural sector is to work through 'intermediary agencies' (Guile & Okumoto, 2007). They are the range of local private- and/or public-sector organisations that act as catalysts to bring SMEs, freelancers, and networks together to forge partnerships. They can include, amongst others, local councils' departments of economic development and social regeneration, sector-specific-funded agencies with a remit for brokering cross-sectoral partnerships, and SMEs who specialise in project development. The next section describes the

work of a number of intermediary agencies and the work placement scheme that they established.

Birmingham City Council (BCC) (2007) has identified 'inclusive economic regeneration' as one of the city's key agendas. Particular emphasis has been placed on increasing the number of the under-represented sections of the community in the labour market. In order to engage with the invisible infrastructure of the creative and cultural sector in the city, BCC established a Creative Team (CT) within the Department of Economic Development. The CT's role was to broker partnerships within the sector to test and promote new means of combating discrimination and fostering economic development, and to identify sources of funding to realise such partnerships' aims and ambitions (BCC, 2007).

Birmingham's Jewellery Quarter was one of the priority areas identified in BCC's *Creative City Report* (BCC, 2003) because, although the jewellery industry had historically been a mainstay of the local economy, it was for a number of reasons now in decline. These reasons can be summarised as follows:

- many companies are struggling to compete with Asian manufacturers who are able to produce a similar range of jewellery products at a cheaper price;
- the split structure of UK's jewellery industry – firms specialising in either purchasing or retailing jewellery – obstructs growth because the purchasers are inclined to buy vast quantities of standardised products, with the result that shops tend to have the same line; and
- jewellery companies are suspicious of graduates because they feel that they 'are not yet suitable for the workplace because they lack experience,' while many graduates feel that 'manufacturing is second to designing' (interview with Gay Penford, Company Manager).

To support Birmingham's jewellery industry to reposition itself in the domestic and overseas marketplace, and young jewellers to develop their vocational practice, the CT worked in partnership with the Jewellery Industry Innovation Centre (JIIC) – part of the University of Central England, Birmingham – with a remit to provide support in research and development in the UK jewellery industry. The JIIC had extensive experience in designing placement schemes; consequently, the CT felt confident about delegating responsibility for designing and managing the new model of practice-based learning – the Design Work Placement Project – trusting the JIIC to involve appropriate companies and graduate jewellers in the scheme.

One of the attractions of this source of funding is that it is unencumbered by UK government targets for education and training; therefore, it enables partners to co-configure work placement schemes according to their needs, rather than as a means to realise externally imposed targets. The Design Work Placement Project was based on a three-way partnership: (a) Manufacturers were prepared to give recently qualified jewellers an opportunity to develop a new range of commercial products based on their research, because they had faith in the JIIC's track record in identifying new talent; (b) recently qualified jewellers were prepared to work

for a small bursary in order to learn how to incubate (i.e., create, cost, and monitor the fabrication of their designs) because they appreciated that this would provide an invaluable opportunity to develop their vocational practice and to develop a profile within the sector; and (c) the JIIC were prepared to act as mentors for the jewellers and as project managers because they understood that working and learning are a single integrated strand of activity rather than two separate and disconnected activities. The scheme ran for 6 months and involved 10 companies and 10 designers. The CT and JIIC felt that this provided sufficient time for the design (i.e., formulation of the project-object) and production (i.e., instantiation of the project-object) phases to occur.

The scheme was explicitly designed in the following way to integrate individual and organisational workplace learning. The conventional business model that had been a feature of the jewellery industry for years, based on leading manufacturers identifying trends and products on the basis of intuition (e.g., 'I think pearls will be the trend this year') and expecting the remainder of the industry to follow, was replaced with a research-based model. This model was predicated on the idea that the designers participating in the scheme, supported by the JIIC, should try to foresee trends by identifying creative and cultural preferences that were emerging across the entire sector. They could then incubate these preferences into new jewellery designs, by working closely with manufacturers to feed their research findings into their design and production process, so as to help companies to move their product range up market.

To achieve this goal, newly qualified designers were offered, firstly, access to a programme of support to undertake and apply their research. The JIIC project managers guided the jewellers through the research process, assisted them to translate their ideas for designs into commercially viable designs, and convened monthly three-way meetings between the designer, the company, and the JIIC to iron out any problems (Kate Thorley & Zoe Youngman, Project Managers, JIIC, interview, November 4, 2005). Secondly, in-company mentoring was provided to ensure that emerging designs combined creativity and practicality. Directors of the participating companies acted as on on-site mentors for each designer by giving support and advice regarding the advantages and disadvantages of fabricating different designs, and liaising with retailers to ensure that the designs were purchased. Finally, designers were offered an opportunity to develop their social capital by showcasing their new designs to the local industry at the end of the project. Participating companies were offered a way to foster a new designer-manufacturer-buyer relationship so as to enable fresh British research-based designs to set new domestic and global jewellery trends.

## 8.4 The Development of Vocational Practice in the Jewellery Industry

One of the work placements negotiated by the JIIC was between M&M and a recently qualified jewellery graduate, Shona Marsh. M&M were keen to participate because the Director, Matthew Twigge, wanted to reposition the company at the 'high end' of the UK and global jewellery marketplace. Shona was selected by the JIIC because she had a first degree in Tapestry from Edinburgh College of Art and a High National Diploma (HND) in Jewellery and Silversmithing from Birmingham School of Jewellery (University of Central England), and had also undertaken a work placement whilst at college. Consequently, the JIIC felt that Shona had the right balance between theoretical knowledge, practical skill, and some experience of the challenge of working in a commercial environment to benefit from the placement.

The aim of the work placement was two-fold: firstly, to design a new range of female and male wedding rings to reposition M&M at the high end of the UK and global jewellery marketplace, and secondly, to assist Shona to develop her vocational practice and social capital so as to make the transition from unemployed to employed status (i.e., full-time employment or part-time/contract-based employment) in the jewellery industry. The work placement was, according to Kate Thorley (interview, May 10, 2007), 'unique' because there were very few companies that were prepared to offer an inexperienced designer the opportunity to 'experiment with new designs based on diamond setting for wedding rings.' M&M were prepared to do so because the company was committed to increasing its profitability by offering an enhanced product range to appeal to the 'middle to the upper end of the market' (Matthew Twigge, interview, February 7, 2006).

This work placement was also, according to Kate (interview, May 10, 2007), very 'focused.' The JIIC, Matthew Twigge, and Shona were all collectively involved from the outset in agreeing upon a brief for the project-object: a written plan that outlined the timeframe, the expected number of designs, and the forms of support. Moreover, regular meetings were convened between Shona and Matthew to discuss ideas for designs and between Shona and Kate (mentor meetings) to discuss progress. On the basis of their previous experiences, the JIIC was acutely aware that this degree of clarity and transparency about the project's outcomes created a context where all parties were collectively involved in the realisation of the project-object and, as a result, more prepared to listen and learn from one another.

During the formulation phase**,** Kate suggested to Shona that she should change her working methods. Up to now, Shona had researched new ideas by collecting images, almost randomly, in scrapbooks. This method of working was, however, rather insular because it did not allow her to identify general design trends in fields other than jewellery or to consider their implications for new jewellery designs. This way of working is an increasingly important aspect of modern

jewellery design because designs are expected to anticipate and complement rather than clash with fashion trends across the age range. Kate introduced Shona to the idea of 'moodboards' based on themes such as 'monotone' and 'Victorian' that reflect emerging fashion trends. Shona collated the sources of inspiration gleaned from shop displays, films, and magazines during the research process on moodboards, and used them as a backdrop for the formulation of her initial ideas for the wedding rings' designs, colours, and shapes. Once Shona had produced a sufficient range of moodboards to stimulate a discussion, Matthew was invited to look at them and to select the themes and images that he would like to see developed further. At this stage, feedback was still fairly provisional. Matthew identified promising ideas worthy of further development.

The transition from the formulation to the instantiation phase took an iterative path. Following the discussion with Matthew, Shona produced the initial rough hand-sketching of between 30 and 40 rings to allow Matthew to exercise his judgement as regards to which sketches were realistic in terms of their design (e.g., shape, size, complexity), appropriate as a commercial product, and, most importantly, deemed to be new in the market. Having received Matthew's subsequent feedback on the commercial potential and practical feasibility of the themes and ideas for designs, Shona then made detailed sketches of the designs, including their measurement and scale.

This task proved to be very demanding because whereas at college Shona had six months to come up with one design, at M&M she had to produce a total of 42 designs within the same period. As Shona (interview, April 5, 2006) remarked: '… the learning curve is to design at a much quicker pace ... I didn't feel pressure but felt it was a different way of working.'

In the past, Shona pondered over ideas for hours; however, given her new production schedule, this was a totally unrealistic way of proceeding. The key challenge that she now faced was to produce a far greater quantity of designs in a very short timeframe. In the workshops, Kate had introduced Shona to a new approach to design based on the principle of 'pinning ideas down' quickly, in other words, drafting them from different angles and perspectives and producing slightly different versions of each design. This process allowed her to clearly explain the idea behind a design to Matthew so that she and Mathew could consider their aesthetic originality. It also allowed her to explain the design's idea to Tuwet Baht, the model-maker, to enable him to swiftly consider the technical implications of each design and offer Matthew and Shona immediate feedback on their practicality and cost implications (Shona Marsh, interview, April 5, 2006). Once all three parties had agreed which designs would be instantiated, Shona produced very detailed final drawings for each design so that Tuwet and his team could easily fabricate them.

The fabrication process also proved to be another particularly demanding challenge. Shona had acquired some knowledge of production methods and learnt a number of casting techniques at college. This fledgling knowledge and skill, in conjunction with Tuwet's feedback and the new methods of working to which

Kate had introduced her, provided Shona with the confidence to ascertain for herself, at an increasingly early stage in the design process, the practical difficulties and cost implications of realising particular designs. In doing so, she began to develop her own judgement and to eliminate at the drafting stage, without having to consult Tuwet, designs that would be difficult to make 'downstairs' in the factory, or that were too expensive, even though she might be deeply attached to them (Shona Marsh, interview, March 8, 2006). Once the models had been completed and fine-tuned to reflect further aesthetic considerations that emerged in her meetings with Matthew, and potential technical difficulties identified by Tuwet, Shona could confidently send them to be fabricated in the knowledge that she was not wasting precious time and resources in the factory (Shona Marsh, interview, May 10, 2007).

The Design Work Placement Project was deemed by all partners to be a great success. Shona felt that she has considerably improved her vocational practice as a result of undertaking the work placement.

> I've learnt how to monitor the production process so as to ascertain at the model-making stage whether designs are being realised so they're consistent with my original intentions … to correct any deviations from the original design in the models and … to monitor the final stages of fabrication. (Shona Marsh, interview, March 8, 2006)

Moreover, the opportunity to work with a number of precious materials was not only an invaluable experience, but also a stepping-stone for her to progress to the next stage as a designer because, as Kate explains, a jeweller's perception of the actual working materials is 'a really big thing' in the design process since it is a major stepping stone to a designer developing their own style:

> If Shona is to do a bespoke design now, she knows what kind of questions she should ask, for example, what kind of rings the client wears – to identify the client's needs. She is much more aware of how things have to be made. (Kate Thorley, interview, April 5, 2006)

Furthermore, because 'M&M allowed [her] to work more freely,' Shona not only significantly broadened her experience and increased her confidence, but also began to rethink her career trajectory as a jewellery designer. Instead of searching for security and seeking a permanent position with a jewellery manufacturer, she was now keen to develop a professional identity and profile as a freelance designer by consecrating a reputation in the industry as someone who has 'developed their own style' (Shona Marsh, mentoring session, April 5, 2006).[11]

M&M were also enormously pleased with the work placement scheme. Before participating, Matthew was responsible for designing all the products as well as running the business; as a result the quantity and quality of his design work was

[11] After finishing this scheme, Shona took part in a new scheme, 'Design Space,' for a year. This scheme is run by the BCC to promote freelance designers to the local jewellery industry. As Kate pointed out, 'this funded project will help her to further build up her confidence' (interview, April 5, 2006).

variable. The scheme, nevertheless, was a real challenge for M&M. It entailed the company re-configuring aspects of their work processes so that Matthew, Tuwet, and the front-line workers in the factory worked collaboratively with Shona to formulate and instantiate the new range of designs. Fortunately, Matthew was very relaxed about the project, appreciating that:

> You have to try a new thing and if you do something new, sometimes it goes well and sometimes it doesn't ... the trick is not to take it so seriously ... I can be like this because it is my company and my money. (interview, April 5, 2006)

He recognised that the introduction of the new work processes had significantly developed the capability and capacity of his staff to fabricate new designs, and anticipated there would be a number of spin-offs from the new designs over the next 6 to 12 months which would also benefit the company. This outcome led him to offer Shona a freelance contract after the project had ended so that they could mutually benefit from their new working relationship (interview, April 5, 2006).

## 8.5 Practice-based Learning: Epistemic and Pedagogic Issues

Some years ago, Engeström (1987, p. 1) argued that psychological theories of learning such as cognitivism and constructivism had little to offer with regard to supporting people to learn to create new artefacts and practices, because they were essentially 'reactive forms of learning.' These theories, having their roots in formal education, meant that they presupposed a given context and a pre-set learning task; as such, they were predicated on a view of learning that assumes we 'cope with tasks *given* to us.' Engeström argued that his theory of expansive learning offered people a way to escape from this trap by positioning them to rethink the purpose of their activity and to envisage and implement those new forms of activity.

He has subsequently applied the gist of his original critique of mainstream theories of learning to the field of workplace learning, by arguing that 'situated' and 'practice-based' theories of learning, which as we saw earlier have been a significant influence in this field, are more suited to analysing incremental change in artefacts and practice, rather than analysing the radical changes that are frequently required in modern workplaces (Engeström, 2004; Engeström, Miettinen, & Punamaki, 1999). In contrast to Engeström's polarisation, this chapter has developed an intermediate position between the 'gradualistic' and 'radical' perspectives on workplace learning. It has done so by using the notion of the object to identify the individual and organisational contribution to the development of vocational practice and social capital and the way in which minor modifications occurred to the organisation of work.

In doing so, the chapter has first revealed the epistemic basis of vocational practices. The conventional conception of being epistemic is the production of foundational knowledge within a disciplinary field in science or in the humanities,

thus restricting epistemic practice to those fields (Toulmin, 1972). The idea that the formulation and instantiation of a new artefact is a knowledge-based process introduces a rather different sense of epistemic compared with the traditional conception. One way of understanding this new conception is to turn to Knorr Cetina's (1999, 2001) argument about the spread of 'epistemic cultures' in advanced industrial societies. Knorr Cetina maintains that scientists' knowledge-generating practices, for example, the accumulation, verification, and distribution of knowledge to remediate practice, are becoming a constitutive feature of other professions. Thus, from her perspective, in those occupations and organisations which have a significant knowledge base,

> … one would expect practitioners to have to keep learning, and the specialists who develop the knowledge base to continually reinvent their own practices of acquiring knowledge. Practice, in this case, would seem to take on a wholly different set of meanings and raise a different set of questions from the ones raised by habitual activities. (Knorr Cetina, 2001, p. 175)

Thus, in this new context, the concept loses its strong foundational and teleological connotations (i.e., movement towards absolute truths). Yet, this concept of practice retains many of the features of knowledge generation that have traditionally been associated with science, for example. That is, there exists a concern for the development of practice based on the spread of research-based methods of inquiry and research-based partnerships. In a nutshell, Knorr Cetina's argument is that those vocational practices that have an explicit knowledge base and are a part of a well-defined field have a stronger epistemic root compared with those practices that are not characterised by such features and, moreover, that this root constitutes a key resource for their continuing development.[12]

This conception of epistemic reveals the way in which the practices to which Kate introduced Shona provided her with a resource that enabled the formulation of ideas and designs more effectively for a new range of jewellery for M&M. In addition, it also to develop the type of expertise to prosper as a freelancer in the creative and cultural sector. In the case of the former, Shona used the moodboards to reposition herself in relation to her previous way of working. Instead of trying to self-generate designs by relying on her imagination, Shona injected a more explicit research-based dimension into her working methods so as to identify emerging fashion trends and to consider their implications for jewellery designs. The research process provided Shona with a space to consider the way in which her ideas for designs might be received in their context-of-consumption (i.e., the way in which customers would perceive them) as well as in their context-of-production (i.e., to anticipate how Mathew might respond to the ideas that lay behind different designs before she presented them to him).

---

[12] I would like to thank Reijo Miettinen, my discussant at a symposium on 'epistemic practice' at the Vth Nordic Socio-Cultural Activity Theory Conference, Oslo, 2007, for pointing out the problems of not fully clarifying the way in which the term epistemic practice was being deployed in a paper that I gave at the conference.

In the case of - the development of expertise to prosper as a freelancer - the introduction of the research-based dimension led Shona to appreciate that the creative and cultural sector is decreasingly a series of separate and fragmented industries, and increasingly an interconnected field where aesthetic notions are shaped 'relationally' by the way in which people can creatively juxtapose ideas, artefacts, and lifestyles (Bourriard, 2002). This alerted her to the dual challenge of 'consecrating' a reputation as a jewellery designer in an era of economic innovation. It is imperative not only to search for inspiration for jewellery designs outside of the immediate field of practice, but also to consider the way in which those sources of influence might anticipate, and thus position, companies such as M&M to be at the forefront of fashion trends.

The chapter has also revealed the crucial role of a new type of pedagogic practice in developing the epistemic dimension of vocational practice in workplaces. Most discussions of workplace pedagogy have focused on (a) the transition from novice to expert (Fuller & Unwin, 2003a), (b) the enculturation into preset work processes (Billett, 2003; Eraut, 2004) and habitus (Casey, 1995), and (c) the conditions to facilitate interaction between different activity systems (Tuomi-Gröhn & Engeström, 2003). Once the focus is placed on how various kinds of knowledge, material entities, skills, and social functions are built into a new range of jewellery to make it functionally coherent and representative of all parties' desires and interests, a new dimension is introduced into workplace pedagogy that was never considered by the gradualistic and radical positions: how to support people to learn to infer what follows from other people's ideas and practices.

The traditional 'front-loaded' argument about the vocational educational curriculum stresses that the techniques that Kate introduced to Shona and the theories that underpin their use should be taught to learners prior to encountering practical situations in the workplace where they may be relevant (Winch, 2006; Winch & Clarke, 2003). However, more recent 'practice-based' argument in vocational education has stressed that modern work is characterised by a need for 'hot actions' and that vocational curricula cannot possibly anticipate and prepare people for such situations, so should focus on the development of generic skills (Beckett & Hager, 2002). The problem with this polarised view of the vocational curriculum is that both positions gloss over, albeit in slightly different ways, the notion that concepts and working practices are neither context-free nor purely situated achievements. Instead, they each dwell in their own normative domain, which is underpinned by culturally and historically constituted reasons. Thus, it follows that in order to grasp the implications of any suggestion (i.e., to know that something either is the case or might be relevant to the case-in-hand), learners have to be able to discern what is or is not a reason for different suggestions, and to use their emerging knowledge of those reasons to infer what does or does not follow for their vocational practice.

The approach adopted in the Design Work Placement Project by the JIIC and M&M followed, even though it was not consciously based on, the above

principles. The JIIC achieved this goal through a combination of what can be referred to as 'orientation' and 'laterally branching' pedagogic strategies (Guile, 2009). The former consisted of workshops that were delivered prior to the jewellers participating in the scheme to alert them to the changing industrial context. The latter involved the introduction of new techniques in relation to the task-in-hand faced by each jeweller. Kate introduced the moodboard and pinning down strategies to Shona as heuristic devises, rather than maxims, and invited her to consider how and/or whether to incorporate those techniques into her own practice. Shona progressively recontextualised her use of those techniques so she was able formulate and instantiate a new range of wedding rings that exhibited some continuity with traditional designs whilst simultaneously introducing new design elements into what is a fairly staid artefact.

M&M achieved the above goal through the creation of what can be referred to as 'workflow' pedagogic process. Matthew accepted responsibility for the creation of a context in the meetings between Shona, Tuget, and himself whereby aesthetic, commercial, and fabrication issues associated with different designs could be discussed so that all parties were able to infer from one another's comments what followed for their practice, and use this growing knowledge to anticipate potential problems with the next round of designs.

## 8.6 Conclusion

This chapter has argued that qualifications are not 'magic bullets' that facilitate access to the jewellery industry because the industry is under pressure to innovate, and newly qualified graduates in any field have not yet developed the forms of vocational practice to contribute meaningfully to the process of innovation. It has also argued that qualifications have to be supplemented by individuals' participation in bespoke non-formal learning programmes that provide them with opportunities to develop their vocational practice and social capital. Intermediary agencies are ideally placed to devise and design such programs because they have, what Lundvall and Johnson (1994) refers to as 'know who' knowledge. Such knowledge regards a network of people who can help individuals to, firstly, secure European funding for bespoke learning programmes, and, secondly, mobilise support from education and industry to design and deliver innovative models of practice-based learning that are geared to supporting aspiring entrants to gain experience of formulating and instantiating new products and services.

The chapter has explored the construction of a bespoke model of practice-based learning in the jewellery industry by drawing on the concepts of object, vocational practice, and social capital. The first concept was used to analyse the reasons behind the design of the JIIC's work placement programme, and to reveal the epistemic and pedagogic basis of the formulation and instantiation of the work placement programme, and the new range of jewellery. In the case of the reasons

behind the design of the programme the chapter has identified how the JIIC recontextualised (Guile, 2010), that is, refashioned, concepts, practices, and networks in their work placement programme to support the development of Shona's vocational practice and social capital. Shona recontextualised the resources provided by the JIIC in the following ways. Firstly, she used the implications of social scientific knowledge of the impact of the global economy to help her understand the challenge faced by the jewellery industry. Secondly, she used the cultural studies knowledge of the changing role of jewellery in customers' lifestyles as a resource to aid her collection and use of ideas. Thirdly, she used the insights that accrued from Kate's pedagogic knowledge to assist her to work in a more commercially-orientated way and formulate and instantiate a new range of jewellery. Finally, she used the JIIC's ability to involve the jewellery industry in the work placement programme to assist her to identify the future direction of her career.

In the case of the the epistemic and pedagogic bases of the programme, the chapter has identified the different pedagogic processes that enabled Shona to recontextualise the knowledge she gained from the JIIC programme, and from working with Kate, Mathew, and Tuwet, to successfully develop a new way of designing jewellery. The use of the distinction between the formulation and instantiation of the new range of jewellery revealed that successful practice-based working and learning entailed all contributing parties grasping the system of mediating connections that inform one another's concepts, practices, and judgements. Accomplishing this goal requires a collective determination on behalf of all contributing parties to make explicit to one another what is implicit in their beliefs and actions. It is only as all contributors involved with the creation of the new artefact begin to grasp the inferential connections that inform one another's utterances, symbolic representation, or actions, that those utterances become intelligible in two senses: First, their meaning becomes clearer, thereby enabling all parties to infer what follows from them, and second, the parties are able to use their understanding of these inferences as a resource to create new practices to instantiate the new artefact. In discussing the issue of inference, the chapter has highlighted an issue that requires further consideration and exploration in discussions of practice-based learning.

## References

Beckett, D., & Hager, P. (2002). *Life, work and learning: Practice in postmodernity*. London: Routledge.

Billett, S. (2003). Workplace pedagogic practices: Co-participation and learning. *British Journal of Educational Studies*, *50*, 457-481.

Bilton, C. (2006). *Management and creativity: From creative industries to creative management*. London: Blackwell.

Birmingham City Council. (2003). *Creative city report.* Birmingham: Author.

Birmingham City Council. (2007). *Homepage*. Retrieved November 10, 2006, from http://www.birmingham.gov.uk/GenerateContent?CONTENT_ITEM_ID=16268&CONTENT_ITEM_TYPE=0&MENU_ID=12175

Bourriard, N. (2002). *Relational aesthetics*. London: Sage.

Casey, C. (1995). *Work, self and society: After industrialism*. London: Routledge.

Delorenzi, S. (2007). *Learning for life: A new framework for adult skills*. London: Institute for Public Policy Research.

Engeström, Y. (1987). *Learning by expanding: An activity-theoretical approach to developmental research.* Helsinki: University of Finland.

Engeström, Y. (2001). Expansive learning at work: Toward an activity-theoretical reconceptualisation. *Journal of Education and Work*, *14*(1), 133-156.

Engeström, Y. (2004). New forms of learning in co-configuration work. *Journal of Workplace Learning*, *16*(1/2), 11-21.

Engeström, Y., Miettinen, R., & Punamaki, R.-L. (Eds.). (1999). *Perspectives on activity theory*. Cambridge, UK: Cambridge University Press.

Eraut, M. (2003). Transfer of knowledge between education and workplace settings. In H. Rainbird, A. Fuller, & A. Munro (Eds.), *Workplace learning in context* (pp. 134-168). London: Routledge.

Eraut, M. (2004). Informal learning in the workplace. *Studies in Continuing Education*, *26*(2), 247-273.

Evans, K., Hodkinson, P., Rainbird, H., & Unwin, L. (2006). *Improving workplace learning*. London: Routledge.

Evans, K., Hodkinson, P., & Unwin, L. (Eds). (2002). *Working to learn*: *Making learning visible*. London: Kogan Page.

Florida, R. L. (2004). America's looming creative crisis. *Harvard Business Review,* 82(10), 122-136.

Fuller, A., & Unwin, L. (2003a). Creating a "modern apprenticeship": A critique of the UK's multi-sector, social inclusion approach. *Journal of Education and Work*, *16*(1), 5-25.

Fuller, A., & Unwin, L. (2003b). Learning as apprentices in the contemporary UK workplace: Creating and managing expansive and restrictive participation. *Journal of Education and Work*, *16*(4), 407-426.

Griffith, T., & Guile, D. (2004). *Learning through work experience for the knowledge economy: Issues for educational research and policy*. Luxembourg: Office for Official Publications of the European Communities.

Guile, D. (2009). Reconceptualising transition as vocational practice: Lessons from the creative and cultural sector. *British Education Research Journal, 35(5),* 761-780

Guile, D., & Okumoto, K. (2007). "We are trying to reproduce a crafts apprenticeship": From Government blueprint to workplace-generated apprenticeship in the knowledge economy. *Journal of Vocational Education and Training, 59*(4), 551-574.

Guile, D. (2010). *The learning challenge of the knowledge economy.* Rotterdam, Sense.

Keep, E. (2006). State control of the English education and training system – playing with the biggest train set in the world. *Journal of Vocational Education and Training*, *58*(1), 47-64.

Knorr Cetina, K. (1999). *Epistemic communities.* Harvard: Harvard Education Press.

Knorr Cetina, K. (2001). Objectual practice. In T. Schatzki, K. Knorr Cetina, & E. Savigny (Eds.), *The practice turn in contemporary theory* (pp 175-89). London: Routledge.

Lave, J., & Wenger, E. (1991). *Situated learning - Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.

Leitch, S. (2006). *Prosperity for all in the global economy – world class skills. Final report.* Retrieved March 1, 2007, from http://www.hm-treasury.gov.uk/media/523/43/leitch_finalreport051206.pdf

Lundvall, B-A., & Johnson, B. (1994). The learning economy. *Journal of Industry Studies*, 1(2), 23-42

Momenta. (2007). *Programmes.* Retrieved May 17, 2007, from http://www.momenta.co.uk/programmes.htm

Nardi, B. (2005). Objects of desire: Power and passion in collaborative activity. *Mind, Culture, & Activity,* 12(1), 37-52

Porter, M. E. (1990). *The competitive advantage of nations.* Basingstoke: Macmillan.

Porter, M., & Ketels, C. H. M. (2003). *UK competitiveness: Moving to the next stage*. London: Department of TYrade and Industry (DTI).

Rainbird, H., Fuller, A., & Munro, A. (Eds). (2004). *Workplace learning in context*. London: Routledge.

Senker, P., & Senker, J. (1994). Transferring technology and expertise from universities to industry: Britain's teaching company scheme. *New Technology, Work and Employment*, *9*(2), 81-92.

Toulmin, S. (1972). *Human understanding*. Oxford: Clarendon.

Tuomi-Gröhn, T., & Engeström, Y. (Eds). (2003). *Between school and work: New perspectives on transfer and boundary crossing*. Amsterdam: Pergamon.

Winch, C. (2006). Rules, technique, and practical knowledge: A Wittgensteinian exploration of vocational learning. *Educational Theory*, *56*(4), 407-422.

Winch, C., & Clarke, L. (2003). "Front-loaded" vocational education versus lifelong learning: A critique of current UK government policy. *Oxford Review of Education*, *29*(2), 239-252.

# Chapter 9
# Guidance as an Interactional Accomplishment
## Practice-based Learning within the Swiss VET System

**Laurent Filliettaz**

University of Geneva, Switzerland

**Abstract** This chapter analyses how apprentices in the Swiss VET system receive practical instruction within training companies and how they are being supported and guided by experts in the workplace. It does so by paying special attention to verbal and nonverbal interaction between experts and apprentices, exploring the hypothesis that a fine-grained analysis focused on language-in-interaction could profitably inform the conditions in which learning arises from a practice-based training model. The chapter commences with a brief overview of the main issues and problems challenging initial vocational education in Switzerland. It then identifies and illustrates four distinct interactional configurations through which guidance progresses in the workplace: as spontaneously provided, explicitly requested, collectively distributed, or implicitly denied. This empirical and interactional approach, based on audio-video data analysis, contributes to a reflection on the strengths and weaknesses of a practice-based training model as it is implemented in the Swiss apprenticeship system.

## 9.1 Introduction

Switzerland, like other European countries, has a long-standing tradition of initial vocational education and training (VET) based on apprenticeship and workplace learning. Consistent with other VET systems, Swiss apprentices spend most of their initial training in companies, where they experience real work-related tasks and are given practical instruction by progressively entering professional communities of practice through their workplace activities. From an economic perspective, this model seems to have proven its efficiency. It provides a renewed skilled workforce and encourages progressive transitions by young workers into employment after their completion of compulsory education. Nevertheless, recent research depicts a more complex portrait of the system and shows that transitions from school to employment are far from smooth and unproblematic (Stalder & Nägele, 2009; Lamamra & Masdonati, 2009). For example, one third of Swiss apprentices aiming at a federal VET diploma break their contract before completion and a substantial number of them fail at their intermediary or final exams.

S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2_9, 

Given these circumstances, it becomes vital to reflect on the conditions under which apprentices learn from their engagement in practice. This reflection needs to address both theoretical and empirical issues. At a theoretical level, it requires conceptualising in detail the complex relations that link work and vocational training (Billett, 2008; Durand & Filliettaz, 2009). At an empirical level, it calls for a better understanding of the real circumstances in which apprentices are being guided and supported once they enter the workplace. This chapter proposes to address these issues by applying and developing innovative research methods. It analyses how newcomers in the Swiss VET system receive practical instruction within training companies and how they are being supported and guided by experts in the workplace. It does so by paying special attention to verbal and nonverbal interaction between experts and apprentices, exploring the hypothesis that a fine-grained analysis focused on language-in-interaction could profitably inform the conditions in which learning arises from a practice-based training model.

To address these issues, the chapter commences with a brief overview of the main issues and problems challenging initial vocational education in Switzerland. It then outlines a research programme[13] that aims at a better understanding of the training and learning opportunities afforded by practical experience in various technical occupations. Particular attention is then paid to the ways trainers provide guidance to apprentices in the workplace. The empirical and interactional approach, based on concepts and methods borrowed from various perspectives in the field of linguistics, contributes to a reflection on the strengths and weaknesses of a practice-based training model. It underlines the importance of cooperation and coordination between trainers and apprentices in the process of learning at work, and argues for an enhanced preparation for trainers who have responsibilities to assist apprentices in the transition to an effective working role through their participation in the workplace.

## 9.2 Apprenticeship in the Swiss VET System

Organised as a multilingual and multicultural Confederation of 26 cantons, Switzerland has developed a rather complex and heterogeneous educational system.[14] The VET system, for instance, is regulated both at federal and canton levels and comprises a combination of shared principles and a number of regional specificities. Amongst the various elements that enter into the organisation of VET in Switzerland, the provision of opportunities for *practice* undoubtedly plays a

[13] This research programme is funded by the Swiss National Science Foundation (SNF) under the following reference numbers: PP00P1-106603 and PP00P1-124650.

[14] For a detailed presentation of the Swiss VET system, see Stalder and Nägele (2009), Dubs (2006), or Gonon (2005).

crucial role. The importance of practice is evident in the high percentage of initial vocational training that occurs compared with general education. After completion of compulsory education at lower secondary level, 65% of the students enrol in the VET system and only one-third specialises in general education at upper-secondary and tertiary levels. In these initial VET programmes, apprentices aim to secure a federal Diploma or Certificate in one of more than 200 occupations available.

Depending on regional specificities, most initial VET programmes are available in two distinct pedagogical forms: a full-time school curriculum, and a practice-based apprenticeship programme, also known as the 'dual' VET system. In this latter format, apprentices experience various learning practices and move back and forth between distinct institutional settings including technical and general courses in vocational schools, cross-company courses to develop specific practical skills, and training in real workplaces where they are hired as apprentices. Within these training companies, apprentices are supervised by vocational trainers – qualified and skilled workers with expertise in their occupational field, but usually with very limited pedagogical training. Most of the time, the apprentices build up expertise by interacting with skilled professionals at the workplace and through undertaking productive work tasks. In Switzerland, this 'dual' form of apprenticeship constitutes the predominant form of initial vocational training, with 80% of VET diplomas being delivered in such practice-based programmes.

In the Swiss context, professional associations and companies, together with the federal state and the cantons, share the responsibility for the operation of the VET system. For instance, economic demand as represented by need for particular kinds of employees strongly influences the recruitment and selection of apprentices. Moreover, the professional associations define the relevant content of the programmes, contribute to the preparation of pedagogical resources, and support the provision of practical training in cross-company courses as well as in ordinary workplaces.

The Swiss VET system has recently undergone important reforms aimed at securing a higher percentage of qualifications at upper-secondary level as well as providing attractive pathways between VET and the tertiary general education system (Dubs, 2006). Nevertheless, the question of the efficiency of the training model remains a constant issue. From an economic perspective, the low level of unemployment amongst Swiss citizens aged under 25 is often seen as evidence that this system has provided a smooth transition into the workforce for students having completed compulsory education. However, some other figures support a more critical understanding of the situation: 70% of Swiss companies do not hire apprentices and do not engage in initial vocational training; 30% of apprentices enrolled in the 'dual' form of apprenticeship do not complete their training programme or drop of the system; and more than 20% of all young people, most of them with migrant background or low literacy and numeracy skills, do not manage to enter upper-secondary education directly (Stalder & Nägele, 2009). In

recurrent discussion about these matters, two central issues have emerged: the conditions under which learners can access the vocational system, and the quality of training provided in such a model. In what follows, we give a more detailed overview of these two challenges.

The first problem often experienced by young people in a market-driven VET system is the difficulty of access to the apprenticeship programme. The source of such difficulties is far more complex than an insufficient supply of apprenticeship positions made available by companies. Instead, it is the recurrent mismatch between the training occupations sought by potential apprentices, and the apprenticeship positions offered by the various sectors of the economy (Dubs, 2006). The domains that provide the most apprenticeship positions, for instance the machine or building industry, tend to be perceived as less attractive by students, whereas highly preferred occupations (e.g., computer specialist, graphic designer) are not available in sufficient places to satisfy candidates' preferences. Indeed, the poor engagement of some occupational groups in the initial VET system has remained a particular and critical issue in Switzerland for the last few years. There are numerous reasons for such a limited offering of apprenticeships. These include the financial costs and administrative obligations for training companies when hiring apprentices (Wolter & Schweri, 2003; Wolter, Mühlemann, & Schweri, 2003) and a growing mismatch between the requirements of the training programmes and those of the production needs of most companies. Whereas the proposed curricula tend to avoid overspecialisation and develop broad professional skills, training companies see their activity scope becoming more and more specialised, which may limit opportunities for learning in an initial vocational training perspective.

The second problem that has attracted continued attention over the years is the quality of the training itself. In some professional trades, over 60% of apprentices fail at their intermediary or final federal exams. Here again, a variety of reasons are put forward to explain such an evolution. Training companies tend to assign the responsibility for such a bad performance to the specific school profile of apprentices and their poor achievement and learning potential. As a matter of fact, tracking between VET and general education at upper-secondary level is to a large extent determined by schooling results; the students with lower records being naturally oriented towards the vocational pathway. But this selection process is not the only reason why so many apprentices drop out of the system. Training companies are sometimes also seen as playing an active role in the difficulties encountered by apprentices. Some companies do not provide sufficient support to apprentices; some see them exclusively as a way to hire a cheap workforce. Moreover, administratively, the cantons are responsible for tracking and avoiding such abuses, but this supervision often turns out to be insufficient and ineffective (Schneider et al., 2005). Furthermore, the vocational schools themselves are sometimes criticised for their insufficient cooperation with professional associations, reinforcing the gap between what is taught in vocational schools and

what is required for the workplace rather than developing continuities between these learning sites.

These issues have long challenged practitioners involved in the initial VET system. They have also prompted new research questions for academics in the domain of VET. Indeed, in the late 1990s, when the Swiss government embarked on a major reform of the VET system, it turned out that there was very little empirical evidence grounded on research methodologies that could help inform these reforms. At that time, the domain of VET research appeared as insufficiently developed, focused on a limited range of thematic issues and methodologies, and not sufficiently coordinated amongst the various institutions carrying out research in VET (Kiener, 1999). Since then, an active policy has been established, aimed at reinforcing the domain of VET research within the Swiss academic system and encouraging interdisciplinarity and collaboration between research institutions. Research priorities have been identified (i.e., teaching and learning, the use of technologies, the role of social norms in VET, the quality of VET, etc.), with the hope that the development of these research fields will profitably support systemic innovation and enable an evidence-based monitoring of the VET system in the future.[15]

## 9.3 Researching the Field of Vocational Learning and Language-in-Interaction

The research programme conducted at the University of Geneva since 2005 is being enacted together with two colleagues, Ingrid de Saint-Georges and Barbara Duc (Filliettaz, de Saint-Georges, & Duc, 2008). The programme is part of a collective effort aimed at building a strong VET research capacity in Switzerland and increasing our empirical and theoretical knowledge about teaching and learning in a workplace context. This research programme focuses on language-in-interaction in vocational learning and proposes to identify close and fruitful connections between issues raised in the field of initial VET and methodological resources developed in the area of applied linguistics. The overall purpose of our research programme is to contribute to a more informed understanding of the real conditions in which training and learning occur within the Swiss 'dual' VET system. The research adopts interrelated and complementary perspectives on vocational training. The first perspective focuses on apprentices and the cognitive and social learning processes in which they engage. The second perspective focuses on the skills and competencies developed by trainers and teachers, namely the professionals who engage with apprentices in various training sites. In the

[15] Additional information regarding the research policy conducted by the Swiss Office for Professional Education and Technologies (OPET) can be found on the following webpage: http://www.bbt.admin.ch/themen/berufsbildung/00405/index.html?lang=en.

'dual' system, these trainers can belong to various professional communities. Some of them are professional and well trained vocational teachers working in vocational schools. Others are skilled professionals with little pedagogical background working in companies. Finally, we focus on the perspective of the 'dual' model itself and seek to identify the complementarities and boundaries between the various training practices combined in this type of programme.

Obviously, these issues refer to a broad research field, but the procedures we apply and develop in order to address these issues appear as considerably more specific. Our approach to understanding teaching and learning in vocational training can be described as *situated*, *interactional,* and *comparative*. Because these terms bear specific meanings and have strong methodological consequences, they deserve further comments and clarifications.

First, we take an action-oriented approach to learning environments. Consistent with a situated perspective on cognition (Lave, 1988; Lave & Wenger, 1991), we consider that learning cannot be seen as an abstract and decontextualised cognitive process. Instead, it appears as profoundly embedded in social action as it occurs in specific cultural and material environments. This perspective has important consequences regarding the selection of methodology and procedures for data collection and analyses. In our perspective, special attention has been paid to ordinary work and training practices as they unfold in naturally occurring conditions. We have conducted ethnographic field work, spending considerable time with apprentices and vocational trainers in various contexts, taking notes based on observation, and making audio-video recordings of specific tasks when possible.

These observed actions are of interest because they are often accomplished collectively and distributed amongst a plurality of participants. From that standpoint, they belong to what can be referred to as an *interaction*, namely 'all which occurs throughout any one occasion when a given set of individuals are in one another's continuous presence' (Goffman, 1959, p. 26). Because most teaching and training practices can be seen as interactions, we hypothesise that there exist fruitful connections between issues related to vocational learning and disciplines devoted to the understanding of 'the interactional order' and its linguistic organisation. This is the reason why we borrow concepts and analytical categories initially elaborated in various domains of linguistics, such as conversation analysis (Sacks, Schegloff, & Jefferson, 1978), interactional sociolinguistics (Gumperz, 1982), and multimodal discourse or interaction analysis (Scollon, 2001; LeVine & Scollon, 2004; Norris, 2004). These various disciplines have developed distinct approaches to discourse and interaction, but they also share some common assumptions about language and social life. In particular, they can be seen as fruitful resources for our purpose. This is because they view language not only as way of sharing information between speakers and recipients, but as a historical and culturally shaped medium by which social actors take actions, achieve cooperation, participate in social events, align identities, et cetera, by engaging in complex meaning-making process supported by a wide

range of semiotic resources, such as speech, gestures, body motions, gaze, and the handling of objects. This perspective again calls for appropriate and specific methodological requirements regarding data collection and analysis. Consistent with these various approaches focused on language-in-interaction, audio-video recorders were used to collect data in the field, and the recordings were transcribed in a multimodal manner. These data constitute the starting point of a qualitative analysis.

Our approach can be described as comparative because it aims at establishing both continuities and contrasts between various occupations and training contexts. Two sorts of contrasts are of interest here. On the one hand, evidence of any contrasts between three different professional trades related to technical skills is being sought. On the other hand, any contrasts between the various sites and institutions in which training takes place within the 'dual' apprenticeship programme are also being sought. Table 9.1 below provides an overview of the data collected for the purpose of this research programme. It shows the different professional trades focused on for this study, the sorts of training settings involved, and the approximate amount of data collected in these various settings. These data consist of video recordings of naturally occurring action involving apprentices and different sorts of trainers in various occupational domains and distinct institutional settings:

**Table 9.1** Sources and amount of empirical data collected from 2006 to 2009

| Professional trades | Training Settings | Video recordings |
|---|---|---|
| Car mechanics | One vocational school | 37 hours |
| | Four different garages | 39 hours |
| Automation specialists | One private training centre | 19 hours |
| | Three companies of the machine industry | 20 hours |
| Electric assemblers | One training centre of a large public company | 17 hours |
| | Two large public companies | 25 hours |

As presented in Table 9.1, video recordings have been collected in three trades within technical occupations: car-mechanics, automation specialists, and electric assemblers. For each of these occupations, data has been collected in both vocational schools or training centres and training companies and, for each of the settings, a range of situations has been observed: three to four different classes or workshops hosted by vocational schools or training centres; and three to four different training companies for each occupational field considered. In all, about 150 hours of video recordings have been collected, involving about 60 apprentices in 3 different vocational schools or training centres and 9 training companies.

The analysis of these recordings has involved first identifying sequences of interaction conducted by apprentices and professional workers. These sequences of interaction have then been transcribed and constituted the starting point of a

fine-grained description of interactions in these settings. So far, various issues and topics within two broader domains of interest have been investigated.

The first domain of interest has focused on knowledge transmission and transformation. In this area, we have been analysing the ways vocational knowledge and skills are explained, experienced, and acquired in different interactional contexts (de Saint-Georges & Filliettaz, 2008). The second broad domain of investigation is related to the notions of transition and identity construction. Here, we have been interested in exploring the relations between participation in interaction and professional socialisation. In particular, we have described how experts shape the nature and degree by which apprentices engage in productive tasks and how such forms of participation create opportunities for developing professional identities. Consistent with these investigations, contrasted forms of guidance have been identified in the various training companies observed (Duc, 2008; Filliettaz, 2008; Filliettaz, de Saint-Georges, & Duc, 2009). It is precisely this issue of guidance in the workplace that has been found to be worthy of more detailed attention and is the focus of the following paragraphs.

## 9.4 An Interactional Approach to Guidance in the Workplace

In the field of research devoted to workplace learning, it has been recurrently argued that direct and indirect forms of guidance provided by experienced workers constitute important conditions for the learning potentialities of specific work environments. Workers do not always learn on their own and just by completing activities and tasks. They can do so only when specific resources are being afforded to them. As Billett (2001) puts it, 'the quality of direct interaction accessible in a workplace is a key determinant in the quality of learning outcomes. This extends to the availability of this guidance, the willingness of individuals to assist others and the skills experienced coworkers have in sharing this knowledge' (p. 35). When reflecting on the specific resources afforded by workplaces, Billett makes a distinction between what he calls *direct* and *indirect* guidance. Indirect guidance is defined as physical arrangements or various symbolic resources accessible through observation within professional environments. As for direct guidance, it refers to close interactions involving skilled and experienced coworkers. Various resources may be engaged in close guidance. As shown by Billett (2001), *questioning dialogues*, *diagrams,* and *models* or *analogies* improve the learning outcomes associated with guidance in the workplace.

In the francophone field of 'vocational didactics' (Pastré, Mayen, & Vergnaud, 2006), complementary and significant contributions to the topic of guidance and workplace learning have been proposed recently. In a research programme devoted to apprenticeship in the field of car-mechanics in France, Kunégel (2005) has stressed the configuring role of supervisors and trainers in the ways apprentices gain access to vocational knowledge and build up their professional

expertise. He proposes a diachronic model of guidance and training, in which apprentices and trainers play various successive roles, associated with specific interactional patterns. In the first period of an apprenticeship programme, apprentices become familiar with the workplace context and often have no direct access to productive tasks. In a second stage, they receive extensive instruction in the form of organised sequences of explanations. Later, they are progressively put to work and gain autonomy in their practice with occasional help from their trainers. Distinct forms of dialogues between experts and novices occur at these various stages. It seems that small talk or brief verbal exchanges characterise the initial period during which apprentices become familiar with the physical and social context of the workplace. Extended forms of questioning dialogues mediate the instruction phase; and later, request for assistance sequences take place once apprentices have a direct access to productive tasks.

Our research programme builds upon these research findings, which elaborate the configuring role of the 'other' in practice-based learning and illuminate some of the semiotic resources engaged in workplace learning. We propose to elaborate these ideas by investigating how discourse and verbal interaction contribute to the achievement of close guidance during ordinary workplace activities. In other words, we propose to see guidance not only as an abstract concept engaged in the construction of expertise and professional socialisation, but as an interactional joint construction, mediated by language use and other semiotic modes and accomplished by participants incrementally in the various workplace activities and interactions in which they participate. Approaching guidance as an interactional accomplishment leads to the following research questions: (i) How do trainers and apprentices accomplish guidance in the workplace and what are the interactional properties of guidance in such contexts? (ii) How do we identify and define various forms of guidance at work and what sorts of semiotic resources are used by participants in these various forms? (iii) What are the potential outcomes of these various forms and properties of guidance both on a cognitive level and on a social one? (iv) What do apprentices learn through guidance and how may it contribute to the development of professional identities?

We have approached the empirical material collected in the context of training companies guided by these questions. A careful analysis of our data has led us to identify four distinct interactional configurations through which guidance progresses in the workplace: as spontaneously provided, explicitly requested, collectively distributed, or implicitly denied. *Spontaneous guidance* arises when support is initiated and provided by trainers or expert coworkers. *Requested guidance* refers to contexts in which apprentices seek assistance and initiate help-request sequences in order to carry on working. *Distributed guidance* refers to interactions where more than one expert coworker engages in the process of providing instruction or assistance to the apprentice. *Denied guidance* arises when experts or trainers resist or refuse to provide requested assistance to apprentices. In what follows, a case study based on observations and audio-video recordings of an apprentice in the automation trade in one particular training company in the

Geneva area provides empirical evidence for these distinct forms of guidance. The apprentice observed here is an 18-year-old apprentice called Rodney (ROD), who commenced his training programme within this company a few weeks before the recordings took place. Rodney presents a rather typical profile of the population that gets enrolled in these sorts of apprenticeship programmes in Geneva. He is not a native French speaker, having immigrated to Switzerland during lower-secondary school. As a consequence, he encountered some difficulties during his schooling and ended his compulsory education with poor achievements in both literacy and numeracy. His school performance channelled him directly into the initial VET system and he made the choice of becoming an automation specialist after having tried various other occupations. The training company that hired Rodney as an apprentice is a small business that specialises in the construction of electronic boards for the building industry. The typical tasks accomplished by automation specialists in this context involve mounting and connecting various kinds of electric modules (terminals, electric breakers, meters, etc.) on metallic structures before installing them in various buildings under construction. Within the company, Rodney is under the supervision of Fernando (FER), his official trainer. As is usually the case, Fernando is not dedicated exclusively to the instruction and supervision of apprentices. He is also the manager of an important workshop within the company and is in charge of productive tasks as well as other employees. Other colleagues are also working in the same environment as Rodney, but they have no official training responsibility for apprentices. The training model followed by this company is strongly practice-based and considers that apprentices should learn by being assigned productive tasks from the very beginning of their apprenticeship programme. This means that Rodney has not been given any period of observation during which he could become familiar with the context of production; instead he assists expert workers in their ordinary tasks. So, he was immediately put to work with the expectation that he would perform productive tasks.

The excerpts of data presented and analysed below refer to various tasks conducted by Rodney when assembling one of his first electric boards. When the observations began, Rodney had already completed most of the mounting procedure. He had installed various modules on the chassis and finished wiring these modules according to an electric installation plan. In what follows, four short excerpts of data have been selected to show how Rodney deals with various tasks related to the construction of this electric board, and how he seeks and sometimes receives guidance from his trainer and other coworkers. These transcribed sequences of interaction will provide an illustration and a fine-grained analysis of the four different forms of guidance identified in our data so far.

### *9.4.1 Spontaneous Guidance*

One way for trainers to accomplish close guidance at work is to provide support spontaneously to apprentices. This type of spontaneous guidance can be observed and illustrated in the example below. At this point of the task, Rodney has completed the wiring of his electric board and has inserted it into a metallic casing. Fernando, his trainer, works in the same workshop, just in front of him. In the transcribed excerpt, Fernando spontaneously interrupts Rodney's work to provide specific instructions.

(1) you call me before you start (226, 01'35 – 02'04)[16]

| | | | |
|---|---|---|---|
| 01'35 | 1 | | ((*ROD and FER are working individually on their own tasks*)) **[#1]** |
| 01'40 | 2 | ROD: | ((*ROD is handling the cover and installing it in the electric casing*)) |
| 01'49 | 3 | FER: | ((*FER gazes at ROD*)) **[#2]** |
| | 4 | ROD: | ((*ROD continues to cover the casing*)) |
| 01'55 | 5 | FER: | for the engraving when you engrave the strips/ . you should do it vertically\ |
| | 6 | ROD: | vertically/ like that OK\ ((*ROD draws a vertical line with his hand*)) **[#3]** |
| | 7 | FER: | you call me before you start so that you don't make any mistakes\ |
| 02'04 | 8 | ROD: | right\ |
| | 9 | | ((*continues to adjust the cover in the electric casing*)) |

*#1: ROD and FER are engaged in individual tasks*

*#2: FER gazes at ROD when he handles the cover*


*#3: ROD draws a vertical line when saying 'vertically like that'*

**Fig. 9.1** Spontaneous guidance

In the sequence of action, successive participation configurations take place and are sequentially performed by ROD and FER as they engage in work. In the

[16] The transcripts have been translated from French. Conventions and symbols used in the transcripts are listed and explained at the end of this chapter.

first two lines of the transcript, individual actions take place in two distinct areas of the workshop. As indicated by their body postures (#1), both the apprentice and his trainer orient their attention to individual tasks, without engaging in verbal communication. There is no close interaction going on at this point. But obviously, these two distinct areas of the workshop are not perceptually dissociated from each other. ROD's work station is visually accessible to the trainer, who provides constant indirect supervision of his action. For instance, in line 3, he reacts to ROD's handling of the cover by gazing at him. Shortly after that, he comes closer to ROD and initiates a verbal exchange by performing a directive speech act: 'for the engraving when you engrave the strips you should do it vertically' (l. 5). In doing so, he anticipates the next step of the mounting procedure: Once electric boards have been wired and covered, plastic strips must be engraved and stuck on the cover to indicate the various electric components included in the board. In this particular case, these plastic stickers must be engraved vertically and not horizontally. In line 6, ROD ratifies the initiation of this verbal exchange ('vertically like that OK'). Interestingly, he completes his rephrasing of FER's instruction by performing a gesture in which he gives an iconic representation of the vertical line (#3).

This first excerpt of data reveals interesting properties of guidance in the workplace. First, it shows that in some cases, guidance can be interactionally initiated by experts without any explicit question or request from the part of the apprentice. Second, it underlines the fact that guidance is not only accomplished through speech, but arises from a fine-grained combination of various semiotic modes. In the example presented above, interaction commences with sharing acoustic and visual affordances and is then performed by participants using various sorts of resources. It is the visual contact with ROD's action that determines the timing of FER's advice; and it is an iconic gesture performed by ROD that helps him express the concept of 'verticality' in this material context. Finally, we see here that the kind of guidance spontaneously provided by the trainer consists in anticipating future steps of the unfolding task. Indeed, it is the handling of the cover that indicates to FER that ROD has completed the mounting of the electric board and that he is approaching the time when he will have to engrave the plastic strips. But it is not only the next step of a routine task that is being anticipated here. As seen in the transcript, FER initiates a second short verbal exchange with the apprentice, asking to let him know when he will engage in the engraving process: 'you call me before you start so that you don't make any mistakes' (l. 7). In doing so, he is not only anticipating a future episode of the task, but he is also indicating the complexity of this task and the difficulties ROD may encounter when engaging in it. In other words, he is projecting a specific symbolic image of the apprentice, an image of somebody who will probably do things wrongly if he is not properly guided.

### *9.4.2 Requested Guidance*

Sequences of spontaneous guidance are quite rare in the data considered in our analysis. Most of the time, guidance is not initiated by trainers but explicitly requested by apprentices when they face difficulties in conducting their work. The second excerpt, exemplifying these requested forms of guidance, takes place a few minutes after the first one, precisely when ROD engages in the engraving process. In order to prepare the vertical plastic strips, ROD has to run a special program on a computer located in a room next to the workshop. This software enables the editing of the text and numbers that will be engraved on the strips. It is the second time ROD has used this software. But despite the notes he took in his handbook the first time he completed the task, he encounters difficulties and is unable to complete the procedure on his own. He then has to seek help from his trainer.

(2) are you on the phone? (227, 02'25 – 04'14)

| | | | |
|---|---|---|---|
| 02'25 | 1 | ROD: | it's really slow/ **[#1]** |
| 02'29 | 2 | | ((*goes back to the workshop*)) |
| | 3 | ROD > FER: | er on the computer I've typed the whole thing/ and I'm I'm on er |
| | 4 | | are you on the phone/ **[#2]** |
| | 5 | FER: | no/ |
| | 6 | ROD: | oh I thought you were on the phone\ |
| | 7 | | and it says «Number N-B/ . layer/ . terminal/ layer/ . er: 2» . shall I delete it and put 1/ |
| | 8 | FER: | ((*carries on working*)) |
| | 9 | ROD: | because you said that I should pay attention to layers\ . |
| | 10 | | and on the lower part of the screen it says er «N-B/ layer/» |
| 03'02 | 11 | FER: | OK I'm coming\ ((*joins ROD in the computer room*)) |
| 03'18 | 12 | | ((*ROD sits down in front of the computer*)) |
| | 13 | ROD: | «N-B layer» ((*points to the message on the screen*)) |
| | 14 | FER: | how many layers did you create altogether\ .. how many lines/ |
| | 15 | ROD: | lines/ er:. four\ |
| 03'29 | 16 | FER: | ((*takes control of the mouse and clicks*)) **[#3]** yes only one so you've removed the others right/ |
| | 17 | ROD: | yes there is only one left/ |
| | 18 | FER: | XXXX more |
| | 19 | ROD: | oh there is a problem here/ |
| 03'43 | 20 | FER: | ((*goes on clicking the mouse*)) |
| | 21 | | you do it again right . do it again\ |
| | 22 | ROD: | vertical\ |
| | 23 | FER: | ((*goes on manipulating the mouse*)) |
| 03'55 | 24 | | what's this mess\ . oh that was before/ |
| | 25 | ROD: | I did this before I pressed 'delete' but it didn't work\ |

| | | | |
|---|---|---|---|
| | 26 | FER: | right you must create one single layer right it's fine if you need only one line/ but if you need more lines/ . then you need to create the same number of layers\ |
| | 27 | ROD: | OK |
| 04'14 | 28 | FER: | ((*leaves the computer room*)) |

*#1: ROD tries to run the computer and says 'it's really slow'*

*#2: ROD goes back to the workshop and addresses FER 'are you on the phone?'*


*#3: FER joins ROD in the computer room and takes control of the mouse*

**Fig. 9.2** Requested guidance

At the beginning of this sequence of work, ROD is conducting the engraving procedure by engaging in an individual form of action (#1). He mutters comments to himself, complaining about the slowness of the computer ('it's really slow,' l. 1). Then, suddenly, he faces difficulties with the software as he does not know how to set the various parameters related to the editing of the numbers he wants to engrave on the plastic strip. He leaves the computer room, walks back to the workshop (#2) and addresses FER directly ('er on the computer I've typed the whole thing and I'm I'm on er,' l. 3). In doing so, he faces two kinds of issues.

The first issue lies in the fact that his trainer does not seem to display immediate availability or willingness to engage in guidance. His reaction leads ROD to infer that FER is engaged in a phone call as evidenced by ROD's conversational insert expansion ('are you on the phone/,' l. 4), completed by FER ('no,' l. 5), and concluded by a justification provided by the apprentice ('oh I thought you were on the phone,' l. 6). Later, after the completion of ROD's request for help, FER carries on working silently without responding explicitly to ROD's question ('shall I delete it and put 1/,' l. 7).

The second issue faced by the apprentice lies in the necessity to provide a verbal account of the problem. Since the computer is located in another area of the workspace and is not visually accessible to the trainer, ROD has to elaborate a linguistic representation of the action he is undertaking. Doing this seems challenging for him, as indicated by the successive attempts he makes as the interaction unfolds: 'er on the computer I've typed the whole thing and I'm I'm on er' (l. 3), 'and it says Number N-B layer terminal layer er 2 . shall I delete it and

put 1/' (l. 7), 'because you said that I should pay attention to layers\ and on the lower part of the screen it says er N-B layer' (l. 9-10). These explanations do not seem to be clear enough for enabling FER to solve the problem from his workspace. He finally acknowledges ROD's request for help by announcing that he is about to come and assist him ('OK I'm coming,' l. 11).

When FER finally joins ROD in the computer room (#3), a sequence of so-called close guidance (Billett, 2001) starts, in which FER very quickly takes control of the situation. It is FER who enters commands into the computer (l. 16), questioning the apprentice about the kind of procedure he has conducted so far ('how many layers did you create altogether how many lines/,' l. 14; 'so you've removed the others right/,' l. 16), and making comments about what has been done ('what's this mess\ . oh that was before/,' l. 24). In the end, he solves the problem but provides very little explanations about how to cope with the software: 'right you must create one single layer right it's fine if you need only one line/ but if you need more lines then you need to create the same number of layers' (l. 26). In other words, FER is not really guiding the apprentice in carrying out his work at this stage. Rather, he is taking control of ROD's activity, solving the problem on the computer, but without using the situation as an opportunity for the apprentice to engage in a better understanding of the editing process. As a consequence, ROD's level of participation decreases as the interaction progresses. He is still sitting in front of the computer, but he is no longer actively engaged in completing the engraving procedure.

In sum, this second excerpt demonstrates additional properties of guidance in practice-based learning. First, it shows that guidance is not only spontaneously offered by experts but may also be initiated and requested by learners themselves. Secondly, it shows that help-request strategies are not immediate realities but take the form of dynamic sequences of actions, progressively elaborated by participants by using a variety of distinct semiotic modes. In the sequence analysed above, the request for help starts with a shift in space, develops with the initiation of a verbal exchange and unfolds with the progressive establishment of visual contact between ROD and his trainer. It is only after the completion of more than 8 action turns that FER finally ratifies ROD's request and provides an explicit form of guidance. We see here that the provision of guidance raises a key issue about the kinds and quality of participation and engagement from the perspective of experts. In particular, providing assistance to learners in the workplace is often associated with a temporary interruption of other tasks in which experts are engaged. In other words, these interactions force experts to cope with different kinds of actions at the same time that may conflict with their own priorities and interests.

### *9.4.3 Distributed Guidance*

It is precisely because guidance takes time and that this time is not always available for expert workers that various forms of cooperation to satisfy apprentices' requests for guidance can be observed amongst experts. It is such a case of collective distribution of guidance amongst a number of workers that occurs in this third excerpt, which takes place a couple of minutes after the previous one. After FER has left the computer room, ROD tries to complete the editing procedure on his own. But again, he is faced with the same kind of problem and is unable to proceed with the editing software. So he goes back to the workshop, where his trainer is engaged in a discussion with Julian (JUL), one of his colleagues.

(3) I have a problem it doesn't work (227, 11'20 – 12'30)

| | | | |
|---|---|---|---|
| 11'20 | 1 | ROD: | ((*ROD leaves the computer room and goes to the workshop*)) **[#1]** |
| 11'27 | 2 | ROD > FER: | I have a problem/ . it doesn't work\ |
| 11'30 | 3 | FER: | of course it doesn't work\ . it can only function\ |
| 11'35 | 4 | FER > JUL: | you go JUL I've had enough |
| | 5 | JUL > ROD: | what's the problem now\ |
| | 6 | ROD: | are those the T-shirts/ |
| | 7 | JUL: | yes these are the T-shirts\ ((*comes with ROD in the computer room*)) **[#2]** |
| 11'43 | 8 | JUL: | and what's your problem then/ |
| | 9 | ROD: | it doesn't work\ |
| 11'48 | 10 | JUL: | what's the problem/ . what doesn't work what's- |
| | 11 | ROD: | I don't know it says this all the time\ |
| | 12 | | ((*ROD and JUL stand in front of the screen*)) **[#3]** |
| 11'53 | 13 | JUL: | but- ((*starts typing on the keyboard*)) |
| 12'01 | 14 | | it's like last time\ . you have too many layers\ . you have to delete them\ . you see/ |
| | 15 | ROD: | oh I always forget that |
| | 16 | JUL: | yes oh yes I know/ er because this is the second time I've had to come here/ |
| | 17 | | and why didn't you do it all at the same time/ |
| 12'13 | 18 | ROD: | because there are some EFI breakers here/ and I don't know how to deal with that/ |
| | 19 | JUL: | right but 8 – 9– 10 what's that/ |
| | 20 | ROD: | 8 – 9 – 10 come before the EFI breakers\ |
| 12'23 | 21 | JUL: | right I'll explain this to you another time\ ((*leaves the computer room*)) |

*#1: ROD goes back to the workshop*

*#2: JUL comes with ROD in the computer room*

*#3: JUL joins ROD in the computer room*

**Fig. 9.3** Distributed guidance

As in excerpt 2, this sequence of interaction starts with a help request initiated by the apprentice ('I have a problem it doesn't work,' l. 2). But this time, the type of reaction provided by the trainer in response to that implicit request is much more 'face threatening' in Goffmanian terms (Goffman, 1959). In a first turn, FER replies with anger to ROD, reminding him that he is using inappropriate vocabulary for describing the problem: The computer cannot 'work'; it can only 'function.'[17] In a second turn, he initiates another exchange addressed to his colleague Julian and asks him to respond to the apprentice ('you go JUL I've had enough,' l. 4). These negative and face-threatening responses are not only provided by the trainer. They are also evident in JUL's attitude towards ROD, as attested by his recurrent questioning focused on the nature of the encountered problem ('what's the problem now,' l. 5; 'and what's your problem then,' l. 8; 'what's the problem what doesn't work,' l. 10).

When the two participants finally congregate in the computer room, the material environment provides visual affordance and assistance to ROD's explanation of the problem ('I don't know it says this all the time,' l. 11). But here again, it is JUL who immediately takes control of the mouse (l. 13) and carries out the editing procedure. He draws ROD's attention to the fact that he is facing the same problem as before ('it's like last time you have too many layers you have to delete them you see,' l. 14) and that it is the second time he has to come over here to fix the same problem ('yes oh yes I know er because this is the second time I've had to come here,' l. 16). JUL then continues to question the apprentice about the strange way he numbers the stickers ('and why didn't you do it all at the same time/,' l. 17; 'right but 8-9-10 what's that/,' l. 19). Obviously upset by ROD's incomplete answers ('I don't know how to deal with that,' l. 18), he leaves the

[17] In fact, FER is playing with words here, the French verb 'marcher' being able to mean both 'walking' and 'functioning.' A literal translation of FER's response would be something like 'of course the computer cannot *walk*, it can only *function.*'

computer room without giving any more explanation and postponing additional explanation to an unclear future: 'right I'll explain this to you another time' (l. 21).

This third excerpt brings a new perspective on guidance in the workplace. First, it shows that guidance is not provided exclusively by official trainers or supervisors in that context. It can also be provided by coworkers present in the same workplace environment. In this case, for instance, an explicit process of collective distribution of the guidance responsibility involves both the official trainer and another experienced colleague. Secondly, it is noteworthy that forms of guidance appear as social practices in the sense that they seem to be shared and reproduced amongst experts belonging to the same work community. The way JUL engages with the apprentice is very similar to the method used by FER in excerpt 2. Both display annoyance when they are disturbed from their ordinary tasks. Both also appear to have clear expectations regarding the linguistic adequacy of ROD's engagement in interaction, specifically regarding the way he provides verbal accounts of the problem he is facing. Finally, both conceive their contribution to ROD's work as a local solution of the problem rather than an opportunity for him to engage in learning. These unfulfilled expectations and recurrent requests initiate a kind of vicious circle that has strong consequences at an interpersonal level and on the way ROD is seen by the professional community to which he is trying to belong. The fact that guidance brings very little input in terms of instruction and learning maintains and increases ROD's dependence and need for assistance. At the same time, ROD's lack of autonomy progressively affects the willingness of experts to provide guidance. These conditions lead to a rapid 'marginalisation' (Wenger, 1998) of the apprentice and are probably highly counterproductive in terms of professional socialisation and identity construction.

### *9.4.4 Denied Guidance*

In some of the excerpts analysed, experts were found to refrain from providing guidance spontaneously or willingly. In some other cases, they do not provide guidance at all or actively refuse to do so. This fourth response we term *denied guidance*. There are instances approaching this type of interactional accomplishment of guidance in our data, and we give an illustration of it in this fourth excerpt. ROD has finished engraving the plastic strips and is about to stick them on the cover of his electric board when suddenly it falls down from the trestle table on which it was lying and the metallic structure drops out from the casing. At the beginning of this sequence, ROD is busily trying to insert the chassis into the casing again, checks if nothing is broken, and screws the chassis inside the casing.

(4) oh no no it's fine (226, 39'15 – 40'20)

| | | | |
|---|---|---|---|
| 39'15 | 1 | ROD: | ((*ROD inserts the chassis into the casing after it fell down from the trestle*)) **[#1]** |

| | | | |
|---|---|---|---|
| 39'21 | 2 | | right the wire here/ . I hope it's not broken\ |
| | 3 | | ((*ROD switches on the interruptors*)) |
| | 4 | FER: | ((*FER looks over at ROD*)) **[#2]** |
| | 5 | ROD: | ((*ROD turns around the electric board*)) |
| 39'37 | 6 | ROD > FER: | er:/ Fernando/ |
| | 7 | FER: | ((*ironically*)) er:/ Rodney/ .. |
| | 8 | ROD: | oh no no it's fine\ it's fine\ |
| | 9 | FER: | are you sure/ |
| | 10 | ROD: | yeah\ |
| 39'47 | 11 | | ((*ROD is busy trying to retrieve a screw that has fallen into the electric casing*)) |
| 40'03 | 12 | ROD: | it's hot in here\ |
| | 13 | | ((*screws the chassis into the electric casing*)) **[#3]** |
| 40'20 | 14 | ROD: | yeah I made it\ .. first go\ |

*#1: ROD inserts the chassis into the casing after it fell down from the trestle*

*#2: FER looks over at ROD*

*#3: ROD screws the chassis into the electric casing*

**Fig. 9.4** Denied guidance.

At the beginning of this excerpt, ROD engages in an individual form of work. He inserts the metallic chassis containing the electric modules into the casing and checks that nothing is broken (#1). However, he does not just 'do' so but reports on the issues he is facing in a self-addressed comment muttered to himself: 'right the wire here I hope it's not broken' (l. 2). These self-addressed comments catch FER's attention and afford another instance of his visual control over the situation, as indicated by FER's gaze at ROD on line 4 (#2). As soon as ROD feels that his trainer is looking at him, he turns around the board and addresses FER directly: 'er Fernando/' (l. 6). From a conversational perspective, this form of address can be described as the initiation of a pre-sequence (Schegloff, 2007). It is not meant as a request as such but as a preparation for it in which participants negotiate readiness to engage in a more developed form of exchange. Quite interestingly however, FER does not provide a preferred form of response to the pair's first turn. Instead of acknowledging ROD, he echoes his address in a sarcastic fashion: 'er Rodney/' (l.7). In doing so, he publically displays a form of unwillingness to engage in

guidance, aborting the help-request in the preliminary stage of its sequential accomplishment. This implicit denial has serious consequences for the global unfolding of the verbal exchange. In the next turn, ROD decides not to carry on the help-request sequence he had initiated and takes back his question (‘oh no no it’s fine its fine,’ l. 8), even after FER’s repair attempt (‘are you sure/,’ l. 9).

These recurrent forms of denied guidance displayed by the experts progressively transform the ways the apprentice engages with his work environment. For instance, in the second half of excerpt 4, ROD provides different sorts of verbal actions. He makes comments regarding the temperature in the workshop (‘it’s hot in here,’ l. 12) and expresses his satisfaction when he succeeds in screwing the chassis into the casing (‘yeah I made it\. first go,’ l. 14). These verbal actions can be seen as hybrid forms of talk. Like other instances of self-talk, they can be interpreted as personal expressions of feelings addressed to the speaker himself. But given that they are performed much more loudly and distinctly than other instances of self-talk, they are also probably oriented towards other colleagues sharing the work environment and provide a public account of the task in progress. As a consequence, the level of interactivity decreases as explicit instances of dialogue become less frequent, and are progressively replaced by public forms of monologues. These indirect and hybrid forms of address show how difficult it becomes for ROD to engage explicitly with his colleagues in a context where criticism, blame and sarcasm are used as responses to his help-request strategies. They also provide empirical evidence of the forms of marginalisation going on in this particular work context.

## 9.5 Concluding Remarks and Practical Implications

In this chapter, different forms of guidance have been described on the basis of various interactional patterns that occur in ordinary work situations. This empirical approach has helped to identify recurrent properties of guidance that is provided in practice-based training conditions. More specifically, our analysis shows that guidance is more than a static and immediate reality accomplished exclusively through linguistic means. Instead, it comprises a dynamic process, sequentially and collectively constructed by a range of social participants, and resulting from a combination of semiotic resources such as speech, gaze, gesture, body orientation or material objects bearing specific meaning in the context in which they are being used. The interactional conditions in which participants accomplish guidance at work are closely associated with the learning opportunities afforded by work environments. In the data considered here, poor conceptual content was provided by experts as they engaged with the apprentice. Thus, the kind of responses they proposed to his questions and help-requests obviously affected the conditions in which he could develop autonomy and self-confidence and be legitimated in his new professional identity (Wenger, 1998).

If taken literally, this type of analysis could establish a rather pessimistic view on guidance at work and also provide a very negative image of initial VET in Switzerland, which is obviously not the case and not a point made here. There are a number of other examples in our data, which we analysed and reported elsewhere (Duc, 2008; Filliettaz, de Saint-Georges & Duc, 2009), that illuminate and elaborate productive ways of guiding apprentices in a number of contexts, including professional trades workplaces. This evidence shows that the issues raised by practice-based learning in professional contexts remain highly complex. An empirical and interactional perspective such as the one adopted here could address these complexities in at least three different ways.

The first practical contribution is related to the variety of ways guidance may be provided (or not) to apprentices depending on the contexts in which they are trained. In our inquiry about vocational learning in the Swiss 'dual' VET system, we observed workplaces where spontaneous forms of guidance were much more frequent than in others, or where vocational trainers responded easily and willingly to help requests (Duc, 2008). In contrast, we also observed companies in which denied forms of guidance constituted the dominant interactional pattern and in which workers competed for expertise and for becoming a legitimate trainer (Filliettaz, 2009). This raises important issues both at political and ethical levels. Apprentices are not treated equally in the companies for whom they work. Moreover, the conditions afforded to apprentices may differ considerably from one context to another. This high degree of contextual variation certainly constitutes an important challenge for practice-based models of learning as it considerably weakens its overall efficiency.

Secondly, the kind of data we have collected and briefly analysed here demonstrates some of the contradictions faced by apprentices regarding guidance in the workplace. On the one hand, they are being put to work with the instruction to 'ask for help' if they encounter difficulties but, on the other hand, as we saw here, the conditions in which these questions and help-requests are being responded to by experts are often contested and may endanger their legitimate participation in professional communities.

Such verbal accounts illustrate both the dualities and the tensions that arise between what Billett (2008, 2009) has termed *workplace affordances* and *individual engagement*. On the one hand, workplace practices may afford a wide range of resources for learning, including expertise and available guidance. On the other hand, though, workers seem to have clear expectations regarding the ways learners should engage with these particular affordances. Assistance may be available in the workplace, but not all the time. Asking questions may be possible, but not repeatedly. Problems may be encountered, but apprentices should be able to report on them adequately. This finding stresses another important issue of practice-based learning in the workplace, namely the fact that its efficiency relies not only on the availability of specific resources and on the willingness of experts to share them with learners. More than these, this efficiency also depends on the

ways learners engage with these resources and on the social expectations that shape these forms of engagement.

Consistent with this last point, our approach finally emphasises the social nature of practice-based learning and the configuring role of trainers in the process of building up expertise. Apprentices do not learn effectively by just engaging in work. They do so when they are able to accomplish successful forms of interactions with colleagues, trainers or teachers. How experts become efficient trainers and provide guidance adequately remains an open question. Some feel immediately very at ease with this role, others do not. Obviously, practice-based VET systems could gain in quality by developing specific training programmes preparing expert workers to assist apprentices adequately. There is an ongoing debate in Switzerland about this issue. Should vocational trainers undergo more pedagogical training than what is now required? What kind of curriculum and training programmes should be available for them? In consonance with some previous work conducted in the field of workplace learning (Billett, 2001), our own investigations show that it is crucially important to increase the level of pedagogical qualification of trainers in the workplace to enhance the overall quality of the guidance provided in training companies. It is only when these conditions exist that practice-based learning models can develop their efficacy. Using ethnographic interactional analysis certainly does not solve this complex problem. However, it can generate interesting pedagogical perspectives about how to prepare vocational trainers by using complex and naturally occurring data, and not, as is often the case, by transmitting decontextualised content and making general claims about efficient instruction in the workplace.

## References

Billett, S. (2001). *Learning in the workplace: Strategies for effective practice*. Crows Nest: Allen & Unwin.

Billett, S. (2008). Emergent perspectives on workplace learning. In S. Billett, Ch. Harteis, & A. Eteläpelto (Eds.), *Emerging perspectives of workplace learning* (pp. 1-15). Rotterdam: Sense Publishers.

Billett, S. (2009). Modalités de participation sur la place de travail: La dualité constitutive de l'apprentissage par le travail [Workplace participatory practices: The dualities constituting learning through work]. In M. Durand & L. Filliettaz (Ed.), *Travail et formation des adultes* (pp. 37-63). Paris: Presses universitaires de France.

Dubs, R. (2006). An appraisal of the Swiss vocational education and training system. Bern: HEP Verlag.

Duc, B. (2008). Trajectoire de participation et trajectoire identitaire d'un apprenant dans le travail en entreprise [Trajectory of participation and identity construction in workplace learning]. In L. Filliettaz, I. de Saint-Georges, & B. Duc, "*Vos mains sont intelligente!": Interactions en formation professionnelle initiale* (pp. 241-274). Université de Genève: Cahiers de la Section des Sciences de l'éducation.

Durand, M., & Filliettaz, L. (Eds.). (2009). *Travail et formation des adultes* [Work and adult Education]. Paris: Presses universitaires de France.

Filliettaz, L. (2008). “J’ai un problème là, ça marche pas... ”: La construction collective d’une participation empêchée [“I have a problem, it doesn’t work”: The collective construction of an obstructed participation]. In L. Filliettaz, I. de Saint-Georges & B. Duc (Eds.), *“Vos mains sont intelligentes!”: Interactions en formation professionnelle initiale* (pp. 279-313). Université de Genève: Cahiers de la Section des Sciences de l’Education.

Filliettaz, L. (2009). Les discours de consignes en formation professionnelle initiale: Une approche linguistique et interactionnelle [Instructional discourse in initial vocational training: A linguistic and interactional approach]. *Education & Didactique, 3*(1), 91-119.

Filliettaz, L., de Saint-Georges, I., & Duc, B. (2008). “*Vos mains sont intelligentes!”: Interactions en formation professionnelle initiale* [“Your hands are intelligent!”: Interactions in initial vocational training]. Université de Genève: Cahiers de la Section des Sciences de l’éducation.

Filliettaz, L., de Saint-Georges, I., & Duc, B. (2009). Interactions et dynamiques de participation en formation professionnelle initiale [Interaction and dynamic participation in initial vocational training]. In M. Durand & L. Filliettaz (Eds.), *Travail et formation des adultes* (pp. 95-124). Paris: Presses universitaires de France.

Goffman, E. (1959). *The presentation of self in everyday life*. New York: Doubleday.

Gonon, Ph. (2005). *Challenges in the Swiss vocational education and training system*. Retrieved 22 December, 2009, from http://www.bwpat.de/7eu/gonon_ch_bwpat7.shtml.

Gumperz, J. (1982). *Discourse strategies*. Cambridge, UK: Cambridge University Press.

Kiener, U. (1999). *La recherche sur la formation professionnelle en Suisse: Grandes lignes d’un concept* [Research on vocational education and training in Switzerland: Outlines of a concept]. Report presented at the Swiss Conference of Cantonal Ministers of Education, Bern.

Kunégel, P. (2005). *L’apprentissage en entreprise: L’activité de médiation des tuteurs* [Learning in the workplace: the mediating role of tutors]. *Education Permanente, 165*, 127-138.

Lamamra, N., & Masdonati, J. (2009). *Arrêter une formation professionnelle: Mots et maux d'apprenti-e-s* [Dropping out from vocational training: an apprentice’s perspective]. Lausanne: Antipodes.

Lave, J. (1988). Cognition in practice: Mind, mathematics, and culture in everyday life. Cambridge, UK: Cambridge University Press.

Lave, J. & Wenger, E. (1991). Situated learning: Legitimate peripheral participation. Cambridge, UK: Cambridge University Press.

LeVine, Ph., & Scollon, R. (Eds.). (2004). *Discourse and technology: Multimodal discourse analysis*. Washington, DC: Georgetown University Press.

Norris, S. (2004). *Analyzing multimodal interaction: A methodological framework*. London: Routledge.

Pastré, P., Mayen, P., & Vergnaud, G. (2006). *La didactique professionnelle* [Professional didactics]. *Revue Française de Pédagogie, 154*, 145-198.

Sacks, H., Schegloff, E., & Jefferson, G. (1978). A simplest systematics of the organization of turn taking for conversation. In J. Schenkein (Ed.), *Studies in the organization of conversational interaction* (pp. 7-55). New York: Academic Press.

de Saint-Georges, I. & Filliettaz, L. (2008). Situated trajectories of learning in vocational training interactions. European Journal of Psychology of Education, XXIII(2), 213-233.

Schegloff, E.A. (2007). Sequence Organization in Interaction: A Primer in Conversation Analyis, Volume 1. Cambridge: Cambridge University Press.

Schneider, B. et al. (2005). *Evaluation du dispositif de surveillance de l’apprentissage en entreprise* [Monitoring the apprenticeship system: An evaluation]. Report addressed to the External Commission for Evaluation of Public Policies. Republic and Canton Geneva.

Scollon, R. (2001). Action and text. Toward an integrated understanding of the place of text in social (inter)action. In R. Wodak & M. Meyer (Ed.), Methods of critical discourse analysis (pp. 139-183). London: Sage.

Stalder, B. E. & Nägele, C. (2009). *Vocational education and training in Switzerland: Organisation, development and challenges for the future*. Brisbane/Bern.

Wenger, E. (1998). Communities of practice : Learning, meaning and identity. Cambridge, UK: Cambridge University Press.

Wolter, S., Mühlemann, S. & Schweri, J. (2003). Why some firms train apprentices and many others do not. Discussion Paper No. 916. IZA (The Future of Labour). Bonn.

Wolter, S. & Schweri, J. (2003). *Kosten und Nutzen der Lehrlingsausbildung aus der Sicht Schweitzer Betriebe* [Costs and benefits of apprenticeship from the perspective of Swiss firms]. Bern: OPET

## Transcription conventions

(.) or (..) = pause
(a:) = vowel lengthening
(-) = interrupted segment
(/) = rising tone
(\) = falling tone
(CAPitals) = accentuated segment
(>) = address to a specific recipient (ROD > FER)
((*action, movement or gesture*)) = non-verbal behaviour or comment
(XX) = unintelligible segment
<u>underlined segment</u> = overlapping speech
<u>underlined segment</u> = speech overlapping with non-verbal behaviour

# Chapter 10
# Cooperative Education: Integrating Classroom and Workplace Learning

**Chris Eames and Richard K. Coll**

University of Waikato, New Zealand

**Abstract** Cooperative education (co-op) is a strategy of education that combines academic learning in the classroom with real-world practice in a relevant workplace. To provide this mix of learning opportunities, co-op involves collaboration among students, educational institutions, and employers. Real-world experience for students in the form of work-based placements or internships can serve to provide entry for learners into a particular community of practice. Theorising and research into student learning through cooperative education has focussed on the experiential nature of the learning opportunity, and more latterly through sociocultural views of learning. These latter views help us to understand that cooperative education exposes students to worlds of learning that are different but complementary. These complementary worlds have different sociocultural dimensions that afford different learning opportunities to students. Clearly defined integrative pathways are required that allow students to make sense of the learning that they are afforded. The real strength of cooperative education as a strategy of practice-based learning is not that students gain opportunities to learn in the classroom and in the workplace, but that these opportunities are integrated to create learning that is more than the sum of the two parts.

## 10.1 Cooperative Education as a Model of Practice-based Learning

Cooperative education (co-op) is a strategy of education that combines academic learning in the classroom with real-world practice in a relevant workplace. To provide this mix of learning opportunities, co-op involves collaboration among students, educational institutions, and employers. Real-world experience for students in the form of work-based placements or internships can serve to provide entry for learners into a particular community of practice. This experience, undertaken as part of an educational programme, aims to ease the passage of students into their vocation, upon graduation. It is predominantly practised at the tertiary education level, at a point where development of occupation-specific knowledge and skills are most pertinent. The co-op model began in the USA in the 1900s and has since been adopted in over 40 countries. Originally trialled in the engineering discipline, co-op has since been offered through the sciences,

S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2_10, 

business, the arts, social sciences, law, and technical disciplines. It has a natural allegiance with traditional apprenticeships, and to programmes that adopt internship-like arrangements such as in medicine, nursing, and teaching. More recently, the co-op model has also become known as *work-integrated learning* to strengthen the recognition that co-op requires more than simply combining academic and work experiences. Instead, it refers to an integration of learning between the classroom and the workplace to secure the kinds of knowledge and skills that graduates will need, and to recognise its connections to other work-based learning strategies such as internships, practica, and industry-based projects.

This chapter elaborates the co-op model of learning by examining the traditions that have led to the current understandings about cooperative education as a practice-based model of learning. It begins with a discussion of the institutional context in which co-op has evolved, and then critically examines the organisational milieu and pedagogical theorising which has both enabled and constrained its development. Using examples from a science and engineering-based programme, the chapter discusses how effective co-op requires clear recognition that the classroom and the workplace both offer opportunities for planned learning, but that these sites differ in their intents, purposes, and outcomes. The chapter concludes with an exploration of the challenge to explicitly integrate these opportunities to maximise the learning that can be achieved for the development of workplace practitioners.

## 10.2 The Development of Cooperative Education

The cooperative education movement is regarded as having its foundations in 1906 when an engineering professor, Herman Schneider, at the University of Cincinatti, USA, 'became convinced that many professional concepts and skills could not be learned effectively in the classroom [alone], but required practical experience for their understanding and mastery' (Sovilla & Varty, 2004, p. 4). This blending of theoretical learning with practice has historical antecedents in fields such as nursing and many technical occupations. Nevertheless, this initiative was perhaps the first deliberate attempt to design such a learning programme in a university. Schneider's emphasis on formal integration of learning between the classroom and the workplace necessitated the student spending time in both settings, and there was an expectation that learning would occur in each (Cates & Jones, 1999). However, there was little theorising about how this learning would happen in the workplace, nor how it would integrate with classroom learning. The popularity of cooperative education programmes grew slowly until the US government brought in a funding strategy for new programmes in the 1960s. This saw a dramatic rise in the number of programmes until the mid-1990s (Howard, 2004), but theoretical development of the model did not keep pace (Sovilla &

Varty, 2004). From this previous emphasis on quantity, many in the field are now seeking to reorientate towards quality and justification of the educational strategy.

Cooperative education spread gradually from the USA into many other countries, as success of the strategy became more widely known. A programme began at the University of Waterloo, Canada, in 1957 (Barber, 1968), and developed as sandwich education in the UK (Tucker, 1969). Today, it is practiced in more than 40 countries (World Association for Cooperative Education, 2009) and examples of co-op have recently been described from countries in other regions of the world such as Australia, Asia, and Africa (Campbell, 2009; Chen, 2006; Cullen, 2007; Spowart, 2006). Programme offerings have diversified from the original base in engineering to a multitude of fields such as accounting, police studies, sport management, hotel management, information technology, and science (Abeysekera, 2006; Campbell, 2009; Coll, 1996; O'Shea & Watson, 2007; Spowart, 2006; Venables & Tan, 2009). More recently, the reconceptualisation of co-op as part of a broader work-integrated learning philosophy has led to recognition of synergies with other learning-through-practice programmes such as internships in nursing (Fujimoto-Ikuma & Ishida, 2008) and the teaching practicum (Allen & Peach, 2007). A consistent finding across these reviews is the need to balance theory and practice and enhance connections between learning in the classroom and in the workplace. The development of co-op and its integration of learning settings has been both enabled and constrained by the organisational milieu within which it operates. That is, the kind of educational environment in which it acts is central to its prospects of being successful. This salient issue is discussed next.

## 10.3 The Organisational Milieu of Cooperative Education

The provision of cooperative education involves a three-way partnership between an educational institution, the participating students, and the organisation that will employ the students. Our understanding of the purpose of this partnership has evolved from Schneider's early conception of combining classroom and work opportunities (Cates & Jones, 1999), to an understanding that nonscholastic work should be incorporated into the educational curriculum (Wilson, 1970), through to our present-day thinking that learning in the workplace and in the classroom should be fully integrated (Coll et al., 2009). Co-op involves a student undertaking relevant and productive work in one or more placements that is formally recognised as part of a student's academic qualification (Groenewald, 2004; New Zealand Association for Cooperative Education, 1995). Co-op is also recognised as a strategy that is different from workplace learning (Billett, 1998; Boud & Garrick, 1999), although these two approaches to supporting learning share some similar goals. The vast majority of co-op programmes are based in an educational institution and incorporate a work component, but the term could also be applied

to programmes based in workplaces that integrate a formal classroom component in an educational institution. Co-op generally occurs at the higher or tertiary education level, due to the requirement for the student to be engaged in meaningful and productive work, but programmes are also possible at secondary levels of schooling.

Cooperative education has been proposed as an ideal response to calls from the world of work to make education more relevant to the workplace (Bates, Bates, & Bates, 2007). Well integrated programmes can produce graduates who have the best of up-to-date theoretical knowledge and applicable skills, as well as an understanding of how the world of work operates. It has been argued that opportunities to spend time with experienced professionals can begin to enculturate a student into a community of practice (Eames & Bell, 2005) and provide learning in what have been called soft skills (Coll, Zegwaard, & Hodges, 2002; Hodges & Burchell, 2003), those skills such as communication and time management, which are not often taught in the educational institution.

As noted above, most cooperative education programmes are initiated by an educational institution. Imperatives for this initiation have included a desire to balance theory and practice in students' education, to build partnerships with local employers, and to provide students with income whilst they are studying. Benefits to the institution that have been espoused include enhanced student recruitment into desirable programmes with high employment rates, feedback on workplace practices to inform curriculum planning, development of relationships between academics and workplaces leading to consultancies and research contracts, and financial benefits resulting from enhanced income streams (Weisz & Chapman, 2004). On the other hand, there are certain costs associated with co-op programmes. Institutions have generally facilitated their programmes through the use of a placement coordinator (Coll & Eames, 2000) who may be responsible for organising placements and maintaining institutional relationships with employers, as well as a range of broader tasks (Lazarus & Oloroso, 2004), and co-op programmes often involve faculty in the process of monitoring and assessing student placements, with varying degrees of commitment (McCurdy & Zegwaard, 2009). This involvement of staff is important in enhancing the integration of learning between the two settings but is a cost on the institution in terms of staff time, and some institutions have preferred to have students locate and manage their own placements, with consequent issues of placement relevance and lack of pathways to ensure integration of learning occurs. As Bennett (2008) has argued, any cost-benefit analysis of running a work-integrated learning programme must be able to address the worth of the learning integration that occurs for students for the true value of the programme to be assessed.

Models of placement structure within an educational qualification differ between institutions with many large North American universities running programmes that alternate placements with in-class semesters (Wilson, 1985). However, British institutions often favour a sandwich of a whole year on placement between years in class (Tucker, 1969), capstone courses (Fleming &

Eames, 2005), and variations on these themes (e.g., Coll, 1996). A recent study by Fenster and Parks (2008) offered some evidence that both alternating (a semester of classroom study followed by a semester of work) and parallel (part-time work and part-time study simultaneously) placement structures offered significant, but not necessarily the same, benefits. How these different models support student learning is the subject of some debate (Branton et al., 1990; Fenster & Parks, 2008).

The issue of learning through cooperative education has been a major area of concern for educational institutions, with perceptions that out-of-class learning does not constitute learning that belongs in an academic qualification, and uncertainties as to what educational outcomes are achieved through work placements (Cutt & Loken, 1995; Van Gyn, Cutt, Loken, & Ricks, 1997; Wilson, 1973). Criticisms have stemmed from a belief that co-op placements *train* students to do tasks rather than engage in the higher order thinking thought to be the domain of academia, and critics have pointed to a lack of theorising about learning on, and assessment of, work placements (Eames, 2003a). Certainly, educational institutions should consider more deeply the curriculum and pedagogical processes that underpin co-op (Bates et al., 2007) and we would argue that this is key to facilitating the integration of student learning between the classroom and the workplace. This issue has attracted much recent theoretical and research attention, which is discussed further in the next section. Indeed, much of the early research into co-op focused on what could be termed operational outcomes and these tended to be premised upon students' success in finding a placement, value of money earned during placements, and enhanced prospects for finding a job post-qualification (Wessels & Pumphrey, 1995). These studies have found evidence for such outcomes, as well as personal benefits such as enhanced self-confidence and increased initiative (Weisz, 2000), career benefits such as career clarification (Weston, 1986) and improved starting salaries for graduates (Gardner, Nixon, & Motschenbacker, 1992), and work skill benefits (Calway & Murphy, 2000). Recently, a stronger emphasis on viewing placements as learning opportunities has reorientated theorising and evaluation of co-op back towards learning outcomes (Dressler & Keeling, 2004). Some research evidence has been found for academic benefits such as increased motivation to study and application of theory into practice (Van Gyn et al., 1997). Achievement of these benefits can be influenced by matching employer and student expectations of placement outcomes, the provision of quality supervision and mentoring in the workplace, and encouraging reflection on the learning opportunities afforded by placements (Van Gyn et al., 1997; Van Gyn, 1996).

Benefits for employers participating in cooperative education programmes have also been identified. It has long been touted as a 'try before you buy' opportunity for employers, which offered significant benefits, but also some costs. A number of studies have described benefits for employers in terms of the aforementioned screening of potential new employees, the short-term employment of enthusiastic students, productive interactions with educational institutions, cost savings due to

hiring relatively cheap student labour to undertake tasks, and the completion of projects (Braunstein & Loken, 2004). Some employers might view taking a student on placement as a social service, and on the negative side, there is a cost involved in supervisory time for the student whilst on placement. However, Braunstein's (1999) study appeared to show that these were relatively minor concerns for employers.

The three-way partnership that is cooperative education has potential benefits for all three parties involved, and realisation of those benefits can be influenced by the organisational structure of the co-op programme. Sound facilitation of the integration of the learning opportunities between the classroom and the workplace may rely on the beliefs about learning that participants hold. Theoretical ideas about learning on placements are discussed next.

## 10.4 Theorising Learning in Cooperative Education

A range of theoretical ideas have previously been used to explain learning in cooperative education. These include the cognitive development ideas of Piaget (Cates & Jones, 1999; Van Gyn, 1994); the experiential learning views of Dewey (Heinemann & DeFalco, 1990; Jabs, Jabs, & Jabs, 1978; Saltmarsh, 1992) and Kolb (Cates & Jones, 1999); reflective practice (Van Gyn, 1996); self-efficacy (Coll, Zegwaard, & Lay, 2001; Linn & Ferguson, 1999); the view that there are multiple intelligences (DeFalco, 1995; Williams, Sternberg, Rashotte, & Wagner, 1992); and sociocultural views of learning. A full review of the contribution of these ideas to theorising learning in co-op is not possible here, but we provide some further discussion on three sets of ideas that are important for integration of learning between the classroom and the workplace, namely experiential learning, reflective practice, and sociocultural views of learning.

There has long been a natural inclination towards theorising cooperative education through the lens of experiential learning (Branton et al., 1990; Heinemann & DeFalco, 1990). The opportunity to learn from experience on placements fits this model easily, although as Dewey cautioned, not every experience is educative of itself (Dewey, 1938). That is, experiences should be relevant to, valued by, and reflected upon by the learner for them to lead to learning. Dewey espoused a laboratory model of education in which experience evolved into learning, and in which the artificial dualism of academic and vocational education is eliminated (Heinemann & DeFalco, 1990). He advocated a connection between theory and practice that created meaning for students in their learning, and that knowledge should be valued for what you can do with it. Branton et al. (1990) note that the Wilson and Lyons study of 1961 may have been the first published attempt to link cooperative education with educational theory around experience. Since then many authors have explored these links (Heinemann & DeFalco, 1990; Jabs et al., 1978; Van Gyn & Grove White, 2004).

Saltmarsh (1992) noted the strong transformative emphasis that Dewey (1916) placed in his educational philosophy, and argued that if co-op was to be true to Deweyan ideals it should go beyond Schneider's original intentions to promote education for social change. This educational goal, Saltmarsh (1992) argued, would truly situate workplace learning as an educational process worthy of integration with academic studies. A more recent advocate of experiential learning, Kolb (1984), has followed these ideals in defining learning as the 'the process whereby knowledge is created through the transformation of experience' (p. 38). This process, in which Kolb views experience leading to theory-making through a process of reflection, has been argued to be the most relevant learning theory to underpin co-op (Cates & Jones, 1999). The coupling of experience to theory-making appears a sound explanation for how learning in the two settings of a co-op programme could occur.

As Dewey (1938) noted above, experience may not always lead to desirable learning, but the use of reflection has been argued to enhance the likelihood that it would (Raelin, Glick, McLaughlin, Porter, & Stellar, 2008; Van Gyn, 1996). Therefore, cooperative education programmes should regularly build in a requirement for reflection on practice in which students are encouraged to look back upon their placements to consider what they have learnt. Raelin et al. (2008) argue that reflection-in-action (whilst on placement in the workplace) is potentially even more powerful as a promoter of learning, being capable of 'real-time' learning that allows students to both draw from and give back to their work colleagues, and make sense of experiences that are both individual and collective. These perspectives make a valuable contribution to our understanding of learning in cooperative education in emphasising the roles that experience and reflection can play in integrating theory and practice between the classroom and the workplace, and acknowledge the importance of the contributions of the physical and social settings in which the learning takes place. Early theorising in these perspectives tended to see the student as an individual learning in a social context. More recently, it has been recognised that contexts have social, cultural, and historical dimensions that are important in learning.

These sociocultural dimensions provide another useful way of looking at learning through practice in co-op programmes (Eames & Coll, 2006). A variety of conceptions of learning have become known as sociocultural views of learning. These ideas draw on the influences of earlier theorists such as Vygotsky (1978) and Piaget (1950), who tended to view learning as an individual process in a socially mediated environment (Piaget, 1950; Vygotsky, 1978; Wertsch, 1991). However, more recent theorising by Lave and Wenger (1991) viewed learning as a social process occurring in a community of practice, and by Rogoff (1991, 1995) saw learning as occurring through participation with others. Within these sociocultural perspectives, three ideas can be identified: (i) learning as a situated activity occurring through participation; (ii) learning as distributed cognition; and (iii) learning as mediated action. These three conceptions are now discussed as a means to explore the integration of learning in co-op programmes.

The first of these conceptions depicts learning as a situated activity within a community of practice (Lave, 1991; Lave & Wenger, 1991; Wenger, 1998). Lave (1991) defines situated learning as emphasising 'the inherently socially negotiated quality of meaning and the interested, concerned character of the thought and action of persons engaged in activity' and 'that learning, thinking, and knowing are relations among people engaged in activity *in, with, and arising from the socially and culturally structured world*' (p. 67). The emphasis on social negotiation of meaning highlights the interactional mode of learning in which participants share knowledge and understanding to reach a joint construction of their knowledge for engaging in collaborative problem-solving activities. Students on co-op placements may undergo a kind of experience that has been described as cognitive apprenticeship (Brown, Collins, & Duguid, 1989) through working alongside practicing professionals and participating in authentic activities (Billett, 1994). The key qualities of this kind of apprenticeship is that it is held to potentially develop more strategic learning outcomes and processes than if the apprentice learns by observation and imitation alone. In this way, the students learn through their participation (Rogoff, 1995), gradually adopting the culture of the workplace in a process of enculturation (Brown et al., 1989; Hennessy, 1993), but also importantly engaging in thinking and acting with a more experienced other who can provide access to knowledge that the learner might otherwise be unable to learn.

A second conception of learning that underpins sociocultural views of knowledge construction is that cognition (e.g., learning) is distributed across a community of practice. The notion of distributed cognition suggests that learning is seen to involve not only the person, but the person-plus (Perkins, 1997), being the person plus the surround. In this way cognition (and learning) is seen to be located outside individuals' heads, and jointly composed in a system of people and artefacts (Salomon, 1997). For example, a student on a chemistry placement may develop knowledge of how to use a particular analytical instrument through being trained in its use by a colleague, and come to appreciate how the data the instrument produces play a role in the practice of the community. A community of practice, such as a workplace, can then be conceived of as having learning distributed across its people and artefacts in a social world of activity within a cultural medium (Cole & Engestrom, 1997). The distribution of cognition and learning across a community is seen as being stretched over, rather than divided up amongst participants (Salomon, 1997). Therefore, more than participation alone, it is the kind of participation in activities in the particular workplace setting that afford opportunities for the student to learn the practice of the community.

A third concept that contributes to sociocultural views of learning is that human action is mediated by tools and signs (Bell & Cowie, 2001; Vygotsky, 1978; Wertsch, 1991). This concept draws on the work of Vygotsky (1978), and mediated action considers that human action such as learning is effected by tools and signs, which are themselves situated in the social and cultural environment in which they exist (Wertsch, 1991). However, Wertsch, del Rio, and Alvarez (1995)

separated the mediational means into technical tools (such as instruments and computers) and psychological tools (such as language and counting systems). Two key ideas arise from consideration of the influence of mediational means. Firstly, they are used in social interaction, particularly in the case of language. Secondly, they are 'products of sociocultural evolution, and are inherently situated in sociocultural context' (Wertsch, 1991, p. 91). For instance, most workplace communities engage in the use of specific language such as jargon and acronyms, and the gradual learning of this language allows students to increase their participation in, and understanding of, their community. Additionally, all students in co-op placements are likely to be required to use some form of instrument or other tool that could mediate the actions they take in the course of their participation in the community of practice. These ideas can also be seen in activity theory, which posits that learning occurs in an activity system that is a dynamic, artefact-mediated environment (Engestrom, 2001), such as where students might find themselves in work placements.

Using these theoretical perspectives, learning in cooperative education occurs through participation in two distinct, but connected forms of social practice: that of the educational institution and that of the workplace. Each of these social practices is likely to represent different kinds of situated activity, have different kinds and distributions of social forms and artefacts, and have different opportunities for mediation of individuals' learning through their engagement with these forms and artefacts. Consequently, studying in a co-op programme allows the student to move between the two distinct kinds of social practices, crossing the border between subcultures of related practice (Aikenhead, 1996). If learning is seen as mediated through the use of tools and language, distributed across the community in all directions, situated in the context of each of these settings, and assessed as increasing participation within that practice, their connected, but distinct, contributions stand as being key qualities of cooperative education experiences. Seen from this perspective, the integration of these experiences is, we would argue, imperative to maximise student learning. The final section of this chapter examines this important issue with examples drawn from a science and engineering programme.

## 10.5 Integrating Classroom and Workplace Learning

As noted earlier, scholars now firmly believe in the critical importance of ensuring integration of classroom and workplace learning through a cooperative education programme. A key feature of co-op programmes is thus the notion that they must involve the *integration* of knowledge and skills gained in the educational institution and the workplace. It is this feature that distinguishes co-op from workplace learning (i.e., what someone learns in the workplace) (Billett, 1999; Boud & Garrick, 1999). Integration here means how the student takes what they

have learned in the classroom into the workplace, and how a student's learning in the workplace becomes related to, or incorporated into, the next phase of their academic learning.

Despite the claims of its centrality to cooperative education, the literature on integration in co-op programmes is sparse. Any mention of integration typically does not address this issue explicitly. For example, Van Gyn et al. (1997) and Parks (2003) report that students *say* their co-op placement experiences allow them to see how to put theories learned in the classroom into practice when in the workplace. Likewise, Eames (2003b) reported a student saying that he learned about the theory underpinning the use of chemical instrumentation in classroom experiences and, subsequently, found this theory essential when trying to use, and do trouble-shooting when using, scientific instruments in the workplace. Even less seems to be known about transfer of knowledge and experiences from the workplace back into the classroom. Wong and Coll (2001), for example, report that a student learned the use of a discipline-specific statistical package, which was subsequently found useful upon return to study.

So whilst a few reports about how students report integration occur in the literature (e.g. Fink, 2001), there have been a number of calls for more integration of on-campus and off-campus learning (Grollman & Tutschner, 2006; Stenstrom et al., 2006). Any reports of integration are in fact typically descriptions of current programme practice rather than *research* into the integration of knowledge and skills between settings (e.g., how it is or might be better facilitated). A number of possible outcomes of cooperative education have been identified in the literature as areas likely to be integrated. These are, as might be expected, generic skills such as the application of theory (Furco, 1997), increased discipline thinking (Cates & Langford, 1999), problem-solving (Burchell, Hodges, & Rainsbury, 2000), behavioural skills (Carrell & Rowe, 1994), time management (Parks, 2003), and teamwork and cooperation (Burchell et al., 2000; Weisz, 2000). Such generic skills are more likely to be able to be integrated because the diversity of placement contexts means more specific topics are less likely to be generally applicable.

The only other literature that offers insights into integration in cooperative education is based on the notion of critical reflection (Coll et al., 2009). As discussed, this has been argued to be important in enhancing learning in co-op, rather than in directly fostering integration. However, examination of the research on reflection indicates that it can foster integration. As an illustration, Gray (2007) talks of facilitation of learning in the workplace using critical reflection tools such as reflective metaphor, reflective journals, and critical incident analysis. It seems such tools work because they help students to engage in metacognition.

Our work in cooperative education in science and engineering has begun to illuminate this key facet of learning through practice. Eames (2003a) conducted a longitudinal study of 22 university science and engineering co-op students as they moved between their classroom and work placement experiences, and reported that many students believe they can apply at least some of their university-learnt

knowledge and/or skills in work placements. This is perhaps not surprising. It might be expected for a chemistry student to use chemistry knowledge during a placement when working in a chemistry laboratory. However, the students reported learning in their placements in a different way to learning at university. They found that learning at university was abstracted from application and motivated by an emphasis on process. In contrast, they described learning at work as very applied and highly contextual and motivated by process and outcomes. This distinction may prove a hindrance to integration unless students can be shown how to, and be given the opportunity to, navigate between the context/intention worlds of the classroom and workplace (Billett, 2008).

Furthermore, integration appears to be very domain-specific (i.e., specific to a particular domain of practice, such as geology), and there is a need to improve our understanding of whether, and if so how, students are able to carry over ideas from one domain to another. Paku and Lay (2008, p. 3) reported such transfer can occur, but noted this occurred only to a limited extent:

> Where students have been in placements unrelated to their field of study, they were still able to make links between theory used [in industry] and [those] that [they were] taught at university. For example, Adam [a pseudonym] was completing a materials degree and did a placement with an electricity company. He found that the principles behind electricity theory were very similar to processing concepts such as mass balances; the equations were similar but needed different numbers, units and symbols. This reflected the student's ability to see the similarities between mass and electricity theory.

What this suggests is that some transfer seems to occur naturally, but there is then the possibility that this might be enhanced if there is some way transfer is better facilitated. From a sociocultural viewpoint, integration in this learning could be seen to be mediated by the tools of the community, in this case, the tools being the equations used in working out mass balances. Other examples in Eames's (2003a) study included the use of scientific instrumentation common to both the classroom and the workplace, and, critically, the use of language in mediating learning in particular domains. It would, for example, be difficult for students to learn from their workplace mentor if that mentor did not understand the scientific terminology (or equations) used in that particular workplace.

We have found some evidence that students feel their learning on placement can influence their learning upon returning to the classroom. Eames (2003a) cites examples such as students reporting that learning a specific technique or use of a particular scientific instrument at work was useful in later papers in the classroom, with this learning tied tightly to the domain-specificity of the workplace. But, more commonly, students reported learning generic aspects such as a more positive attitude to study, more efficient study skills/habits, better time management, and some insights into the practice of science in the educational laboratory being different to that of the workplace (Eames, 2003b). So learning on placement can be integrated with classroom learning, but probably not to the extent we would wish. This finding leads to a stronger acknowledgement of the different identities of the two communities of practice (Wenger, 1998) within

which a student learns in a cooperative education programme, and a clearer emphasis on providing an integrative pathway for students to move successfully between these two communities (Billett, 2008). Recent work by Coll et al. (2009) supports this emphasis. Their study comprised a three-sector investigation into the integration in co-op programmes and concluded that:

> It is evident from this project that despite coming under an umbrella term, *work-integrated learning* [WIL], most programs do relatively little to formally drive the integration of knowledge between the HEI [Higher Education Institution] and workplace and vice versa. Whilst there is some logic in suggesting the student has ultimate responsibility for his or her own learning, WIL practitioners argue they are *educators* or at least that they should be considered educators … in which case we argue here they must accept ultimate responsibility for the integration through WIL. In doing so, they need to draw upon their training as educators, their personal experiences and research. (Coll et al., 2009, p. 32)

So it seems integration can and does occur, but in a fairly ad hoc manner unless explicitly encouraged. Coll et al. (2009) were able to make a number of recommendations to help move the integration agenda forward. Firstly, they say that programme leaders should formally state that their cooperative education programmes must involve the integration of knowledge, and set this as an explicit learning objective (Billett, 2008). Secondly, integration can be driven by reflection, in a variety of ways – reflection-*on*-action, reflection-*in*-action, and reflection-*before*-action. These three models of reflection, Coll et al. (2009) argue, are all necessary if integration is to occur in both directions (viz., to and from the workplace). Thirdly, they argue that co-op educators need to draw upon their educational background, and work with employers to help develop workplace-based pedagogies that will enhance workplace learning, believing that much workplace learning is accidental or ad hoc in nature.

## 10.6 The Real Value of Cooperative Education

Cooperative education has been a recognised strategy for learning through practice for over 100 years. It provides an opportunity to expose students to worlds of learning that are different but complementary. These complementary worlds have different sociocultural dimensions that afford different learning opportunities to students. We argue that these complementary settings for learning are equally valid in providing the type of holistic education that Schneider may have envisaged in 1906. What are required to achieve this education are clearly defined integrative pathways that allow students to make sense of the learning that they are afforded, and that which they also contribute to the settings of the classroom and the workplace. This places greater emphasis on all three parties to understand the mediational means that afford learning in these settings, to recognise their differences and their similarities, and to structure cooperative education programmes that enhance integrative opportunities for learning in both settings.

Support in this emphasis is required for the role of the co-op educators who facilitate the movement of students between the settings, and encourage development of the reflective capability that will provide the students with the lifelong skill of managing their own learning. The real strength of cooperative education as a strategy of practice-based learning is not that students gain opportunities to learn in the classroom and in the workplace, but that these opportunities are fostered and integrated to create learning that is more than the sum of the two parts. This helps the learner to find their place in the world and to understand how to shape the future, which are true measures of education.

## References

Abeysekera, I. (2006). Issues relating to designing a work-integrated learning programme in an undergraduate accounting degree programme and its implications for the curriculum. *Asia Pacific Journal of Cooperative Education, 7*(1), 7-15.

Aikenhead, G. S. (1996). Science education: Border crossing into the subculture of science. *Studies in Science Education, 27*, 1-52.

Allen, J. M., & Peach, D. (2007). Exploring connections between the in-field and on-campus components of a pre-service teacher education programme: A student perspective. *Asia Pacific Journal of Cooperative Education, 8*(1), 23-36.

Barber, A. S. (1968). The story of co-operative education in Canada. *Journal of Cooperative Education, 5*(1), 1-7.

Bates, A., Bates, M., & Bates, L. (2007). Preparing students for the professional workplace: Who has responsibility for what? *Asia Pacific Journal of Cooperative Education, 8*(2), 121-129.

Bell, B., & Cowie, B. (2001). *Formative assessment and science education*. Dordrecht, The Netherlands: Kluwer.

Bennett, K. C. (2008). Managing experiential education: Work-integrated learning in the context of a cost-benefit analysis. *Journal of Cooperative Education and Internships, 42*(2), 34-44.

Billett, S. (1994). Situating learning in the workplace - having another look at apprenticeships. *Industrial and Commercial Training, 26*(11), 9-16.

Billett, S. (1998). Understanding workplace learning: Cognitive and sociocultural perspectives. In D. Boud (Ed.), *Current issues and new agendas in workplace learning* (pp. 43-59). Leabrook, South Australia: NCVER.

Billett, S. (1999). Guided learning at work. In D. Boud & J. Garrick (Eds.), *Understanding learning at work* (pp. 151-163). London, England: Routledge.

Billett, S. (2008). Cooperative education: Supporting and guiding ongoing development. *Journal of Cooperative Education and Internships, 41*(2), 37-44.

Boud, D., & Garrick, J. (1999). *Understanding learning at work*. London: Routledge.

Branton, G. R., Van Gyn, G., Cutt, J., Loken, M., Ney, T., & Ricks, F. (1990). A model for assessing the learning benefits in cooperative education. *Journal of Cooperative Education, 26*(3), 30-40.

Braunstein, L. A. (1999). Employer benefits of, and attitudes toward postsecondary cooperative education. *Journal of Cooperative Education, 36*(1), 7-22.

Braunstein, L. A., & Loken, M. K. (2004). Benefits of cooperative education for employers. In R. K. Coll & C. Eames (Eds.), *International handbook for cooperative education* (pp. 237-245). Boston: World Association for Cooperative Education.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32-42.

Burchell, N., Hodges, D., & Rainsbury, L. (2000). What competencies do business graduates require? Perspectives of New Zealand stakeholders. *Journal of Cooperative Education, 35*(2-3), 11-20.

Calway, B., & Murphy, G. (2000). Career progression of cooperative education graduates. *Journal of Cooperative Education and Internships, 35*(2-3), 68-75.

Campbell, M. (2009). Learning in early-career police: Coming into the workplace. *Asia Pacific Journal of Cooperative Education, 10*(1), 19-28.

Carrell, S. E., & Rowe, P. M. (1994). Effects of cooperative education on student adaptation to university. *Journal of Cooperative Education, 29*(1), 33-40.

Cates, C., & Jones, P. (1999). *Learning outcomes: The educational value of cooperative education*. Columbia, MD: Cooperative Education Association.

Cates, C. L., & Langford, D. R. (1999). Documenting communication and thinking skills through co-op student reports. *Journal of Cooperative Education, 34*(3), 7-13.

Chen, M. (2006). How a Chinese university trains engineers to meet with challenges today and tomorrow. *Asia Pacific Journal of Cooperative Education, 7*(1), 1-6.

Cole, M., & Engestrom, Y. (1997). A cultural-historical approach to distributed cognition. In G. Salomon (Ed.), *Distributed cognitions: Psychological and educational considerations* (pp. 1-46). Cambridge, UK: Cambridge University Press.

Coll, R. K. (1996). The BSc(Technology) degree: Responding to the challenges of the education marketplace. *Journal of Cooperative Education, 32*(1), 29-35.

Coll, R. K., Eames, C., Paku, L., Lay, M., Hodges, D., Bhat, R., et al. (2009). An exploration of the pedagogies employed to integrate knowledge in work-integrated learning. *Journal of Cooperative Education and Internships, 43*(1), 14-35.

Coll, R. K., & Eames, C. W. (2000). The role of the placement coordinator: An alternative model. *Asia-Pacific Journal of Cooperative Education, 1*(1), 9-14.

Coll, R. K., Zegwaard, K., & Hodges, D. (2002). Science and technology stakeholders' ranking of graduate competencies part 1: Employer perspective. *Asia Pacific Journal of Cooperative Education, 3*(2), 19-28.

Coll, R. K., Zegwaard, K., & Lay, M. (2001). The influence of cooperative education on student perceptions of their practical ability in science. *Journal of Cooperative Education, 36*, 58-72.

Cullen, M. (2007). The role of cooperative education in developing environmental science skills. *Asia Pacific Journal of Cooperative Education, 8*(1), 37-52.

Cutt, J., & Loken, M. (1995). The nature of evidence in assessing co-operative education. *Journal of Cooperative Education, 30*(3), 24-38.

DeFalco, A. A. (1995). The learning process, apprenticeships, and Howard Gardner. *Journal of Cooperative Education, 30*(2), 56-67.

Dewey, J. (1916). *Democracy and education: An introduction to the philosophy of education*. New York: Macmillan.

Dewey, J. (1938). *Experience and education*. New York: The Macmillan Company.

Dressler, S., & Keeling, A. (2004). Student benefits of cooperative education. In R. K. Coll & C. Eames (Eds.), *International handbook for cooperative education* (pp. 217-236). Boston: World Association for Cooperative Education.

Eames, C. (2003a). *Learning through cooperative education work placements in science and technology.* Unpublished PhD thesis, University of Waikato, Hamilton, New Zealand.

Eames, C. (2003b). Learning to work: Becoming a research scientist through work experience placements. *Asia Pacific Journal of Cooperative Education, 4*(2), 7-15.

Eames, C., & Bell, B. (2005). Using sociocultural views of learning to investigate the enculturation of students into the scientific community through work placements. *Canadian Journal of Science, Mathematics and Technology Education, 5*(1), 153-169.

Eames, C., & Coll, R. K. (2006). Sociocultural views of learning: A useful way of looking at learning in cooperative education. *Journal of Cooperative Education and Internships, 40*, 1-12.

Engestrom, Y. (2001). Expansive learning at work: Toward an activity theoretical reconceptulization. *Education and Work, 14*(1), 133-156.

Fenster, M., & Parks, D. (2008). Does alternating and parallel programmatic structure make a difference in student outcomes? *Journal of Cooperative Education and Internships, 42*, 33-40.

Fink, F. K. (2001, October). *Integration of work based learning in engineering education*. Paper presented at the ASEE/IEEE Frontiers in Education conference, Reno, NV.

Fleming, J., & Eames, C. (2005). Student learning in relation to the structure of the cooperative experience. *Asia Pacific Journal of Cooperative Education, 6*(2), 26-31.

Fujimoto-Ikuma, A., & Ishida, D. (2008). Transition into the work world: An assessment. *Journal of Cooperative Education and internships, 42*, 11-19.

Furco, A. (1997). Service-learning and school-to-work: Making the connections. *Journal of Cooperative Education, 32*(1), 7-14.

Gardner, P. D., Nixon, D. C., & Motschenbacker, G. (1992). Starting salary outcomes of cooperative education graduates. *Journal of Cooperative Education, 27*(3), 16-26.

Gray, D. E. (2007). Facilitating management learning: Developing critical reflection through reflective tools. *Management Learning, 38*(5), 495-517.

Groenewald, T. (2004). Towards a definition for cooperative education. In R. K. Coll & C. Eames (Eds.), *International handbook for cooperative education* (pp. 17-25). Boston: World Association for Cooperative Education.

Grollman, P., & Tutschner, R. (2006, September). *Possible intended and unintended effects of European VET policies - The case of integrating work and learning*. Paper presented at the European Research Network in Vocational Education and Training Symposium, Geneva.

Heinemann, H. N., & DeFalco, A. A. (1990). Dewey's pragmatism: A philosophical foundation for cooperative education. *Journal of Cooperative Education, 27*(1), 38-44.

Hennessy, S. (1993). Situated cognition and cognitive apprenticeship: Implications for classroom learning. *Studies in Science Education, 22*, 1-41.

Hodges, D., & Burchell, N. (2003). Business graduate competencies: Employers' views on importance and performance. *Asia Pacific Journal of Cooperative Education, 4*(2), 16-22.

Howard, A. (2004). Cooperative education and internships at the threshold of the twenty-first century. In P. L. Linn, A. Howard, & E. Miller (Eds.), *Handbook for research in cooperative education and internships* (pp. 3-10). Mahwah, NJ: Lawrence Erlbaum.

Jabs, B., Jabs, M., & Jabs, A. (1978). Cooperative education must relate to different educational philosophies to be successful. *Journal of Cooperative Education, 14*(1), 74-88.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice Hall.

Lave, J. (1991). Situated learning in communities of practice. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Shared cognition: Thinking as social practice, perspectives on socially shared cognition* (pp. 63-82). Washington, DC: American Psychological Association.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.

Lazarus, F. C., & Oloroso, H. C. (2004). Administering cooperative education programs. In R. K. Coll & C. Eames (Eds.), *International handbook for cooperative education* (pp. 179-188). Boston: World Association for Cooperative Education.

Linn, P., & Ferguson, J. (1999). A lifespan study of cooperative education graduates: Quantitative aspects. *Journal of Cooperative Education, 43*(3), 30-41.

McCurdy, S., & Zegwaard, K. (2009). Faculty voices: What faculty think about work integrated learning. *Journal of Cooperative Education and Internships, 43*, 36-53.

New Zealand Association for Cooperative Education. (1995). *Cooperative education - learning integrated with work: Who benefits?* Wellington, New Zealand: Author.

O'Shea, M., & Watson, G. (2007). Academic learning for sport management students: Learning through engaged practice. *Asia Pacific Journal of Cooperative Education, 8*(1), 53-65.

Paku, L., & Lay, M. (2008). *Reflection and review: Confessions of placement students.* Paper presented at the 11th Annual Conference of the New Zealand Association for Cooperative Education, New Plymouth, New Zealand.

Parks, D. K. (2003). *An examination of cooperative education students' learning outcomes.* Unpublished Dissertation, Valdosta State University.

Perkins, D. N. (1997). Person-plus: A distributed view of thinking and learning. In G. Salomon (Ed.), *Distributed cognitions: Psychological and educational considerations* (pp. 88-110). Cambridge, UK: Cambridge University Press.

Piaget, J. (1950). *The psychology of intelligence*. London: Routledge & Kegan Paul.

Raelin, J. A., Glick, L. J., McLaughlin, K. E., Porter, R. D., & Stellar, J. R. (2008). Reflection-in-action on co-op: The next learning breakthrough. *Journal of Cooperative Education and Internships, 42*(2), 9-15.

Rogoff, B. (1991). Social interaction as apprenticeship in thinking: Guided participation in spatial planning. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 349-364). Washington, DC: American Psychological Association.

Rogoff, B. (1995). Observing sociocultural activity on three planes: Participatory appropriation, guided participation and apprenticeship. In J. V. Wertsch, P. del Rio, & A. Alvarez (Eds.), *Sociocultural studies of mind* (pp. 139-164). Cambridge, UK: Cambridge University Press.

Salomon, G. (1997). No distribution without individual's cognition: A dynamic interactional view. In G. Salomon (Ed.), *Psychological and educational considerations* (pp. 111-138). New York: Cambridge University Press.

Saltmarsh, J. A. (1992). John Dewey and the future of cooperative education. *Journal of Cooperative Education, 28*(1), 6-16.

Sovilla, E. S., & Varty, J. W. (2004). Cooperative education in the USA, past and present: Some lessons learned. In R. K. Coll & C. Eames (Eds.), *International handbook for cooperative education* (pp. 3-16). Boston: World Association for Cooperative Education.

Spowart, J. (2006). Hotel school students' views of their preparation for work-integrated learning: An exploratory study. *Asia Pacific Journal of Cooperative Education, 7*(2), 10-15.

Stenstrom, M.-L., Grollman, P., Tutschner, R., Tynjala, P., Nikkanen, Loogma, K., et al. (2006, September). *Integration of work and learning: Policies, strategies and practices.* Paper presented at the European Research Network in Vocational Education and Training Symposium, Geneva.

Tucker, W. H. (1969). British sandwich courses. *Journal of Cooperative Education, 6*(1), 39-43.

Van Gyn, G., Cutt, J., Loken, M., & Ricks, F. (1997). Investigating the educational benefits of cooperative education: A longitudinal study. *Journal of Cooperative Education, 32*(2), 70-85.

Van Gyn, G., & Grove White, E. (2004). Theories of learning in education. In R. K. Coll & C. Eames (Eds.), *International handbook for cooperative education* (pp. 27-36). Boston: World Association for Cooperative Education.

Van Gyn, G. H. (1994). The educational orientation of cooperative education: A critical variable in effectiveness. *Journal of Cooperative Education, 30*(1), 17-25.

Van Gyn, G. H. (1996). Reflective practice: The needs of professions and the promise of cooperative education. *Journal of Cooperative Education, 31*(2), 103-131.

Venables, A., & Tan, G. (2009). Realizing learning in the workplace in an undergraduate IT programme. *Journal of Information Technology Education: Innovations in Practice, 8*, 17-26.

Vygotsky, L. S. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.

Weisz, M. (2000). Developing a measure of student attributes. *Journal of Cooperative Education and Internships, 35*(2-3), 33-40.

Weisz, M., & Chapman, R. (2004). Benefits of cooperative education for educational institutions. In R. K. Coll & C. Eames (Eds.), *International handbook for cooperative education* (pp. 247-258). Boston: World Association for Cooperative Education.

Wenger, E. (1998). *Communities of practice: Learning, meaning and identity*. Cambridge, UK: Cambridge University Press.

Wertsch, J. V. (1991). *Voices of the mind*. Cambridge, MA: Harvard University Press.

Wertsch, J. V., del Rio, P., & Alvarez, A. (1995). Sociocultural studies: History, action and mediation. In J. V. Wertsch, P. del Rio, & A. Alvarez (Eds.), *Sociocultural studies of mind* (pp. 1-36). Cambridge, UK: Cambridge University Press.

Wessels, W., & Pumphrey, G. (1995). The effects of cooperative education on job search time, quality of job placement and advancement. *Journal of Cooperative Education, 31*(1), 42-52.

Weston, W. D. (1986). Career identity and its relationship to participation in a cooperative education program. *Journal of Cooperative Education, 23*(1), 25-36.

Williams, W. M., Sternberg, R. J., Rashotte, C. A., & Wagner, R. K. (1992). Assessing the value of cooperative education. *Journal of Cooperative Education, 28*(2), 32-55.

Wilson, J. W. (1970). On the nature of cooperative education. *Journal of Cooperative Education, 6*(2), 1-10.

Wilson, J. W. (1973). Cooperative education and degree credit. *Journal of Cooperative Education, 14*(2), 28-38.

Wilson, J. W. (1985). Cooperative education program characteristics and program size. *Journal of Cooperative Education, 21*, 4-8.

Wong, N. A., & Coll, R. K. (2001). Student experience of international cooperative education: Reflections on personal and professional growth. *Asia Pacific Journal of Cooperative Education, 2*(1), 11-18.

World Association for Cooperative Education (WACE). (2009). *WACE.* Retrieved 7 August, 2009, from www.waceinc.org

# Chapter 11
# Individual Learning Paths of Employees in the Context of Social Networks

**Rob F. Poell**

Tilburg University, Netherlands

**Ferd J. Van der Krogt**

Radboud University, Netherlands

**Abstract** This chapter investigates the question of how social networks in organisations contribute to employee learning. Based on the learning-network theory, which views organisations as networks of actors creating various processes, we distinguish between two specific actor networks especially relevant to individual learning. First is the work network, in which employees carry out and improve their daily work, which may lead to learning; and second is the learning network, where employees participate in especially designed programmes in order to learn. Their learning-relevant experiences acting in both networks can lead employees to creating their own learning paths, that is, to making sense out of the many experiences with a view to bringing coherence and meaning to them. Individual learning paths are both employee-driven and affected by their work experiences and participation in learning programmes, which are informed to a considerable extent by the particular work and learning networks in which employees participate.

## 11.1 Introduction

Organisations offer employees work and learning experiences that contribute to individual professional development (Ellström, 2001; Billett, 2001). These experiences occur in three types of organisational process (Van der Krogt, 2007), namely, 1) the primary work process of the organisation; 2) the human resource management (HRM) process; and 3) the human resource development (HRD) process. First, individual employees gain experiences relevant to learning in the primary work process of the organisation, that is, by preparing, executing, and improving their everyday work. For example, a more experienced colleague shows them how to solve a particular problem on the job. Second, in the HRM process, individual employees further their careers, which provides them with experiences as they acquire, maintain, and change job positions in organisations.

S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2_11, 

For instance, they are subjected to job appraisals by their supervisor. Third, and probably easiest to recognise, in the HRD process, employees engage in learning-relevant experiences specifically intended to contribute to their professional development. Obvious examples are participating in education programmes and being coached by a supervisor (Van der Krogt, 2007).

The experiences gained in these three types of processes by individual employees form the basis for their professional development. Each employee, however, will have to bring some form of coherence into the diverse experiences in order to make sense of them. We refer to this activity as the creation of a learning path by the employee. The concept of a learning path refers to a set of learning-relevant activities that are both coherent as a whole and meaningful to the employee. The activities are based on learning-relevant experiences gained in the organisational processes (and in the social networks associated with the latter). Coherence and meaning are created by the employee through engaging in new learning-relevant experiences and/or 'discovered' by the employee through reflection on past experiences in the organisational processes (Van der Krogt, 2007). Each employee thus creates their own learning path on the basis of experiences gained in various organisational processes (and their associated social networks).

Individual employees can create learning paths in various ways (Poell, 2005). One option is drawing up and executing a personal development plan (cf. Fenwick, 2004). Another possibility is conducting an individual learning project, that is, undertaking activities for a specific period of time with a view to learning about a particular theme relevant to the employee (cf. Clardy, 2000; Tough, 2003; Roberson & Merriam, 2005). A somewhat less structured approach is when an employee creates informal opportunities to gain learning-relevant experiences, for example, by joining or forming a community of practice (Wenger, 1998). And, finally, employees themselves engaging in transfer-enhancing measures around formal training courses (Broad & Newstrom, 1992; Koslowski & Salas, 1997) would resemble the creation of a learning path as well.

The creation of meaningful learning paths that contribute to individual employees' professional development depends on their position in the organisation (Van der Krogt, 2007). More specifically, the various social networks from which employees operate have a large impact on the experiences that they can gain and, hence, on the learning paths they create. In particular, the positions of actors in these networks and in the communication and consultation structures determine to a large extent how much impact an employee can exert on the organisational processes and, therefore, on the learning-relevant experiences they can gain from these. It is these social networks (cf, Lin's notion of social structure, 2001) that give rise to the organisational processes and the experiences relevant to the learning paths and professional development.

By addressing these factors, this chapter examines how individual actions and learning-relevant experiences that form the basis of a learning path are influenced by specific organisational processes and the social networks of actors creating

those processes. In this view, social networks are understood differently than traditional sociological conceptions of social networks. The view presented here suggests that social networks -- their structure and actors -- emerge from organisational processes.

We suggest that the type of organisational process will have a large impact on the actors and the social structure of the network; these actors and structures then greatly influence employee learning and professional development. Consequently, the types of organisational processes in organisations determine in part what and how an employee learns. In the context of learning, social networks are not considered static snapshots of nodes and ties. Instead, social networks are self-perpetuating constellations of actors with specific meaning for those actors as they engage in organisational processes.

It follows, therefore, that this chapter presents a perspective on organisations as social networks of actors, which can help explain how employees create individual learning paths and what constraints and opportunities they encounter in doing so. We use the theoretical framework of the learning-network theory (Van der Krogt, 1998, 2007), which emphasises the structure of social networks as well as the actors operating from these networks (cf. Lin, 2001) to give rise to various organisational processes relevant to the professional development of employees. Two such processes are presented in this argument. Due to space limitations, this chapter focuses on the primary work process and on only one HRD process, namely the organising of learning programmes. Therefore, this chapter will not consider HRM and other HRD processes. Notwithstanding this restriction, the two processes illustrate how individual employees' opportunities to engage in professional development are strongly dependent on the social networks from which they operate in the organisation. Each process is represented by a different social network, which we call, respectively, the work network (i.e., generated from the primary work process of the organisation) and the learning network (i.e., generated from HRD interventions, i.e., the creation and execution of learning programmes). These two social networks provide learning-relevant experiences on which individual learning paths are based and they influence how individuals make meaning of these experiences.

The chapter is structured as follows. First, the chapter elaborates the perspective on an organisation as a social network of actors, building particularly on Mintzberg's theory of organisations (1989; see also Mintzberg, Ahlstrand, & Lampel, 1998). Second, it demonstrates how the learning-relevant experiences gained by employees are affected by the structure of the work network. This social network is related to and perpetuates the primary work process in the organisation. Third, it will focus on the way in which learning programmes are organised to illustrate how the structure of the learning network that gives rise to HRD processes influences employees' learning-relevant experiences. Finally, the chapter revisits the question of how employees create individual learning paths, and presents the implications for HRD research and practice.

## 11.2 Viewing the Organisation as a Network of Actors

The learning-network theory presented here (Van der Krogt, 1998, 2007) regards organisations as networks of actors; it is these social networks that influence organisational processes. In this view, organisational processes are shaped by interactions between various actors (e.g., employees, managers, HR professionals, clients, trade unions, professional associations, and so forth), who hold positions in different types of social network. From these various network positions, actors create three organisational processes that are crucial to the professional development of employees: the primary work, HRM, and HRD processes. The structure of each network comprises the positions (authority, responsibility, dependency) of the actors as well as the communication and consultation structures. The network structure determines each actor's opportunities for interaction, positional power (formal authority), and access to means and to other actors necessary for exerting influence. On the basis of their positions in the network structure, actors thus create processes that, over time, result in process structures.

This perspective on organisations and organising is based on Mintzberg (1989; see also Mintzberg et al., 1998), who assumes that the organisation of the primary work process depends on the structure of the actor network, that is, on the positions of actors and their power relations (cf. Sambrook, 2007; Garavan, Gubbins, Hogan, & Woodlock, 2007). Two important social structural characteristics of Mintzberg's organisation types are: 1) the distribution of authority among actor positions -- centralisation vs. decentralisation – reflected in the power and resources of each actor; and 2) the communication and consultation structures. Four specific types of actor constellation in Mintzberg's work are particularly interesting to our purpose, namely 1) the entrepreneurial organisation; 2) the bureaucratic organisation; 3) the organic unit organisation; and 4) the professional organisation. These four types clearly show the different positions of employees in the actor-network structure (cf. Lin's notion of social structure, 2001) that gives rise to the primary work process. They are illustrated below.

The entrepreneurial organisation is characterised by a relatively loosely coupled actor network, meaning that employees in the primary work process have the individual autonomy to work directly with their own clients highly independent from one another (e.g., real estate agents working in a partnership company). In the bureaucratic organisation, the power relationships between actors are highly hierarchical and regulated. Employees in the primary work process (e.g., assembly-line workers in a factory) are highly dependent on the technostructure (Mintzberg, 1989) of the organisation, which designs the work procedures, and on the management, which enforces these procedures. The organic unit organisation is characterised by egalitarian power relationships between actors and the primary process is organised in self-managing teams, each working with their own set of clients (e.g., IT specialists developing company intranets for different industries). Employees operate strongly interdependently. In

the professional organisation, professionals in the primary process follow the methods and codes developed by the professional field outside their own organisation (e.g., medical doctors in an academic hospital). Employees are highly dependent on their external colleagues and professional associations, who enforce the way in which the professionals work.

Organisations in this view can be seen as network structures and actors creating, shaping, changing, and perpetuating the organisational processes described above (see Figure 11.1). Figure 11.1 shows the relationships between the network of actors, the organisational processes they create, and the ensuing process structures, which in turn affect the network of actors. We refer to these relationships as a process cycle. The network of actors, who each have their own action theories, can be characterised by a specific network structure (Figure 11.1, bottom left). Processes are created as the actors interact with one another (top of Figure 11.1). Over time, specific process structures, both functional structures and infrastructures, thus come into being (Figure 11.1, bottom right).

The network structure in this view refers to the relationships of power and influence among the actors, that is, their authority and their formal position in the communication structure. Actors engage in the creation of processes on the basis of their action theories (i.e., their values and norms as well as their knowledge and skills; cf. Argyris & Schön, 1996). They create processes and tackle problems encountered while doing so. Actors apply their action theories and learn from doing so, as they interact with others who may hold different action theories.

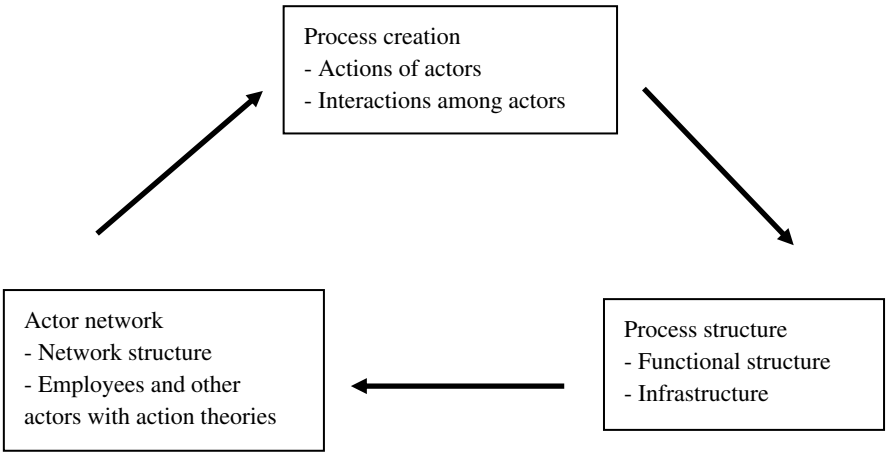


**Fig. 11.1** Process cycle: Relationships between the network of actors, the creation of processes, and the structure of processes

The network structure, however, needs to be distinguished from the work-process structure. Over time, actors in an organisation carry out and improve work processes, which come to be embedded in the work-process structure and the work network. Whereas the network structure comprises the responsibilities and communication channels needed to carry out work and improve work processes, the work-process structure comprises the functional structure (i.e., the tasks and work procedures) and the infrastructural facilities (i.e., tools for carrying out work). Quality control is an important part of the work-process structure, responsible for the systematic evaluation and improvement of the work process, meaning the division of tasks and jobs as well as the work procedures.

Besides the network and work-process structures, Mintzberg's (1989) theory also addresses the values and norms as well as the knowledge and skills of the various actors in and around the organisation (sometimes referred to as the action theories of actors, cf. Argyris & Schön, 1996). Actors do not always act according to the given structures in the organisation; they also follow their own expertise and beliefs in shaping organisational processes. Actors learn as they develop their action theories, applying these in organising work processes and thus gaining learning-relevant experiences.

Minztberg's (1989) work focuses on the primary work process in organisations, paying little attention to HRM and HRD processes. The learning-network theory (Van der Krogt, 1998, 2007) attempts to fill that gap, assuming that each organisation will develop various networks for organising the primary work process, the HRM process, and the HRD process. A further assumption is that these actor networks will differ according to the type of process that it produces.

The learning-network theory presented here uses both action theories (comprising knowledge, skills, norms, values; cf. Argyris & Schön, 1996) of actors and Mintzberg's (1989) network structures to explain how learning is organised. Highlighting both action theories and network structures provides the analytical tools to understand how employees learn while they are embedded in the organisation. Developing one's action theories (i.e., learning) is an important mechanism to encourage the shaping and improvement of organisational processes. Action theories enable employees to interpret situations and act appropriately. New and old experiences are integrated into the existing action theory and get their meaning within that particular framework. The action theory itself can also be redefined, however, as learning involves a process of mutual adaptation between the existing action theory and (new and old) experiences.

Summarising this section, we view an organisation as a set of networks, each consisting of a network structure and actors with action theories (see Figure 11.1). From these networks, actors create three types of process (work, HRM, and HRD), each thus leading to a process structure. The process structures, in turn, influence the activities carried out by the networks of actors, as the latter perceive and interpret process structures on the basis of their action theories. Actors act according to their perceptions and action theories from their positions in the

network structures. By applying their action theories in organising processes, actors develop these action theories, that is, they learn.

## 11.3 Learning-Relevant Experiences Gained from the Work Network

As illustrated above, employees gain experiences from the primary work process that are relevant to their learning and professional development. Which experiences they can gain depends on the type of work network and on the way in which work has come to be structured. This scenario will be illustrated in this section, which suggests that actor positions in the network structure generate different learning-relevant experiences. First, the way in which actors organise work will be modeled as a cycle. Then, four ideal types of work process will be introduced. Finally, this section will describe three dimensions on which work-network structures can differ.

### *11.3.1 How Actors Organise Work: A Cycle*

The primary work process in an organisation is brought about by actors in and around that organisation. For example, in service organisations it is shaped by a client in interaction with one or several employees and other actors. Students in a secondary school, for instance, engage in their educational career together with teachers, mentors, counselors, their parents, and their fellow students. Patients in health care institutions work with doctors, nurses, specialists, and family members, in order to regain health.

An application of the general-purpose Figure 11.1 to the domain of work, Figure 11.2 shows the relationships between the work network, the work process, and the ensuing work structure, which in turn affects the work network. The work network consists of actors, who each have their own particular action theories about work. It can be characterised by a specific work-network structure (Figure 11.2, bottom left). Work processes occur as the actors interact to tackle work-related problems (top of Figure 11.2). To provide services employees use various facilities, such as technical equipment and protocols for treatments and quality control. Thus, over time, a work structure comes into being, which can be characterised by a functional structure and a particular work infrastructure (Figure 11.2, bottom right).

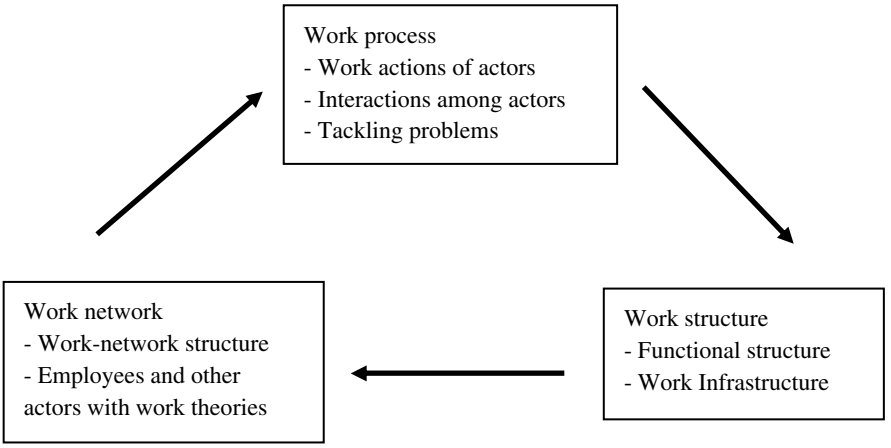


**Fig. 11.2** Relationships between the work network, work process, and work structure

The actors in the work network can use the existing work structure to engage in new work activities. They do so based on their perception of the work structure. Their action theory about work also plays an important role, as it influences their perception and interpretation of the work structure as well as their actions in the work process. Their actions are also affected by their position in the work network (cf. Lin, 2001).

The positions of the actors in the work network delineate the boundaries within which they can operate. Their action theories, however, determine to what extent they can actually use that room, as their expertise and beliefs may limit the extent of their actions. Problems encountered in the work process influence how actors operate in learning-relevant work processes. Employees will try to reduce such problems by adapting their learning paths accordingly (e.g., by paying more attention to relevant topics). Managers will do so by acting strategically in the development of learning arrangements (e.g., by asking educators to design better-fitting programmes). Educators themselves obviously have learning and development as their job rather than as tools for them to use; they will however attempt to align themselves with the dominant actors to secure their relatively weak position (e.g., in bureaucratic organisations they will choose the side of management, while in organic unit organisations they will be more likely to affiliate themselves with the various autonomous teams).

### *11.3.2 Four Ideal Types of Work Process*

As described above, employees create work processes together with other actors based on their positions in the work network. According to the learning-network theory, different work processes are expected to occur in different work networks. Table 11.1 typifies the different work processes according to their network structure and their work structure, which will be illustrated below. Depending on the type of work process, employees can gain different types of learning-relevant work experiences. The left-hand column of Table 11.1 presents the characteristics of four types of work-network structure, each one in a separate box. The right-hand column contains the characteristics of the four corresponding work structures, each one also in a separate box. The arrows in Table 11.1 indicate that four specific relationships are expected between particular work-network structures and work structures.

**Table 11.1** Relationships expected between work-network structures and work structures

| Structure of the Work Network | | Work Structure |
|---|---|---|
| Loosely coupled network | | Individual work |
| Individual autonomy | ⟷ | By entrepreneurial employees |
| Entrepreneurial organisation | | Broad jobs |
| | | |
| Vertical network | | Programmatic work |
| Hierarchical, formalised relations | ⟷ | By centrally coordinated units |
| Bureaucratic organisation | | Strong task division |
| | | |
| Horizontal network | | Integrated work |
| Organic relations | ⟷ | By teams |
| Unit organisation | | Integrated jobs |
| | | |
| External network | | Specialised work |
| Professional autonomy | ⟷ | By professionals |
| Professional organisation | | Disciplinary task differentiation |

#### 11.3.2.1 Individual Work based in Loosely Coupled Networks

This network structure can very well be characterised as an association of free professionals (cf. Mintzberg's simple structure, 1989). The classical professions are often organised like this, for instance, lawyers working in their own firm, general practitioners who have their own practice, or solitary researchers in a university. Their autonomy at work is maximal, as the network is only a loose connection among the individual employees. Work and its improvement are

individual processes tied to the person. Individual employees decide on their own course of action, do their jobs individually, and make necessary adjustments by themselves. The interaction with clients is crucial, from the diagnosis of the problem, the setting of quality demands, the determining of a solution, to its evaluation. Direct feedback from the client gives the employee opportunities to adjust actions along the way as well.

#### 11.3.2.2 Programmatic Work based in Vertical Networks

This organisation is characterised by a strong division of tasks, both in developing and planning work as well as in its actual execution (cf. Mintzberg's machine bureaucracy, 1989). This structure can be observed, for example, in classical banks and training institutes offering popular off-the-shelf courses. Work is directed by managers and preparatory staff members from the technostructure of the organisation. The client does not contact the individual employee directly but goes through the organisation first. The strength of this network lies in its monitoring of quality standards, guaranteeing clients a predictable level of service guarded by staff departments. Dedicated quality officers or quality circles are often established to monitor the work process. Elaborate procedures and regulations are usually in place, as are systematic evaluation of work and refining protocols, all with a view to quality control.

#### 11.3.2.3. Integrated Work based in Organic Networks

This organisation works with fixed teams, each responsible for a particular type of product or service provided to a particular group of clients (e.g., students in a specific year group at school, patients with a specific disease pattern in residential care). In the extreme ideal-typical shape of this network structure, the employees cooperate very intensely with one another and their clients. Quality control is owned by teams of employees, who collect information, interpret it themselves, and have the authority to change their own way of operating as well (cf. Mintzberg's unit organisation, 1989).

#### 11.3.2.4. Thematic Work based in Professional Networks

The main characteristic of this organisation is the use of specialised, complex methods with predictable outcomes (e.g., medical doctors operating in an academic hospital). Through a process known as pigeon holing, the professionals aim to match their clients to well-known methods, yielding a large chance of success. Managers and clients have little impact on service provision. Quality control depends strongly on the (new) insights and methods developed within the

professional field transferred to its professionals. The professional field develops new treatments or methods, which the individual professionals have to appropriate and apply in their day-to-day routine. Representatives from the professional field monitor to what extent the methods used in practice are still adequate and applied as intended. If necessary, the professional field will take measures, such as conducting further research to improve methods or offering their members more intensive professional development programmes. The (formal as well as informal) professional networks are crucial within this network structure (cf. Mintzberg's professional bureaucracy, 1989).

### *11.3.3 Three Dimensions in Work-Network Structures*

Table 11.1 summarises the different work processes according to their network structure and their work structure. As Figure 11.3 indicates, the positions and relations among the actors in the ensuing four ideal types of work-network structure can be presented along three dimensions: the vertical, horizontal, and external dimensions. The three dimensions can be regarded as axes delineating the space in which work-network structures can be situated. At the centre where all three dimensions converge, the loosely coupled work network can be situated, which is characterised by highly individual work. Moving up the vertical dimension, at the top of Figure 11.3 the vertical work network can be found, which has programmatic work associated with it. Following the horizontal dimension, at the right-hand side of Figure 11.3 the organic work network can be placed, which is tied to integrated work. And going along the external dimension, at the left-hand side of Figure 11.3 the professional work network can be situated, characterised by thematic work.

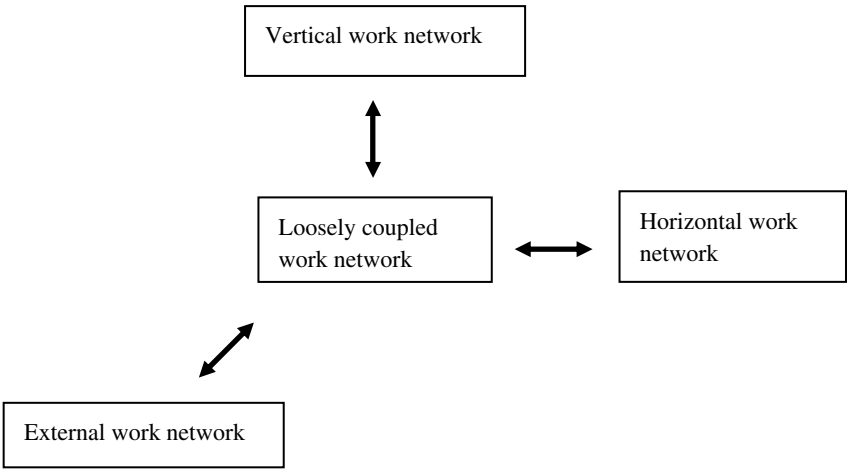


**Fig. 11.3** Four ideal-typical work-network structures along three dimensions

Employees can gain a diversity of learning-relevant experiences from participating in the work process and solving problems thus encountered. Which experiences they gain depends strongly on the position of employees in the three dimensions of the work network (see Figure 11.3), according to the theory presented here. The learning-network theory suggests that if employees operate in a mainly vertical network they are likely to learn how to better apply procedures, whereas more horizontal networks will probably see them solving joint problems with their direct colleagues. Professional networks offer many external learning opportunities, sharing experiences with colleagues from other organisations and experts. In loosely-coupled networks gaining learning-relevant experiences is mainly a function of the individual employee's efforts to improve their work.

## 11.4 Learning-Relevant Experiences Gained in the Learning Network

The previous section dealt with the learning-relevant experiences to be gained by employees from the primary work process in the organisation. This section builds on that foundation and will focus on employee experiences in one crucial HRD process, namely, organising learning programmes. In other words, the learning-network theory presented here suggests that both work processes (summarised in Mintzberg's four types, 1989) and HRD processes combine to influence what and how people learn. Precisely which experiences employees gain from HRD

processes, however, depends strongly on the type of learning network and on the way in which learning has become structured over time. These points will be further illustrated below. First, the way in which actors organise learning networks will be modeled as a cycle. Then, the creation of learning programmes by actors will be explained. Finally, this section will illustrate four ideal-typical learning programmes that actors can create based in four ideal-typical learning networks.

### *11.4.1 Actors Organise Learning Networks: A Cycle*

Over time, a specific learning network comes into being in every organisation (Van der Krogt, 1998, 2007). The learning network is a constellation of actors who, from their positions and action theories, undertake learning-relevant activities. The latter become embedded in the learning structure, which in turn influences the learning-relevant activities of the actors. How the learning network is thus organised bears many similarities to the way in which work networks come about (cf. Figures 11.1 and 11.2).

In the learning network various positions can be distinguished, just like in the work network (e.g., learning employees, consultants, training managers, content experts, supervisors, external training providers), with each position holding particular authority. Each actor has particular action theories about the purposes served by learning and about which learning-relevant activities should be undertaken. For example, employees may be of the opinion that they learn best by asking an experienced colleague, while their supervisor may want to send them to a formal training course. The learning network also has a climate, representing its values and norms about organising learning-relevant activities in the organisation.

### *11.4.2 Actors Create Learning Programmes*

One very important process organised by actors from the learning network is learning-programme creation. Usually a consultant initiates a learning programme, charged to do so by a manager in response to a perceived problem. The consultant forms a programme group consisting of several managers, content experts, and employees involved in the problem directly or indirectly. These actors may also come from outside the organisation. The learning-programme group analyses the perceived problem and develops ideas about the learning theme (e.g., the goals of the learning programme, a global description of the topic at hand), about the learning activities (e.g., courses, self-study, workplace training, experiments, mentoring, analysing difficult work situations), and about the contexts in which employees can learn together (dyads, learning sets, e-learning, self-directed approaches).

Figure 11.4 presents an application of the general-purpose Figure 11.1 to the creation of learning programmes; Figure 11.4 shows the relationships between the learning-programme group, the learning programme they create, and the ensuing learning-programme structure, which in turn affects the learning-programme group. The actors involved in the learning-programme group comprise employees, managers, and consultants (Figure 11.4, bottom left). They create a learning programme, which can be characterised by a particular theme, activities, and context (top of Figure 11.4). Over time, in the learning programme specific learning structures come about (both a functional structure and a particular learning infrastructure; Figure 11.4, bottom right).

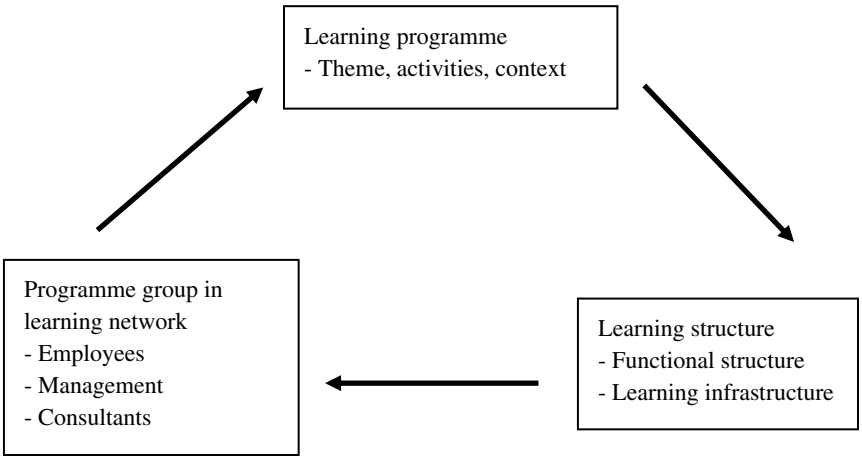


**Fig. 11.4** Learning-programme creation

The programme group is part of the learning network and holds its own position (e.g., 'Customer Focus Implementation Support Group,' 'Treatment Effectiveness Professional Development Group'). The individual members of the programme group hold their own position in the learning network as well, which is usually one of the reasons why they were invited to join the programme group in the first place. The programme group needs to find its position in the learning network and build relationships with other actors, for instance, external training institutes and content experts. The internal structure of the programme group, for example, the responsibilities and relationships among the members, is also important. Just as crucial as the structural aspects, however, are the beliefs, knowledge, and skills of the actors in and around the programme group, as it tries to reach a (more or less) shared problem definition and approach.

The programme group takes into account the tasks and responsibilities of the actors involved as well as the usual procedures in place for developing learning programmes. Another relevant consideration is the current learning infrastructure,

which offers them didactic measures, existing programmes, e-learning facilities, tests, and so forth. They may try to change the existing learning structure so as to be able to function well during the learning programme.

### *11.4.3 Four Ideal Types of Learning Network*

The structure of learning networks can be described in terms of three dimensions similar to those delineating the four work-network structures (cf. Figure 11.3), which together form a three-dimensional space. The space shows how differently learning networks may be structured, as they can differ on each particular dimension. The variety of learning networks is illustrated below (see Figure 11.5) by a description of the four ideal types at the end of each dimension. This subsection will also hypothesise which ideal types of learning programme are likely to be created in each learning network, as indicated in Table 11.2. The left-hand column of Table 11.2 presents the characteristics of four types of learning-network structure, each one in a separate box. The right-hand column contains the characteristics of the four corresponding learning programmes, each one also in a separate box. The arrows in Table 11.2 indicate that four specific relationships are expected between particular learning-network structures and learning programmes.

**Table 11.2** Relationships expected between learning-network structures and learning programmes

| Structure of the Learning Network | | Learning Programme |
|---|---|---|
| Loosely coupled structure<br>Entrepreneurial learning climate | ⟷ | Loosely coupled programme<br>Individual based |
| Vertical structure<br>Controlling learning climate | ⟷ | Centrally regulated programme<br>Competence based |
| Horizontal structure<br>Organic learning climate | ⟷ | Organic programme<br>Problem based |
| External structure<br>Professional learning climate | ⟷ | Collegial programme<br>Method based |

#### 11.4.3.1 The Individual Learning Programme Based in a Loosely Coupled Learning Network

The relations among the actors in the loosely coupled learning network are characterised by individual responsibility supplemented by exchange and negotiation. The learning climate emphasises entrepreneurship and creating learning programmes is the responsibility of individual learners, who will agree on certain 'contracts' with one another. Employees set off on their own learning paths and use the opportunities offered by the organisation as they go; opportunities that may be negotiated (cf. Clardy, 2000; Tough, 2003; Roberson & Merriam, 2005). They will organise learning programmes together with their colleagues, as long as everyone's input is equal or some form of exchange is in place. For example, one employee may agree to provide a colleague with expert input if the latter is willing to counsel the former employee towards solving another difficult problem.

It is likely for individual-based learning programmes to come into being in organisations with loosely coupled work and learning networks, characterised by an entrepreneurial learning climate. Employees in these organisations are expected to be self-directed and to feel responsible for their own work and further development. Usually a coordinator in the organisation takes the initiative to form a programme group willing to learn about a particular theme. The coordinator tries to get a number of employees interested in the topic through informal contacts and snowball strategies. The employees each have their own interests in the topic, however they expect to learn most from each other. They are also sensitive to the learning infrastructure and facilities at their disposal.

At this stage the participants have only limited ideas about other possible programme-group members. The learning theme is still very broad. Participants need to develop the topic by themselves using each other's experiences. Only limited collective decisions are made about learning contexts and learning activities, as the needs and preferences of the individual participants are taken into account as much as possible. It is likely that subgroups will emerge consisting of employees who expect to learn more from their other subgroup members than from others in the larger group, or who join a subgroup for pragmatic reasons. Evaluation will not be very systematic. The coordinator will justify the use of facilities to management and the individual participants will monitor the extent to which they learn enough to warrant further participation in the programme group.

#### 11.4.3.2 The Centralised Learning Programme Based in a Vertical Learning Network

The core of the vertical learning-network structure is based in the technostructure of the organisation, often in dedicated HRD departments. This type is likely to be found in bureaucratic organisations with an extensive division of tasks. An important characteristic of this learning network is that *planning* forms the basis of

training course design and delivery (cf. Robinson & Robinson, 1989; Jacobs & Jones, 1995). Dedicated HRD professionals hold an important position in this network, as they plan and coordinate the learning programmes and often are involved in delivery as well. Other experts and managers (as sponsors) are also involved in preparation, delivery, and evaluation. The learning programmes are regulated and competence based. The learning climate emphasises control. Careful planning based on policy intentions and task analyses is deemed very important in this network. Programme designers and experts engage in these activities extensively before delivery, which also takes into account the needs and possibilities of the learning employees.

Organisations offering this type of learning programme will probably have a centrally coordinated learning network and a tightly regulated learning climate. The vertical dimension is strongly dominant here. The programme in its ideal-typical extreme is designed, delivered, and evaluated according to fixed plans, as described in the traditional handbooks. It is often a line manager or HRD department that takes the initiative, as they perceive problems in the primary (work) process or in the labour market and expect a learning programme to contribute to the solution. A consultant will then be assigned to design a learning programme for a group of employees. The consultant will analyse the problem with the actor who provided the assignment and subsequently devise a plan for approval. Intended participants, their supervisors, and content experts may be consulted for elaboration of the plan, which will also be informed by the consultant's learning expertise and methods as far as budget and responsibilities allow. Examples of such methods include investigating the learning styles of the participants, assessing their prior knowledge, taking transfer-enhancing measures, incorporating workplace training exercises, arranging for coaching and mentoring by supervisors and direct colleagues, and conducting customisation efforts targeted at the individual learning paths and needs of the participants.

#### 11.4.3.3 The Organic Learning Programme Based in a Horizontal Learning Network

Work and learning are integrated in teams in this network. Problem finding, problem analysis, and problem reduction are important mechanisms to encourage learning in teams. A process consultant usually helps teams solve complex work problems. The different expertise and experience of the team members are employed to come up with new creative ideas or solutions. If supervisors are involved, they are engaged on an egalitarian basis with the learners or they may take on the role of consultant. Learning activities are undertaken while progress is being made and new insights are allowed to develop along the way (cf. Argyris & Schön, 1996; Wenger, 1998). The team itself takes the initiative to bring in other experts or advisers. The learning climate is organic.

This programme is expected to occur in organisations with team-based work arrangements and an organic learning network, where employees solve complex problems with clients in teams. The programmes are usually also initiated in those teams, when they cannot solve their problems with the normal procedures. In this scenario, the team decides to put more systematic effort into solving the problem and may invite a process consultant to help them do so. Reflection is the dominant learning activity in this type of programme, leading to the definition of a number of themes for subgroups to work on. What is characteristic here is the joint analysis and mutual learning process among the team members. This team-based learning about a jointly defined problem is what differentiates this type of programme from individual-based programmes. The horizontal dimension of the learning network is much stronger here.

#### 11.4.3.4 The Collegial Learning Programme Based in an External Learning Network

This network comes into being when professionals from different organisations associate with each other, which is a precondition for the creation of professions. Professionals need to acquire and keep up to date with the necessary knowledge, skills, and beliefs that make up their profession (cf. Schön, 1983; Daley, 1999). The professional association plays a central role in this network, as it tries to control the research institutes, the development laboratories, the method-development centres, the continuing professional education, the quality control, and the career policies within the professional field. Professionals working in professional organisations (e.g., universities, hospitals, law firms, consultancy agencies) are thus heavily influenced by their profession and operate in a collegial learning climate.

Scientific research usually triggers the development of new techniques and methods (e.g., a new commercial MRI scanner based on years of laboratory studies). Professional development institutes, on this basis, provide the professionals (e.g., medical doctors who use MRI scans) with training courses, which the latter apply in their own work repertoire. The professionals are thus inspired by innovative insights and new methods developed in the professional field outside their own organisation. Participants together with their external colleagues get acquainted with the professional body of knowledge, insights, norms, and codes valid within their discipline. Their everyday work is adapted to new scientific techniques by their participation in continuous professional development activities offered by dedicated institutes. Highly characteristic of this external learning-network structure is that professionals from several organisations create learning paths together. The other three learning-network types are usually restricted to actors from one and the same organisation.

It is likely that this type of programme occurs in traditional professional organisations, with highly specialised experts and a strong orientation on the

profession and external colleagues. The idea to start an external, collegial learning programme may be based on the professional field proposing new work methods. It may also be due to a specific problem that emerged in an organisation, which several professionals are interested in analysing and resolving together with external colleagues. The driving forces here are new methods and specialised topics. The relations within the programme group are determined largely by the content expertise and positions of the actors in the profession. Studying literature and cases are favourite learning activities. Just as in individual learning programmes, developing individual knowledge, skills, and values for work is very important. In collegial learning programmes, however, a clearly delineated learning theme and the role of the profession are crucial, which is why the external dimension is emphasised.

At the heart of Figure 11.5 where all three dimensions come together, the loosely coupled learning network can be found, characterised by an entrepreneurial learning climate. Moving up the vertical dimension, at the top of Figure 11.5 the vertical learning network can be placed, which has a controlling learning climate. Following the horizontal dimension, at the right-hand side of Figure 11.5 the horizontal learning network can be placed, which is linked to an organic learning climate. And going along the external dimension, at the left-hand side of Figure 11.5 the external learning network can be found, characterised by a professional learning climate.

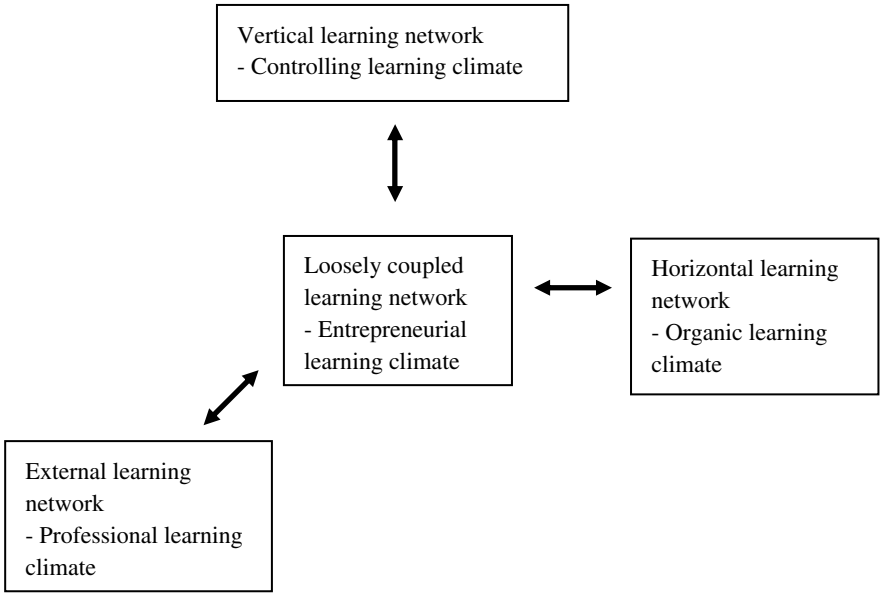


**Fig. 11.5** Four ideal-typical learning-network structures and their climates

This section has shown that the learning-network theory expects certain relationships to occur between the learning network of an organisation and the learning programmes created by actors. Table 11.2 contains an overview of these expected relationships.

### *11.4.4 The Importance of Actors' Action Theories*

The above descriptions of four ideal-typical learning networks and learning programmes are based on the network structure and the learning climate. They intend to show how much learning networks can differ. Up to this point in the argument we have not, however, taken into account the action theories of the actors (i.e., their values, norms, knowledge, and skills; cf. Argyris & Schön, 1996). So far, we have more or less assumed that actors engage in learning programmes in accordance with the network structure and the learning climate. Of course, it is possible that their action theories show similarities with the current climate and structures (as Figure 11.1 suggested). Fortunately, actors also have opportunities to place their own emphases on their organising actions, deviating from the current network. Moreover, actors will not always act in accordance with their action theories, as the latter offer *opportunities* for interpretation and action rather than prescribing or controlling actors' interpretations and actions. The main reason why actions deviate from action theories, however, is that different actors probably use different action theories. Managers, consultants, employees, and external actors each have their own action theories and the desire to place their own emphases on the current learning network. The interactions between the various actors will ultimately determine to what extent their action theories become embedded in the network structure and climate of the organisation.

## 11.5 How do Employees create their Individual Learning Paths?

The previous two sections have demonstrated the various learning-relevant experiences that actors can gain from organising processes created in two types of social network, namely, the work network that gives rise to the primary (work) process in the organisation, and the learning network that organises the crucial HRD process of learning-programme creation. The chapter will now return to the question of how employees organise their individual learning paths out of the many learning-relevant experiences in these processes and associated social networks. In other words, how do individual employees manage to make sense of the multitude of learning-relevant experiences in order to further their own professional development?

A learning path was defined as a set of learning activities that are both coherent as a whole and meaningful to the employee. Employees can organise their learning paths in many different ways. At the core, however, learning-path creation is about an employee recognising and creating learning activities and experiences on the basis of a particular learning idea. Employees use the existing opportunities available through work and learning programmes to gain experiences that can bring about meaningful learning to them. They can also create new opportunities for learning-relevant experiences to be integrated in their learning path.

Central to the notion of a learning path are the work experiences of employees. They will probably also take part in ad-hoc learning activities, such as workshops, training courses, or coaching sessions. Important mechanisms for learning from work are, first, reducing the problems encountered in the work process and, second, improving the quality of services or products. Additionally, employees can learn by participating in the creation of learning programmes, as Figure 11.3 indicated. The latter is more systematic than the former and has the advantage that employees not only learn from what they encounter during work but can influence learning programmes so as to match their subsequent experiences with the learning path they have chosen.

A learning path emerges as individual employees make sense of the many learning opportunities on offer. This, in turn, can guide further learning activities that they undertake (e.g., studying a book or participating in a coaching session). Employees can create and bring order to their learning path along various 'lines.' These lines are referred to as learning ideas, usually problems or themes relevant to the employee. Participation in thematic learning activities will often lead employees to 'recall' experiences from the past that they deem relevant to their current learning path. They interpret and redefine their past experiences so as to fit with their current activities. In other words, when employees engage in intentional learning activities (e.g., self-study, training course), they usually think back to past experiences. They connect the latter to their current activities and, by so doing, integrate them in their learning path. Many trainers and educators also encourage this retrospective construction process (Yorks, 2005; O'Neil & Marsick, 2007). The creation of a learning path will also usually consist of learning activities more explicitly organised by employees themselves with a view to learning more about a certain topic improving a certain skill. Mostly, employees will alternate between integrating past experiences into their learning path and undertaking new activities to bring their learning path forward.

Employees can also participate in learning programmes offered by educators (e.g., a professional development course or a supporting scheme to an organisational innovation). In participating in such programmes, employees usually determine which parts of the course are most relevant to their own learning path. Certain parts of existing programmes are more interesting to employees because they fit the learning paths that they are creating. The educator will notice this when employees drop certain parts of the programme or ask for a

more detailed elaboration of a certain topic. The extent to which the educator is able and willing to make such adaptations influences the benefit gained by individual employees with a view to furthering their learning path.

## 11.6 Learning, Networks, Structure, and Agency

This chapter set out to investigate the question of how social networks in organisations contribute to employee learning. Based on the learning-network theory (Van der Krogt, 1998, 2007), which views organisations as networks and actors (cf. Sambrook, 2007; Garavan et al., 2007), we distinguished between two specific actor networks and corresponding processes especially relevant to individual learning. First, we considered the work network, in which employees carry out and improve their daily work, which may lead to learning; and second, we addressed the learning network, where employees participate in specifically designed programmes in order to learn. It was argued that their learning-relevant experiences gained in both processes can lead employees to create their own learning paths, that is, to make sense of the many learning-relevant experiences available with a view to bringing coherence and meaning to them. Individual learning paths are both employee-driven and affected by their work experiences and participation in learning programmes. These work experiences and learning programmes are, in turn, informed to a considerable extent by the particular social (work and learning) networks in which employees participate.

Unlike many other network approaches, the learning-network theory refrains from seeing 'the' organisation as 'a' network. Instead, it conceives of dynamic and diverse actor networks in an organisation, each characterised by specific structural arrangements. The work network has different actor positions, power relations, and dynamics than the learning network, and both differ from the personnel allocation or HRM network (not discussed here, see Van der Krogt, 2007). Actors create these various networks and they then have to operate in what they have created. The focus here is on the various positions that employees have to negotiate in several different networks at the same time. The problems they experience in organising their work, learning, and careers thus become surprisingly clear, as do the potential roles of managers and consultants in helping them cope. For instance, think of an employee of a law firm who was trained as a lawyer but had to resort to a relatively low-profile job giving legal advice to one-off clients on the periphery of the firm. This employee really wants to become partner and needs the HRM (especially, career management) network, in which she has a weak position, to provide the necessary learning-relevant experiences. The work network does not give her the right experiences to convince the firm's partners to promote her to the next higher level. This employee will probably need the learning network (partially located outside the firm, in continuing legal education) to gain a better qualification in order to get promoted. If she is lucky,

or a good negotiator, she can get her supervisor or a more experienced partner in the firm to mentor her, so that she can more easily integrate the learning-relevant experiences gained in the work, learning, and HRM networks into a coherent and meaningful learning path leading to her desired promotion.

One important question that needs to be answered by further research in this area is how the various networks created by actors are related. For example, is an organisation with individual work more likely to have a loosely coupled than another type of learning network, as the learning-network theory would expect? Similar relationships are assumed between bureaucratic work and a vertical learning network, between organic work and a horizontal learning network, and between professional work and an external learning network. Clarifying these relationships can help employees better negotiate their positions in the various networks and thus optimise their learning paths.

Another characteristic of the learning-network theory that differentiates it from other network approaches is its position in the structure – agency debate. In his theory of structuration, Giddens (1984) distinguishes between structure (contextual conditions) and agency (actions undertaken by actors). He demonstrates how structures come into being over time as a result of agency and how, at the same time, agency is limited by existing structures. Although the tensions between these two principles are often mentioned in literature, it usually remains unclear how exactly actors can and cannot operate in the context of network structures. As we have illustrated in this study, the concept of an individual learning path created in the context of work and learning networks offers opportunities to provide more clarity about that question. Employees can take many opportunities to gain learning-relevant experiences (agency) from social networks, however which experiences and how many exactly depends on the types of networks in place (structure). These particular networks have come about, in the first instance, as a result of the actions of various actors over time. The concept of a learning path demonstrates how agency is both enabled and limited by particular types of structure (cf. Lin, 2001).

Structures in an organisation, such as its social network, are often presented as inherently positive in their capacity to facilitate individual learning, work satisfaction, organisational commitment, and so forth. As far as learning is concerned, however, this chapter has argued that social networks can also restrict employees to a considerable extent. Depending on the type of network and organisation and on the position of the individual employees therein, they may feel supported or inhibited to learn what they deem valuable to their work and their careers. Structure and agency should therefore be regarded in conjunction with one another and in terms of their meaningfulness to employees.

Important questions for further research in this area are how exactly employees create learning paths in the context of various social networks and what factors determine whether these structures support or inhibit them to do so. The learning-network theory offers a framework with which such research questions may be answered. It suggests that employees will be better able to create meaningful

learning paths if they can exert a substantial influence on the primary work and learning-programme creation processes in which they participate. This influence goes beyond having access to relevant information and communication channels; it means having enough power to be able to establish a better fit between work and learning programmes, on the one hand, and their individual learning paths and professional development, on the other hand.

In terms of practical implications, this chapter demonstrates the relevance to organisational actors of various social networks for the individual learning paths of employees. First, employees themselves who are interested in participating more actively in creating their own learning paths can use the framework presented in this chapter to reflect on the types of learning path they have created thus far and on other types available. They can also diagnose the types of work network and learning network in which they participate and see to what extent their learning paths are likely to correspond with existing network structures. This will give them an indication of the amount of energy to be invested in creating these learning paths – more energy is probably needed as correspondence decreases.

Second, supervisors and managers who are serious about fostering employee learning can use the framework to create a better fitting social environment for learning. Based on a diagnosis of the learning paths created or desired by their employees, managers can draw ideas from the framework about the types of work assignments and social support most conducive to the intended learning processes. They may want to call in the help of an HRD professional to facilitate this attempt.

Third, HRD professionals can use the framework to better attune the learning programmes that they develop to the participants' individual learning paths, which are strongly influenced by the work network in the first place. In general, the position of HRD professionals in the relevant social networks is weak, possibly with the exception of their influence on the learning network of the bureaucratic organisation. Managers and employees usually hold stronger positions and have more opportunities to exercise power and influence. The impact of HRD professionals on the work network (and the HRM network) is modest, to say the least, and can be attained only through developing strong relationships with powerful actors in those networks, that is, with employees, supervisors, (HR) managers, and professional associations (including their own). They can, however, help these actors make sense of the relationship between social networks and learning paths, as the former will not usually have the expertise and energy to do so themselves.

## References

Argyris, C., & Schön, D. (1996). *Organisational learning II.* Reading, MA: Addison-Wesley.

Billett, S. (2001). *Learning in the workplace: Strategies for effective practice.* Crows Nest: Allen & Unwin.

Broad, M. L., & Newstrom, J. W. (1992). *Transfer of training: Action-packed strategies to ensure high pay-off from training investments.* San Francisco: Addison-Wesley.

Clardy, A. (2000). Learning on their own: Vocationally oriented self-directed learning projects. *Human Resource Development Quarterly, 11*(2), 105-125.

Daley, B. J. (1999). Novice to expert: An exploration of how professionals learn. *Adult Education Quarterly, 49*(4), 133-147.

Ellström, P. E. (2001). Integrating learning and work: Problems and prospects. *Human Resource Development Quarterly, 12*(4), 421-435.

Fenwick, T. J. (2004). Towards a critical HRD. *Adult Education Quarterly, 54*(3), 174-192.

Garavan, T. N., Gubbins, C., Hogan, C., & Woodlock, M. (2007). Transitioning to a strategically aligned HRD function: The case of a health services organisation. In S. Sambrook & J. Stewart (Eds.), *Human resource development in the public sector: The case of health and social care* (pp. 40-79). London: Routledge.

Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration.* Berkeley, CA: University of California Press.

Jacobs, R. L., & Jones, M. J. (1995). *Structured on-the-job training: Unleashing employee expertise in the workplace.* San Francisco: Berrett-Koehler.

Koslowski, S. W. J., & Salas, E. (1997). A multilevel organisational systems approach to the implementation and transfer of training. In J. K. Ford (Ed.), *Improving training effectiveness in work organisations* (pp. 247-287). Mahwah, NJ: Lawrence Erlbaum.

Lin, N. (2001). *Social capital: A theory of social structure and action.* Cambridge: Cambridge University Press.

Mintzberg, H. (1989). *Mintzberg on management: Inside our strange world of organisations.* New York: Free Press.

Mintzberg, H., Ahlstrand, B., & Lampel, J. (1998). *Strategy safari: A guided tour through the wilds of strategic management.* New York: Free Press.

O'Neil, J., & Marsick, V. J. (2007). *Understanding action learning.* New York: AMACOM.

Poell, R. F. (2005). HRD beyond what HRD practitioners do: A framework for furthering multiple learning processes in work organisations. In C. Elliott & S. Turnbull (Eds.), *Critical thinking in human resource development* (pp. 85-95). London: Routledge.

Roberson, D. N., & Merriam, S. B. (2005). The self-directed learning process of older, rural adults. *Adult Education Quarterly, 55*(4), 269-287.

Robinson, D. G., & Robinson, J. C. (1989). *Training for impact: How to link training to business needs and measure the results.* San Francisco: Jossey-Bass.

Sambrook, S. (2007). Discourses of HRD in the NHS. In S. Sambrook & J. Stewart (Eds.), *Human resource development in the public sector: The case of health and social care* (pp. 15-39). London: Routledge.

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action.* London: Temple Smith.

Tough, A. (2003). Episodes and learning projects. In P. Jarvis & C. Grofin (Eds.), *Adult and continuing education: Major themes in education* (Vol. 2, pp. 35-44). London: Routledge.

Van der Krogt, F. J. (1998). Learning network theory: The tension between learning systems and work systems in organisations. *Human Resource Development Quarterly*, 9(2), 157-178.

Van der Krogt, F. J. (2007). *Organiseren van leerwegen: Strategieën van werknemers, managers en leeradviseurs in dienstverlenende organisaties* [Organizing learning paths: Strategies of workers, managers, and consultants in service organisations]. Rotterdam, Netherlands: Performa.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity.* Cambridge, UK: Cambridge University Press.

Yorks, L. (2005). *Strategic human resource development.* Mason, OH: Thomson South-Western.

# Chapter 12
# Apprenticeships: What happens in On-the-Job Training (OJT)?

**Helena Worthen and Mark Berchman**

University of Illinois Urbana-Champaign, USA

**Abstract** Apprenticeship programmes, designed as practice-based on-the-job (OJT) learning with some classroom supplement, are key to producing high-skill workforces in the American unionised building trades. This study, which asks how learning happens in OJT, is based on interviews and focus groups with apprentices and journeymen in building trades in the Chicago, US area. Unlike classroom learning, OJT requires apprentices to construct their own learning opportunities. The overall participation structure of the community of practice is organised by the economic logic of the industry which focuses on efficiency and the bottom line, not learning, yet it encourages cross-generational cooperation by linking the retirement security of journeymen to the high skills of rising apprentices. Conditions for good apprenticeship learning as proposed by Lave and Wenger (1991), namely legitimacy, transparency and opportunities to do real work, also apply to learning about the community of practice itself.

## 12.1 Apprenticeship and Learning

This chapter examines practice-based learning as it occurs in on-the-job training in formal unionised construction apprenticeship programmes in the United States, based on data from such programmes in the Chicago, Illinois area. We are interested in how apprentices learn during their field experience, because this is not widely discussed in the literature. Much of what has been written about (construction) apprenticeships focuses on either their long history (Clarke, 1999; Elbaum & Singh, 1995; Munck, 2007), or their role in the construction labour market (Marshall, Franklin, & Glover 1973; McKernan, 1994), often with regard to issues of gender or racial discrimination (Berik & Bilginsoy, 2000; Byrd, 1999; Eisenberg, 1998; Frymer, 2003; Hill, 1974; Illinois Department of Labor, 2001; Worthen & Haynes, 2009). Elsewhere, the term 'apprenticeship' is used metaphorically to explore an alternative model to school learning (Guile & Young, 1999; Lave, 1991; Rogoff, 1990). By studying learning in formal apprenticeship programmes directly, we take a different approach, in order to understand and discuss how apprentices' learning proceeds through practice.

The framework we use to explore that learning is derived from Lave and Wenger (1991), and Lave (1991, 1996). They identify two characteristics of

S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2_12, 

apprenticeship learning: first, that it is a form of learning in which very little direct teaching takes place, and second, that it is conceptually linked to the notion of a community of practice and is in fact the process by which the community of practice replicates itself from one generation to the next. Their research studied 'apprenticeship learning' in contexts that were sufficiently unlike each other that they could abstract a description of how and when it succeeds or fails. For example: how tailors who work in the marketplace in Liberia learn to make garments; how girls in the Yucatan learn how to become midwives; how new initiates into Alcoholics Anonymous learn how to become experienced mentors; how inexperienced meatcutters learn how to become skilled butchers; and how quartermasters in the Navy become experts. Not all these examples showed successful apprenticeship learning. For example, in the case of the meatcutters, the researchers found apprentices treated as unskilled labour 'in ways that deny them access to activities in the arenas of mature practice' (Lave & Wenger, 1991, p.76).

They also indicated the conditions under which 'apprenticeship learning' is successful. These can be summarised as: (i) the path from novice to adept is acknowledged to be legitimate by the leaders of the community of practice; (ii) the entire path is transparent, not secret, in the sense that it is known by or visible to the entire community; and (iii) the work that is done by the novice in the course of learning is real work that contributes to the overall productive capacity of the community of practice.

In this chapter, we ask if 'apprenticeship learning' happens in formal building trades apprenticeship programmes and, if so, how and where. We focus on the on-the-job training (OJT), that is, the non-classroom part of apprenticeships. This is supposed to be the experience that turns a raw novice into a skilled worker. We compare what we see with Lave and Wenger's (1991) proposed conditions under which apprenticeship learning can take place. We also make a point of noting the centrality of the economic relationships, both informal and contractual, that shape the participation structure of this learning, and argue that these contracts, ultimately, are what justify the cooperation of experienced workers in developing the next generation of skilled workers.

We will show that during OJT, apprentice learning comes about in three ways. First, apprentices learn when they get to do things on the worksite with tools and materials; second, they learn when they act with initiative because, if all goes well, they are rewarded by journeymen[18] with attention and opportunities to do different and more difficult kinds of work; and third, they learn by being part of a community of practice which is in turn shaped by the logic of the work. All of these, potentially, are subject to the conditions offered by Lave and Wenger (1991): legitimacy, transparency, and the possibility of contributing real work.

[18] There is no alternative to the gendered term 'journeyman.' The term 'JW' means 'journeyman wireman,' not 'journey worker.' Some women report that they are proud to earn the status of journeyman. Others say that they ignore it.

Of the three aspects, we argue that the actuality of the community of practice is paramount in shaping learning, in so far as it sets the boundaries of the other two aspects. These three aspects are now discussed following a consideration of the institutional history that underpins this model of learning through apprenticeship.

### *12.1.1 Institutional History of Apprenticeship Programmes in the US*

As a structure for participation in learning through and for work, the apprenticeship model dates back to the earliest instances of socially organised learning. Today, apprenticeships are used to transmit contemporary technical knowledge often in highly competitive industries. There are in the US some 800 apprenticeable occupations, although the most familiar ones are in the construction trades. Formal apprenticeships in the construction trades in the US are registered with the Office of Apprenticeship and Training of the Department of Labor under the Fitzgerald Act of 1937. This depression-era law was enacted to 'formulate and promote the furtherance of labour standards necessary to safeguard the welfare of apprentices' (50 Stat. 663; 29 U.S.C.50). The law aimed to remedy abuses of workers, many underage, who might be kept in an apprenticeship relationship for long periods of time without either reasonable pay or actual training. It requires that: i) apprentices be at least 16 years old, ii) that there be a 'full and fair' opportunity to apply for apprenticeships, iii) that there be a 'schedule of work processes in which an apprentice is to receive training and experience on the job,' and iv) there be an 'increasing schedule of wages.' The law allows for states to establish their own plans as an alternative; some 22 have done so. In contrast, Illinois operates under the federal law.

In the last two decades, pressures on the unionised construction trades have produced changes in the way apprenticeship programmes are organised. The national percent of workers in construction represented by unions has dropped from 35% (Allen, 1994) to 16.2% in 2008 (Bureau of Labor Statistics, 2008) and in some states, unionised construction work now hardly exists. In the Chicago area, most of the urban commercial construction is union based, yet about half the residential construction is non-union. Outside of Chicago in the Midwest, the percent of union construction declines rapidly. Hence, where apprentices seek to learn will shape the particular model of apprenticeship available to them. Moreover, construction unions depend on the survival of union contractors who have signed onto one of any number of negotiated agreements. These master agreements, which in Chicago may each have several hundred signatory contractors, not only set financial terms but also define work rules which, for example, determine how many apprentices per journeyman are allowed on a job.

Construction unions have adapted to competition from non-union contractors by increasingly emphasising high skills and consequently efficiency and

productivity (Allen, 1988) through their training, including the use of the most advanced technology. The strategy is to ensure that only trades workers who have been through a formal union apprenticeship programme will have the high skills, multiple specialisations, and speed to accomplish the exacting work of the most ambitious construction projects. Controlling the skills means controlling the high-tech segment of the labour market. This strategy contrasts with one that focuses on controlling a large market share of less-skilled workers. In 2008, a revision of the Fitzgerald Act, the Registered Apprentice Act, was passed which allows for distance learning and cross-registration of programmes, and encourages integration between private apprenticeship programmes and the public workforce investment system. This regulatory broadening of the role of apprenticeship programmes is a reflection of the fact that control of any labour market is inevitably contested.

Apprenticeship programmes in the unionised trades are 'joint' labour-management programmes run by joint apprenticeship training committees (JATCs). They are funded through a share of member dues money and employer contributions that go into a separate fund (called a Taft-Hartley Fund) used exclusively for the apprenticeship programme. While the instructors in these programmes are almost always union journeymen, these programmes are seen as a resource for both labour and management, not as part of the union side of a negotiating contest. This is an important difference between building trades unions and, for example, manufacturing, service industry, or public sector unions. For these latter kinds of unions, the struggle is between labour and management over how to divide the 'pie' of the total revenue of the enterprise. For building trades unions, the struggle is between the unionised part of the industry and the non-union part, for market share. This logic permeates the entire community of practice of a trade, from apprentice through apprenticeship programme, union, and contractor.

The intensification of emphasis on training has had visible consequences. One is the increase in qualifications for apprenticeship instructors who are now, in many unions, earning Bachelors degrees. Another is the creation of new programmes. For example, the Laborers Union (LIUNA), many of whose members work on road crews or do landscaping, did not have access to an apprenticeship programme. Recently, the union has established a 2-year apprenticeship programme. A third is the linkages between apprenticeship programmes and community colleges, which mean that high school graduates no longer face a 'forced choice' between a well-paying unionised job in the building trades or college, since the apprenticeship classes can be counted towards an Associate of Science (AS) degree. With the addition of a few general education classes, an apprentice who has graduated will have earned an AS, which at some 4-year institutions will count toward a 4-year college degree.

One important difference among apprenticeship programmes is that some unions (e.g. Plumbers, Electricians) provide OJT assignments for apprentices while others (e.g. Laborers, Carpenters) let apprentices solicit their own OJT.

Construction work is by nature temporary; when the work is done, the job is over. Some unions have hiring halls and take an active role in reassigning a journeyman who has been on a job that is completed to a new job. However, other unions expect members to find their own work. A union that provides OJT assignments for its apprentices makes a commitment that all the apprentices who are accepted into their programme will be assigned enough work during their apprenticeship to complete the required 2,000 to 8,000 hours of OJT. Such unions have a different relationship to their apprentices than a union that expects apprentices to find their own work and does not make a commitment to finding assignments for them. For example, a union that provides training assignments is likely to accept fewer apprentices, to make sure that the there is a rough match between the number of jobs available and the number of apprentices and workers who are looking for work. A union that does not assume this responsibility is not bound to limit the number of apprentices going through its training programme, since once they are out in the field, their ability to find work is their own responsibility. There are, of course, many regional variations as each local union devises its own job strategy.

Historically, the operation of training assignment plans, hiring halls, and all versions of them has been a site of internal union disputes, as issues of favoritism, seniority, racism, and sexism have come into play in making referrals to jobs, reports of which form bibliographies on discrimination. Lave and Wenger might recognise this as what they call 'the contradiction between continuity and displacement' (1991, p. 114). They are certainly instances of failure of legitimacy or transparency but are, in our view, characteristics of a particular community of practice of a specific apprenticeship programme. We will give examples of these in greater detail in our section on what can go wrong in OJT.

## 12.2 Methodology of this Study

Our description of what goes on in OJT was developed through interviews and focus groups with journeymen, apprenticeship instructors, and apprentices who are members of International Brotherhood of Electrical Workers (IBEW), Heat and Frost Insulators, United Brotherhood of Carpenters (UBC), and United Association or Plumbers (UA) in Chicago and several other towns in Illinois. In addition, one of the authors is an instructor in the electricians' apprenticeship programme and a journeyman himself. The other author has worked for 10 years with a pre-apprenticeship programme that prepared applicants for entry into various construction trades unions and has interviewed journeymen and apprenticeship coordinators from other trades in connection with this work. Each interview began with the question, 'How do people learn in on-the-job training?' We often included an explanation of what is meant by a 'community of practice' as proposed by Lave and Wenger (1991). The quotations from apprentices and journeymen in this chapter are drawn from transcripts of taped focus groups and

individual interviews. Some are composites and those are indicated as such. This approach is intended to capture the points of view of teachers and learners reflecting on their own experience prompted by a succession of questions by the interviewers.

## 12.3 The Physical Context of the Classroom as compared to the Field

Lave and Wenger (1991) warn that 'many vocational education and union-based "apprenticeship" programmes implicitly reject an apprenticeship model and strive to approximate the didactic mode of schooling...' (p. 77). We did not find this to be the case in any instance. However, we found that typically OJT alternates with RTI (Related Technical Instruction) which does take place in a classroom. For this reason, we will start by describing the classroom context and then turn to field experience. The two are supposed to be complementary and the learning in one context is supposed to both transfer to and be reinforced in the other context. Thus the relationship between learning in the field and learning in a classroom raises issues of 'boundary-crossing' (Tuomi-Grohn & Engestrom, 2003) and how learning in one context transfers to another, when 'transmission' becomes 'practice,' when opportunities to learn have to be seized, not received, and when the 'curriculum' is adventitious, not hierarchical.

For the electricians in Chicago's IBEW Local 134, for example, the first year of an apprenticeship includes 11 weeks of classroom-based activities and the next 2 years include 9 weeks each, with the rest being activities in the field, followed by one further week in the classroom for the 4th- and 5th-year apprentices. The classrooms in the apprenticeship school typically hold 20 or 25 students, and have desks, tables, laboratory benches, computers, banks of electronic equipment, and blackboards or projection systems. Apprentices sit within an arm's reach of each other. Work in the classroom is temporary; it is dismantled after each session. Classroom activities include direct instruction, close supervision of students by journeyman instructors, structured projects, team assignments, homework, grades, and tests. The progress or failure of a student in the classroom can be easily discerned by the instructor. Comparing the classroom experience with OJT, several apprentices explained:

> In the classroom, everything is set up. It's laid out in order. Everything is arranged, connected. It's the ideal situation. If you're pulling wire, you're only pulling one at a time. The wire is on a spindle, it's measured. In the classroom, you don't have to be discovered. The classroom is the foundation from the book standpoint. You see something in the field, you go back in the classroom and 'Now I know why we're doing it that way.' You will never be able to 100% duplicate what is going on out in the field, in the classroom. Out in the field, you don't know what you're going to see. You run into things nobody told you about. It's on a different scale. But it all comes together.

It is easier for an instructor to assess how an apprentice is progressing in the classroom, because the exercises are standardised so that each student can be monitored and compared. The performance of the individual student is not masked by interactions with others. For the student who wants to be recognised for effort or competence, this is a benefit. During OJT, the fact that an apprentice knows something has to be demonstrated in a way that gets the attention of the journeyman who may, as a reward, give him an opportunity to do it.

The economics of the relationship between apprentices and instructor are important. The person teaching in the classroom is being paid to teach, whereas the journeyman in the field is being paid to get a construction job done, not to teach. To use the concept of activity system (a complex interaction of purposeful activity mediated by tools and language, as described by Engestrom, 1987), the activity systems of the classroom and the field are different and, therefore, the roles taken by participants in each are distinct.

When the apprentice crosses the border into the field the learning acquired 'in the ideal situation' has to face the reality of the job. The prepared classroom vanishes and is replaced by the complex and often dangerous worksite. The attentive teacher is replaced by the hurrying journeyman whose attention must be captured. The pace of work is no longer fitted to learning, it is fitted to the job. Now Lave and Wenger's (1991) conditions for good learning – legitimacy, transparency, and the opportunity to contribute real work – are tested.

## 12.4 On the Job: The Worksite itself as Resource for Learning

With the transition into the field, the scale of the apprentice's experience expands immeasurably. The scale of the job in terms of acres, height, miles, square feet, days, months, or years, and geography shapes the resources for learning. One interviewee, an instructor, used the metaphor of a 'keyhole.' In the classroom, the apprentice sees the work as if through a keyhole. In the field, the door opens. The apprentices entering a worksite now have to find their own way into work that is useful. Grasseni (2007), who studied big-game hunting, cattle breeding, and surgery (among other kinds of work), describes how a novice learning each kind of work develops 'skilled vision,' a developed skill of perception that combines recognising, understanding, and knowing how to act upon a 'landscape of practice.' Apprentices who shift from looking through a keyhole into entering the complex, interactive landscape of a worksite similarly have to learn how to 'read' what they are seeing and quickly find a way to participate.

Work in the field is permanent; mistakes last, but so do displays of skill: workers take pride in walking past a building and saying, 'I worked on that.' The worksite leaves a record of itself as it progresses. The effect of climate and use on the edifice over the years can be seen and learned from. The most frequently mentioned difference between the air-conditioned classroom and the field is the

weather; one of the things that is learned in the field is how to survive extreme weather. Construction work takes place summer and winter; the heat on top of a rising deck can be extreme, as can be the effect of wind, rain, and snow in winter in an unheated building.

Some apprentices say that the ideal first OJT is to go to a smaller job where a team of 10 or 12 electricians are working consistently. On a job like that, there are opportunities for close observation and continuing relationships with more experienced workers. Another 'ideal' first job is to be assigned to a large job that is just starting, and stay with it all the way through. However, an apprentice can be sent wherever a worker with a specific level of skill is needed, and what they learn and how is a matter of opportunity and luck. This pathway is in many ways inconsistent with the smooth progression of an apprenticeship experience that Lave and Wenger (1991) reported from the Angolan tailors' study, and more fraught with the discontinuities identified by Guile and Young (1999). For example, apprentices described working on the construction of a large city hospital, a job big enough that apprentices who did not want to work hard could hide and escape being given work to do. Some jobs are so big that apprentices repeat the same work day after day for months, a situation which may make the apprentice an expert in that particular task, but limits their utility for the rest of the job. Other apprentices said that they liked being left alone to do the same job over and over. This independence allows them to reflect on what they are doing and perfect their technique without being criticised by anyone else.

Apprentices must learn not only how to do their own trade well enough to satisfy the journeymen on the job but also how to interact with the other trade workers. Each trade will have its sequence of tasks that have to get done on time. A big job can present opportunities for an apprentice to informally observe many kinds of work being done. Sometimes multiple trades are trying to stage jobs from the same platform at the same time. A job by one trade that is delayed, causing the delay of the work of other trades, can escalate the cost of the project. An apprentice who gets in the way and slows things down will get corrected or removed from the job. These are all ways in which being on the worksite is itself a learning experience. In addition, the tools and equipment provide learning.

## 12.5 On the Job: Tools and Equipment as Resources for Learning

The tools and equipment themselves mediate learning, or, as Lave and Wenger would put it, are encoded with community practices and play an 'epistemological role of artifacts in the context of the social organization of knowledge' (1991, p. 102). By including as 'tools' everything from forklifts to instruction books to blueprints to hand tools, we distinguish learning from them from the learning that takes place through the relationships with the other workers on the site. As

apprentices get to use and operate tools, they learn by practice and cause-and-effect.

Learning from and about tools starts even before OJT starts. Apprentices may be given a list of tools to buy; the list may lack specifications or brand names. Apprentices may have to learn by trial and error which are the right tools, which ones will last year in and year out. They learn the trade names of the tools, how to carry them, how many different ways they can be used. Using the right tools correctly means getting the job done well and quickly; using them incorrectly may mean damaging a job or injuring oneself or somebody else.

In addition to the tools on the apprentices' tool belt, there are the materials used in the project. Apprentices are likely to be assigned to unload trucks or boxcars and then deliver materials all over the site. During the workday, they are likely to be asked to get certain materials. Through doing this work, they also learn to identify materials, to carry them safely, and to place them so that they can be lifted quickly and installed efficiently. Apprentices also learn the limits of the material: when it breaks or bends, what happens to it when it gets rained on, how high it can be stacked. They learn their own physical limits. This learning often takes place without explanation from the journeymen. An apprentice claimed that he would be told to get a certain material and bring it back to the journeyman, and by then he would have formulated a question in his mind, 'How is he going to use that?'

> You may have no idea what it's for, but you have to get it now. Before, you're wondering what he's going to do with that, how he's going to do that. Then you see him try to start doing it, and the lightbulb turns on and I can start anticipating what he's going to do next.

In this example of learning through practice, not a word is exchanged between apprentice and journeyman. Instead, observation and listening feature strongly as in the kinds of apprenticeships that Lave and Wenger (1991) described earlier.

However, the same interaction can be used to hide a learning opportunity from a novice. One journeyman commented, looking back on his own experience:

> If you're a helper, and you work with two journeymen, they may say, 'Go get me this, go get me that.' You go, and when you come back, they've got some of the stuff done and you don't know how they got it done.

## 12.6 Learning Through Interaction in the Absence of Master-Apprentice Relationships

Although apprentices worked with journeymen, they appeared to work with all the journeymen on a job, not closely or consistently with one journeyman in an apprentice-master relationship. We looked for evidence of such relationships forming in OJT but found very few where 'you work with someone and follow him.' That is, we did not find evidence of stable, intentional 'master-apprentice' relationships developing. On the contrary, in the field, we found that the most

frequently reported learning effort by apprentices was trying to engage a more expert worker for an often brief moment of instruction or explanation.

While this makes sense within the economic logic of a construction worksite, it was unexpected from the perspective of learning theory. The community-of-practice model derives from sociocultural approaches with their roots in Vygotskian learning theory; a fundamental Vygotskian concept is the 'zone of proximal development' (Vygotsky, 1978). The 'zone of proximal development,' sometimes called 'zpd,' refers to the relationship between a less competent and a more competent worker, in which the skills of the more competent worker make it possible for the less competent to outperform what they could do on their own. Apprentices were explicit about how hard it sometimes was to get this attention, extract an explanation or demonstration from a more experienced worker, get an assignment from which they could learn, or even get assigned a location on the worksite from which they could observe the work process and learn the logic of production. This finding also contrasts with the assumption of Sannino, Trognon, and Dessagne (2003) who attempted to understand apprenticeship learning in the field by analysing the speech acts of master-apprentice pairs in the field. In our interviews we found such master–apprentice pairs rare and at best temporary; the majority of learning took place while the apprentice was negotiating his way toward a successful interaction with a journeyman or more expert worker. Another way to express this is that learning within this community of practice requires strong agency of the individual learner (see Billett, 2007). This leads us to comments about the importance of apprenticeship initiative in learning during OJT.

## 12.7 Learning and the 'Bottom Line': Why the Apprentice has to 'Work' the Journeyman

Journeymen are not paid to teach apprentices; they are being paid to get the work done. Any teaching and learning must be secondary to the time pressure of the schedule of the work. The economic relationships are stark. Electricians' pay, not including benefits, is currently about $40 per hour; apprenticeship pay scale starts at about 40% of journeyman pay and goes up in increments over the course of the apprenticeship. While the hourly rate for apprentices is cheaper, in other words, their presence on the job may slow the work down so much that the cost is actually higher.

Sometimes, an apprentice is lucky enough to get a moment of personal attention: One journeyman looking back on his own apprenticeship remembered that his journeyman actually demonstrated how to use a trowel:

> He showed me how to hold my hand, hold a trowel in my hand and what angle to put my hand and how to turn my wrist. He actually touched my hand and told me to hold it this way, and he glided my hand across.

Another mentioned that the rapidity with which technology changes sometimes forces interaction. For example, a new kind of switch might arrive at a worksite that even an experienced journeyman has not seen before. Apprentices report sitting down with journeymen and studying the instructions and blueprints when planning together how to install the switch and make it work.

But few journeymen, according to one woman who was also a director of an apprenticeship programme, voluntarily undertake their roles as teachers. She said, 'They treat their apprentices the way you'd treat your children – "Go get this! Go get that!"' She described a 'don't speak unless you're spoken to' attitude taken by older journeymen. She remembered her own apprenticeship:

> They didn't say a word. You observed. Then you anticipate their next move. Once you could anticipate this next move, they'd know you'd learned what they were doing. But not a word was exchanged.

When they do teach, much of what journeymen do teach apprentices today consists of how to do tasks faster and more efficiently. A journeyman may walk past an apprentice who is doing some work. As an apprentice suggests:

> They'll look at the time it takes you to do something compared with that they can do. They may pull you aside and show you a shortcut. 'Hey, kid, why don't you do it this way?' But they won't slow down what they're doing. They say, 'Do it this way, that's how we do it.' No explanation. Get the motor running, get the job done.

The teaching consists of telling the apprentice how to cut five steps into two, how to minimise taking measurements, and not to worry about the appearance of work that will be concealed under other materials. Another apprentice reported:

> I had just run an overhead trapeze setup to hold several conduits, fifteen feet high. The next one was five feet away. I was climbing down and re-leveling each trapeze. The journeyman, he came back, he showed me another way to set it up, a way I didn't have to get down [and go back up again]…This also compensated for any unevenness in the floor.

Another apprentice gave three examples:

> Sometimes I get my own idea and they say, 'No, you're an apprentice, you have to do what I say.' So I change myself. But maybe they understand you and they give you a chance, they ask me to think about things and make a choice and not just do what they say. Or then they'd let me do something my way just to see that it won't work that way.

The apprentice adapts each time to the type of opportunity the journeyman is willing to provide.

The work of an apprentice is evaluated by journeymen on the job and if it is approved, may be rewarded with more teaching. If it is not approved, the apprentice may be punished by being excluded from other opportunities to learn. Here is where the issue of 'legitimacy' comes up. Does the apprentice have a legitimate right to learn? It depends. The exchange is good work (in the eyes of the journeyman) for opportunities to learn. Apprentices reported how they felt themselves evaluated (another composite quote):

> They do not ask you what your skill level is. They can spot someone who is fresh. They can see if you're a 'mope', a 'hack', a guy who is really not putting everything into his work, a person who takes no pride in his work. They don't tell you 'good job', but they let you know. It's a complement and criticism all in one sitting. I like you and I like the work you're doing and we're going to teach you more. If they don't like you, trust me, you will feel as cold as ice. If you're able to do more complicated work, and people like you or somebody gives you a chance to do it, all of that comes into play. If they don't like you and you could do it, you won't get a chance. You aren't going to be able to do it, because they don't like you.

More formal evaluations of apprentices are completed on paper and submitted to the apprenticeship programme by the journeymen when an apprentice has completed a stretch of work. However, interviewees reported that 'Journeymen are not really honest in doing evaluations; they don't want any bad blood.' Instead, paper evaluations are all 'satisfactory' and complaints are filed over the phone.

OJT is, above all, an opportunity to showcase one's ability to do the work. One journeyman reported that how he demonstrated that, as a young apprentice, he knew how to read blueprints, a skill he would not have been expected to know. He showed his skill by carrying blueprints onto the worksite and marking the prints with a highlighter so that someone standing at a distance could see that he had read them. When an expensive mistake had been made, he was able to show the foreman the marked-up prints to reveal that he had foreseen that mistake and had already accounted for it. This same journeyman, a minority member, stated,

> I was only there to get knowledge. I wasn't there to be liked. I just wanted to know what they knew. [When one journeyman wouldn't explain how he did something] I kept asking like a kid in the store, 'When are you gonna tell me?' I was there to work this guy to learn as much as I can, not let him grind you down, make him teach me anything he can, so I can get my game up and then I can go onto the next job.

In this way, as an apprentice this journeyman exercised considerable agency in promoting and directing his learning. However, under such pressure, the journeyman, who is not being paid to teach, may come to regard the apprentice as a liability or a threat. Unless that journeyman has grasped the relationship between rising apprentices and the way the union depends on the next generation for contributions to its pension and welfare fund, he may balk at teaching.

## 12.8 What can go Wrong: When the Apprentice's Claim to Learning is treated as Illegitimate or when the Path to High Skills is not Transparent

The three conditions proposed by Lave and Wenger (1991) for good learning in an apprenticeship programme are legitimacy, transparency, and access to real work. All three of these conditions can be violated in numerous ways which, in turn, reflect the culture of the community of practice. Transparency can be opacity; legitimacy can be illegitimacy; relevance can be irrelevance.

Some violations are ambiguous. Pranks, hazing,[19] and cruel jokes may mean that an apprentice has been accepted into the culture of a workplace or they may have the effect of excluding an apprentice from the opportunity to learn. A journeyman reported that a common prank is when a new apprentice comes on the job, everyone will want to borrow and break in his new tools. One apprentice reported having his new white canvas toolbag dragged behind a truck to make it look old, or more like the toolbag of an experienced worker. The line between a joke and harassment, which may be a violation of federal antidiscrimination law, also marks the edge of the community of practice, putting some people out and letting others in. Letting harassment be tolerated as a joke delegitimises the presence of the apprentice in the community. While collective monitoring of pranks and hazing is the immediate responsibility of nearby workers (including apprentices), what goes on is ultimately an expression of the assumptions of the community of practice as a whole. This collective responsibility is reflected in labour law when workers have union representation: The union that tolerates harassment is liable along with the employer for violations of civil rights law (Frymer, 2003).

All of the issues that can trouble a union – racism, favoritism, young versus older workers, the presence of women in a traditionally male environment, the presence of minorities in a traditionally white environment, fear of losing work that is already scarce – play out in the course of OJT. During the 1970s and 1980s, many of the largest unions in the Chicago area were the target of lawsuits that correctly claimed that unions discriminated in their training and job assignment practices on the basis of race and gender. Several of the big construction trades unions including the ones mentioned here were put under consent decrees that required them to bring in more members of minority groups, especially African-Americans. One effect of this has been to encourage apprenticeship programmes to recruit more aggressively in minority neighborhoods. The strategies used to achieve this outcome include partnering with community-based organisations that find and channel good applicants from minority neighborhoods into the apprenticeship application process (Worthen & Haynes, 2008). Although the change has been slow and far from uniform across the industry, the experience of minority journeymen of the previous (1970s and 1980s) generation stands in contrast to that experience today. We locate this change, too, in the community of practice of which OJT is a component. That is to say, this transformation is not the result of changing the behaviour of individuals. Instead, it reflects changes in the fundamental presumptions about what is the legitimate, endorsed path from apprentice to journeyman within the community of practice and the nature of the community, which is replicating itself through the apprenticeship process.

[19] This is a term for a kind of extended, semi-officially permitted bullying that is associated with initiations into the lowest levels of institutions such as the military, private schools or fraternities or building trades apprenticeship programmes.

One African-American journeyman reported that as an apprentice, he 'really had to fight to get into the spotlight,' to attract the attention of journeymen who would then teach him the craft. Thirty years after his apprenticeship, he reported:

> There are people today that did not do well, who still are not very good journeymen, because they didn't get that help. They struggled through, and they still struggle today because they didn't get that help.

A famous case from Chicago is Daniels vs Pipefitters Association Local 597, in which the decision reports that 'use of racial epithets by union officials pervaded the hiring hall' out of which job referrals for both journeymen and apprentices are made. The importance of the hiring hall is noted in the decision:

> An unbiased referral system would have assisted black union members in overcoming the racism they might have faced were they required to apply for positions on their own. Moreover, a referral system free of discrimination's taint would have opened additional doors of opportunity to blacks, who because of their historical exclusion from the industry, lacked the personal contacts to hear about job openings through other means. (Daniels, paragraph 24)

In practice, the leadership of the union is expected to manage the culture of the community of practice. The term used in many apprenticeship programme policies is 'promulgate': the union promises to 'promulgate' an anti-discrimination, anti-sexual harassment policy.

## 12.9 Apprenticeship Learning as Reproduction of the Economic Viability of the Community of Practice

Unionised construction is a community of practice that has many parts – the contractors, the unions, the apprenticeship programmes just to name the obvious ones – but they are all linked by contracts that manage the flow of money among the parts so that the logic of the relationships is fundamentally economic, driven by the bottom line. The unionised construction trades' pension and benefit plans are famously generous, but they have to be funded by working union members who pay into those plans. Those working union members are the next generation. When an apprenticeship programme accepts a new apprentice, it begins an investment in that apprentice that will eventually cost the union upwards of $40,000, according to an apprenticeship director, but which that apprentice is expected to repay many times through productive work over a lifetime. This means that union apprenticeship programmes place high value on retention and high completion rates for their apprentices. The nonunion trades, although they may have apprenticeship programmes, do not have comparable systems of contracts and benefits and therefore do not have as pressing a need to ensure that their apprentices complete and become journeymen. No pension and welfare payments to retirees are supported in nonunion construction by contractual

contributions from journeymen and employers. This difference is reflected in various state-level studies of the comparisons between completion rates for union and non-union programmes, where union programmes exceeded nonunion by ratios of 26:1 (Washington State), 2.5: 1 (Pennsylvania); 59:39 (Kentucky) and 38:7 (West Virginia) (Etherton, Cook, & Massey 2002; Londrigan & Wise, 1997; Loomans & Seaman, 2000; Bradley & Herzenberg, 2002).

Apprentices (again, a composite quote) explained why journeymen who understood this might willingly take on roles as teachers despite the short-term drag on their work, as part of the conscious self-replication of the community of practice:

> They know what we did because they went through it themselves. We're the future of these companies. We want people to continue to use union electricians. If they want to keep working, they have to train us. When we're working, we're working for them; we're paying into their pension plans.

Nor is it just the issue of high skills. In order to pay back the investment in training, the apprentice needs to survive and work a full 20 or 30 years, which raises issues of health and safety.

> They want you to stay healthy so you can work a long time. When I worked nonunion they didn't give a crap about you. Your body would be dead at the end of the day.

The community of practice, therefore, needs to be viewed as an economic whole. Tensions that are problematic at the level of the relationships between individual journeymen and individual apprentices on a single worksite can be resolved when looked at in the context of the whole community of practice. An example is the tension between learning and work. Sometimes apprentices are supposed to be taking initiative and trying to learn; sometimes they are just another warm body getting the job done. One journeyman told of how a call was sent in to get an apprentice to come and pull wire for 10 hours. The apprentice, who was asking too many questions and interrupting the work of the others, was told to be quiet and do his job. The role of the apprentice as an element in the productive capacity of the work team overruled his role as a learner, but both were secondary to the 'bottom line'.

Another tension is that between journeymen who have been through an apprenticeship and the few who have come into the union through another way. Because of the proliferation of non-union work and the mandate to organise nonunion work, there has developed a way for skilled workers who have not worked union to get credentialed as a journeyman through taking a test. The economics of the industry – the presumption that that the union has to have command over the skills and the workers who possess those skills, even if the union was not the source of those skills – has generated this contradiction. At the level of the industry community of practice such arrangements may make sense. However, within the inner circle and at the level of an individual construction site, these arrangements may lead to contestations that embroil apprentices.

## 12.10 Conclusion

This study takes the concept of 'apprenticeship learning,' which was formed to explain how people learn in communities of practice where no direct teaching appears to be going on yet where the survival of the community depends on the creation of the next generation through learning, and holds that concept up to a learning context that is much more close to home, the formal apprenticeship programmes of the unionised building trades. In so doing, it confirms what Lave and Wenger (1991) suggest are the conditions necessary for good learning in the apprenticeship context: namely, legitimacy, transparency, and access to 'mature practice' or opportunities to engage in real work. Through our interview process, we captured reports of how each of these conditions plays out in the OJT part of apprenticeship programmes. They gave us a measure by which we could understand when apprenticeship learning works well and how it can be subverted.

We saw that the worksite itself played a powerful role in making learning possible. We also saw that it fell consistently to the apprentice to engage the other workers on the worksite and negotiate interactions that produced teaching and learning. This was in striking contrast to the context of the classroom. Apprenticeship learning could not be passive; in order to learn, the apprentice had to actively construct learning opportunities. These interactions were typically brief and focused on how to be more efficient and fast. Notably missing was anything like the traditional stable master-apprentice relationship that might have been predicted. Using the conditions proposed by Lave and Wenger (1991), we were able to interpret reports of what appeared to be obstructions to learning, actions that delegitimised an apprentice's claim on the right to learn, or activities such as concealing tricks of the trade that made the path from apprentice to journeyman obscure rather than transparent.

However, the most important factor in supporting apprenticeship learning was the role of the whole community of practice, particularly in the way its economic logic shaped the structure of participation in which the apprentice was engaged. This explained the brevity and efficiency focus of the interactions between apprentices and journeymen. It also showed how tensions that were unresolvable at the level of the individual worksite, or between an individual journeyman and an individual apprentice, could be resolved, at least in concept, at the level of the community of practice because the production of new generations of skilled workers is essential to the economic welfare of the older generations.

In order for this potential to be realised, however, full apprenticeship learning, under ideal versions of the conditions proposed by Lave and Wenger (1991), requires that apprentices have not only the skills that apply to the worksite. They – and they journeymen on whom they rely for OJT – must possess the knowledge of the economic relationships of the community of practice, and that knowledge must also be available under conditions of legitimacy, transparency, and access to mature practice.

## References


Allen, S. G. (1994). Developments in collective bargaining in construction in the 1980s and 1990s. In P. Voos (Ed.), *Contemporary collective bargaining in the private sector* (pp. 411-455). Madison, WI: Industrial Relations Research Association.

Allen, S. G. (1988). Further evidence on union efficiency in construction. *Industrial Relations: A Journal of Economy and Society, 27*(2), 232-240.

Berik, G., & Bilginsoy, C. (2000). Do unions help or hinder women in training? Apprenticeship Programmes in the United States. *Industrial Relations, 39*(4), 600-624.

Billlet, S. (2007). Including the missing subject: Placing the personal within the community. In J. Hughes, N. Jewson, & L. Unwin (Eds.), *Communities of practice: Critical perspectives* (pp. 55-67). London: Routledge

Bureau of Labor Statistics, U.S. Department of Labor. (2008). *Workforce statistics: Construction.* Retrieved 18 August, 2009, from http://www.bls.gov/iag/tgs/iag23.htm#workforce

Bradley, D.H., & Herzenberg, S. A.. (2002). *Construction apprenticeship and training in Pennsylvania.* Report by the Keystone Research Center for the Capital Area Labor-Management Council, Inc. and the Construction Management Coordination Project.

Byrd, B. (1999). Women in carpentry apprenticeship: A Case Study. *Labor Studies Journal, 24*(3), 3-22.

Clarke, L. (1999). The changing structure and significance of apprenticeship with special reference to construction. In P. Ainley & H. Rainbird (Eds.), *Apprenticeship: Towards a new paradigm of learning* (pp. 25-40). London: Kogan Page.

Eisenberg, S. (1998). *We'll call you if we need you: Experiences of women working construction.* Ithaca, NY: Cornell University Press.

Elbaum, B., & N. Singh. (1995). The economic rationale of apprenticeship training: Some lessons from British and U.S. experience. *Industrial Relations: A Journal of Economy and Society, 34*(4), 593-622.

Engestrom, Y. (1987). *Learning by expanding.* Helsinki: Orienta-Konsultit.

Etherton, S., Cook, S., & Massey, R. (2002). *A comparison of union and non-union building trades programmes in the 1990s.* Morgantown: West Virginia University Institute for Labor Studies and Research.

Fitzgerald Act (50 Stat. 663;29 U.S.C.50).

Frank Daniels, Plaintiff-Appellee, Cross-Appellant, v. Pipefitters Association Local Union NO. 597, Defendant-Appellant, cross-Appellee. 138 L.R.R.M. (BNA) 2576; 60 USLW 2315; 57 Empl. Prac. Dec. P 41; 120 Lab Cas. P 10; 945 F.2d 906

Frymer, P. (2003). Acting when elected officials won't: Federal courts and civil rights enforcement in U.S. labor unions, 1935-1985. *American Political Science Review, 97*(3), 843-858

Grasseni, C. (Ed.) (2007). *Skilled visions: Between apprenticeship and standards.* New York: Berghahm Books.

Guile, D., & Young, M. (1999). Beyond the institution of apprenticeship: Towards a social theory of learning in the production of knowledge. In P. Ainley & H. Rainbird (Eds.), *Apprenticeship: Towards a new paradigm of learning* (pp. 111-125). London: Kogan Page.

Hill, H. (1974). *Labor union control of job training: A critical analysis of apprenticeship outreach programmes and the hometown plans*. Occasional paper, Institute for Urban Affairs and Research, Howard University (vol. 2, no. 1). Washington, DC.

Illinois Department of Labor. (2001). *Progress of women and minorities in the workforce*. Retrieved 18 August, 2009, from http://www.state.il.us/agency/idol/

Lave, J. (1991). Situated learning in communities of practice. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 63-82). Washington, D.C.: American Psychological Association.

Lave, J. (1996). Teaching, as learning, in practice. *Mind, Culture and Activity, 3*(3), 149-164.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* New York: Cambridge University Press.

Londrigan, W. J., & Wise, J. B. (1997). *Apprentice training in Kentucky: A comparison of union and non-union programmes in the building trades.* Building Trades Apprenticeship Coordinators/Directors Association of Kentucky, Inc and Greater Louisville Building and Construction Trades Council.; AFL-CIO.

Loomans, R., & Seaman, M. (2000). *Apprenticeship utilization in Washington state programmes in the building and construction trades.* Washington: Washington State Labor Council.

Marshall, R., Franklin, W. S., & Glover, R. W. (1973). *A comparison of union construction workers who have achieved journeyman status through apprenticeship and other means*. Austin: University of Texas Press.

McKernan, J. R. (1994). *Making the grade: How a new youth apprenticeship system can change our schools and save American jobs.* Boston: Little, Brown.

Munck, B. D. (2007). *Technologies of learning: Apprenticeship in Antwerp guilds from the 15th century to the end of the ancient regime*. Turnhout, Belgium: Brepols.

Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context.* New York: Oxford University Press.

Sannino, A., Trognon, A., & Dessagne, L. (2003). A model for analyzing knowledge content and processes of learning a trade within alternance vocational training. In T. Tuomi-Grohn & Y. Engestrom (Eds.), *Between school and work: New perspectives on transfer and boundary crossing* (pp. 271-289). Amsterdam: Pergamon.

Tuomi-Grohn, T., & Engestrom, Y. (Eds.). (2003). *Between school and work: New perspectives on transfer and boundary crossing.* Amsterdam: Pergamon.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Cambridge, MA: Harvard University Press.

Worthen, H., & Haynes, A. (2009). Outcomes of two construction trades pre-apprenticeship programmes: A comparison. *Journal of Community Practice, 17*, 207-222.

# Chapter 13
# Interactive Research as a Strategy for Practice-based Learning: Designing Competence Development and Professional Growth in Local School Practice

**Jon Ohlsson and Peter Johansson**

Stockholm University, Sweden

**Abstract** This chapter focuses on the work of teachers and education administrators' use of interactional learning strategy. Instead of being guided by external experts, an interactive and dialogic approach is enacted between researchers and practitioners, in promoting the developmental needs and capacities of educational practitioners and generating responses to problems arising in practice settings. It is held that these problems and what constitutes effective and appropriate solutions may be unknown and unknowable to external experts, which limits their capacity to provide direct and effective guidance and recommendations. Instead, practice-based responses arising through interactions between practitioners and researchers are more likely to be generative of effective responses, whilst building capacity to resolve subsequent problems. Factors shaping the likely success of these strategies are premised upon the degree by which the practitioners are ready to and are confident in their capacity to progress these interactions. The pedagogic dimensions of these interactions were promoted by the use of specific strategies that included meetings and sharing of concerns and potential responses through a facilitated process ordered by the researchers as external agents. It is through these interventions that collective learning is secured and commitments to remake practice are emphasised.

## 13.1 Introduction

This chapter addresses the potential for joint construction of competence as a means to develop the local school practice through interactions between practitioners in local schools and researchers. The aim is to describe and critically discuss a practice-based model of learning and remaking of professional practice that has been developed during the last 10 years through several interactive research projects on teachers' collective learning processes and competence development. More specifically this chapter discusses issues associated with the interactive research approach as a strategy to strengthen and promote learning and professional growth in school practice. In the first section, we present our

S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2_13, 

theoretical framework, which includes an attempt to clarify the conceptual complexity of learning and competence development, referred to here as the remaking of professional practice. The second part of the chapter focuses on specific cultural aspects of teachers' learning and professional growth that are pertinent to generating a model of competence development, followed in the third section by a description of interactive research as a kind of developed action research design. Here, these interactions between researchers and practitioners are held to be best when they comprise an ongoing processes whereby all the participants in the project contribute to the process of knowledge construction and remaking professional practice. The presentation of empirical examples from an interactive case study in the fourth section leads to a concluding discussion on a model of practice-based learning. It is proposed that this model enables and supports collective learning through practice. The model is premised on collaborative interactions between researchers and practitioners in which access to actual practice and opportunities for collective reflection on that practice is the key basis for both professional growth and the remaking of teachers' professional practice.

## 13.2 Towards a Model of Competence Development

During the last decades, learning and competence development have been highlighted in the working life research literature. In order to advance workplace learning as both an individual and a social process of constructing and construing knowledge (Billett, 2006; Harteis & Billett, 2008; Ohlsson, 2002) in this chapter we adopt a theoretical framework within a social-constructivist tradition that comprises a synthesis of the constructivist and situated learning perspectives. In constructivist theory, learning is defined as processes of change, usually a change of conceptions, actions, or understanding (Dixon, 1994; Kolb, 1984). Theories on situated learning (e.g., Lave & Wenger, 1991) have a stronger focus on sociocultural aspects of workplaces. This includes viewing the process of learning as participation in social practices, where learning is an ongoing social construction process within a community of practice (Wenger, 1999). The ongoing processes of knowledge construction are also shaped by peoples' earlier experiences, reflections, knowledge, and also professional values, beliefs, and identities (Vähäsantanen & Billett, 2008). Yet, learning is a situated process. This means that individuals deal with everyday problems or situations that are embedded in the social context of artifacts that affords actions of different kind (Löfberg, 1989). For example, a workplace can be described as such a social context, an environment affording opportunities for learning (Billett, 2004). Learning is, therefore, regarded as an experience-based process via which individuals, through participation in social practices, change their ways of thinking and acting, and also constructing beliefs and identities.

Over the years, the notion of context has changed from the dualistic idea of the individual and the environment as separate and detached entities, into viewing the individual as embedded in social contexts (Billett, 2004). Following Habermas (1984) and his elaboration of the sociological action theory, importantly individuals are held not to be totally embedded within their context. Through communicative actions including critical reflections, inquiry, and increased consciousness grounded in a rational discourse people have potential to question and alter structural and cultural conditions (Habermas, 1984). Thus, individuals are active in creating their context, both in an action-oriented relation to the environment and through their participation in communicative actions. Consequently, learning through activities such as critical reflections on practice appears as a key process with the potential for increased consciousness and shared understanding.

In taking forward the discussion about the development of personal competence, this conceptualisation of learning as an individual and social process of construction is important yet needs further elaboration, because it offers significant promise to illuminate the process of professional development. Competence is regarded as the outcome of the ongoing individual and social learning processes (Ellström, 2001). In this way, competence is partly an individual ability to perform a skill, (e.g., handling situations and solving tasks). Yet, it is also partly premised on a socially constructed web of norms figured to be accepted and adequate actions adapted to the specific situation and context in which the individual acts. Consequently, in practice it is not possible to separate between individual and social aspects of competence, although a valuable analytical distinction can be made of their distinct contributions. Competence is always related to a task or a problem, an object that is socially and discursively constructed and constituted, and, as a consequence, it is also related to individuals' understanding and performance of the particular task. Thus, the ongoing processes of development of competence are both discursive and concrete activities essential in the institutionalisation of knowledge in the organisation (Nonaka & Takeuchi, 1995), and institutionalisation of knowledge also implies a remaking of the professional practice. Indeed, in most of the 'learning organisation' traditions dialogue is regarded as the central component in this respect (Senge, 1990). Dialogue enables the organisation members to participate, make sense, and learn together. An organisational culture that promotes dialogue creates shared understanding and organisational knowledge (Schein, 1993). The organisational knowledge is institutionalised in collective meaning structures that serve as a collective base for the organisation members' thought and actions (Dixon, 1994).

However, as Argyris (1999) shows, organisations sometimes have difficulties connecting talk and concrete actions because of the gaps between 'espoused theories' and 'theories-in-use' within the organisation. This means that organisations pose a risk of generating discrepancies between what people say about strategies and plans for action and how things concretely are carried out in the local practice. Simultaneously, when expressed, these discrepancies provide in

the organisation potential conflicts that can be driving forces for learning processes (Argyris, 1999). Ohlsson (2002) argues that concrete actions, as well as verbal communication, have a coordinating function and help people to perform together, and in ways that can overcome these discrepancies. Development of competence in teams and organisations is a collective learning process consisting of several steps. The collective learning process includes ongoing transformation of experiences, through joint reflection, sense-making, and concrete actions. This is a situated process whereby individuals together generalise from their specific experiences, make their private thoughts and images public, and, through communicative actions, build up jointly shared understanding. Through the critical and collective reflections the individuals are also able to be aware of things that otherwise have been taken for granted. It follows, therefore, that these communicative actions within teams and organisations appear vital for the individuals' opportunities to coordinate their actions in order to solve joint tasks. Through these ongoing learning processes a team or an organisation is able to develop practice-based collective competence. The collective competence can be described as shared understanding and joint preparedness for concrete actions and problem solving, manifested in ongoing processes of construction and reconstruction in a specific and communicative context (Ohlsson, 2002). Developing such shared understanding through collaborative processes is seen to be potentially helpful for the ongoing development of teachers.

## 13.3 Cultural Context of Teachers' Learning and Professional Growth

Teachers' daily work is a complex activity and the skills and competencies of relevance in local school practice cannot be fully developed in teacher education programmes. Teachers' work needs to be considered to fully understand and intervene in pedagogically appropriate ways in the local school practice contextual and cultural setting. Until quite recently, Lorties's famous study (1975) of school teachers' extremely individualistic ways of organising their work has dominated explanations of teachers' development. Now, attempts to clarify and explain teachers' individualistic work have identified individual shortcomings and lack of safety (Rosentholtz, 1989); social norms in the local school as well as in school as a societal institution (Fullan, 1993); and different interests and unequal power relations between headmasters and teachers (Mulford, 1998). With reference to theories on learning organisations Mulford (1998) suggests that teachers' resistance to change strategies works in favor of collaborative initiatives. This is because working together with colleagues can be understood as a reaction against unequal power conditions in the organisation and a lack of opportunities to participate in the formation of collaboration and dialogue. Due to the complexity of teachers' everyday work issues, managing and organising the profession is

somewhat problematic. It is an ongoing tendency in so called western countries today that teachers' professionalism and praxis are threatened by increasing demands on instrumental rationality, effectiveness, and measuring of evidence-based methods and results (Biesta, 2007; Kemmis & Smith, 2008). Yet, the premises for teachers' tasks and work appear to be largely contextual and situated, which complicates the institutionalisation of knowledge and development of rationality at a national level. In teachers' practice, the relations between intentions and actions are often far from clear and unambiguous, and, as a consequence, rational strategic planning and evaluation of strategies and efficiency are difficult to accomplish (Salo & Johnson, 2008). Kemmis and Smith (2008) also argue that teachers' praxis includes the morally and ethically committed action teachers carry out in their everyday work and therefore is difficult to measure. Consequently, quality in everyday work needs to be contextualised. This implies that the content and meaning of professionalism, competence, and the supposed rational actions need to be constructed in relation to the local school by principals, teachers, and local authorities. This view underlines organisational issues as important factors to consider in processes of professional growth and remaking practices in educational workplaces.

Teachers' reflective activity can play a key role in their professional growth (Goodson & Hargreaves, 1996); in learning from experience and in development of practical knowledge in the local school organisation (Day, Fernandez, Hauge, & Möller, 2000; Parsons & Stephenson, 2005). Teachers' reflection-in-action and reflection-on-action are described as active parts in the identifying of problems and in finding adequate solutions (Schön, 1983). It is claimed that reflection helps the practitioner to be aware of new aspects of the situation when there is doubt about how to proceed, and also to be conscious of possible solutions that otherwise would be neglected (McCotter, 2001). However, teachers' reflections are often limited by the pressure in the daily work, where practical problems ought to be solved quickly and 'here-and-now' (Korthagen & Vasalos, 2005; Ohlsson, 2002). Studies on learning and educational innovation indicate that teachers tend to keep their own old routines in teaching, instead of testing new ideas and methods (Verloop, van Driel, & Meyer, 2001). Furthermore, teachers' everyday reflections appear insufficient for professional growth; in order to reach deeper, 'core reflections,' educational intervention in practice, as well as improvement in teacher education, is probably needed (Korthagen & Vasalos, 2005). Consequently, it is important to go beyond simple prescriptions of reflection. For instance, different kinds of action research initiatives are now being used as strategies for interventions in order to strengthen teachers' reflective thinking and to promote school development (Rönnerman, Moksnes Furu, & Salo, 2008). Collaboration among researchers, teacher educators, and teachers tends to help practitioners to identify and reflect upon tacit dimensions of their professional work, and to enable professional growth (Orland-Barak, 2006). Therefore, it is important to understand more about processes that have promoted that collaborative development.

## 13.4 Interactive Research – A Strategy for Development of Practice and Theory

In the Nordic countries, action research has a long tradition in the social sciences. Yet, it is not possible to describe action research as a specific design or in a uniform way. Over the years, a number of alternative approaches have been developed within this tradition (Aagard Nielsen & Svensson, 2006). In many action research approaches, the key aim is to build up local or situated knowledge valuable for the participating practitioners in the specific project (Genat, 2009). Through critical reflections and contextualisation, the researcher and practitioners make sense of practice together by helping each other clarify and elaborate conceptual reasoning and practical implications. Consequently, action research offers a process through which researchers and practitioners construct shared understanding of work tasks and competence. For that reason, action research is an attractive approach in its contribution to an ongoing development of practice. Within the European Union *ongoing evaluation* as a form of action research has been adopted as a general recommendation in order to strengthen learning processes within regional developmental projects funded by the EU. Johansson (2008) holds that ongoing evaluation is processes aimed at creating practice-based knowledge, based on researchers' feedback from observations of ongoing developmental processes. However, a more critical aspect of the action research process concerns the researchers' ambitions to contribute to production of scientific, valid, and general theoretical knowledge, an aspect action research has been criticised as neglecting. In response to these imperatives, during the last 10-15 years an *interactive research* approach has been developed in the Nordic countries as a further development of the action research methodology. One reason to refer to this approach as interactive research rather than action research is to emphasise that to a higher degree the aim of the research process is to contribute not only to development of practice, but also to the development of theory; that is, the knowledge produced by the use of interactive research should be of practical relevance as well as of a high scientific standard (Svensson, Ellström, & Brulin, 2007).

The interactive research approach is based on a mutual commitment to the research process whereby researchers and practitioners interact largely with the shared aim of promoting learning processes and competence development, but from different angles and, in some respects, with different purposes (Svensson, Eklund, Randle, & Aronsson 2007). This implies a challenging view of the researchers' role in research projects. Instead of being researchers who study the practice in the belief they should not interfere with the practice, the ambition for interactive researchers is to contribute to the learning and development of practice. Therefore, interactive research can be described as a case of conducting research with – not on – the participants (Svensson, Eklund, et al., 2007). Svensson, Eklund et al. hold that there are two systems interacting with each other: a practice system and a research system. This implies that the researchers and the practitioners share

a common interest of the research unit of analyses. However, in most cases researchers and practitioners have some different interests in the research process.

> The researchers and the participants share experience as a result of their curiosity and desire to learn – to better understand a phenomenon, to solve a problem, to discover something new, to explain something or to reveal something that was previously hidden. But the knowledge is used in different ways and with different aims – in a development context or in a research context. (Svensson, Eklund, et al., 2007, p. 261)

From a researcher perspective, an ambition to contribute to elaboration of concepts and development of theory is vital, because the further development of knowledge is important to researchers. Nevertheless, there are some critical issues associated with this kind of research approach, which are consonant with almost all qualitative research designs where people are used as informants. That is, interactions between researchers and practitioners (but also through interviews, questionnaires, observations) are potentially changing the learning conditions. Stimulating reflection through questions or feedback also implies stimulating learning processes. This makes it difficult to study 'authentic' conditions of learning at, for example, a workplace such as a school. In order to overcome such issues, it is possible to make use of these circumstances. Interventions in form of feedback processes then become vital in promoting learning and development of practice, as well as providing data for further analysis. Perhaps then it is more adequate to add that interactive research both is a case of conducting research *with* the participants and *on* the participants. The interactive research approach, therefore, can be seen as an acknowledgement that knowledge produced through research potentially has a specific as well as a general value.

## 13.5 The Interactive Processes – The 'Quality Case'

As researchers we are interested in the conditions for collective learning at the local school level; in teacher teams as well as in the principals' teams. We are trying to illuminate critical incidents in the learning processes that illuminate both constraining and enabling factors. Occasionally, the principals and teachers took the role of advisors and they also comment and suggest modifications of the research questions. In our interactive research process, the researchers and the practitioners have different roles and in some respect different aims to be realised through their efforts. As researchers, we are not leading the practitioners in one particular direction. On the contrary, we are trying to secure a questioning of their practice, through inquiry and by identifying critical incidents. The aim for such strategies is to problematise and to find new approaches beyond those that comprise the practitioners' habitual way of understanding and enacting their practice. Experiences from an ongoing interactive research project are used as examples of central elements in the practice-based model of competence

development. The project concerns collective competence development and quality construction in local schools.

### *13.5.1 Local Schools' Collective Competence Development and Quality Construction*

The interactive research project is a collaboration between pedagogic researchers at Stockholm University and a school organisation in a small Swedish municipality. The project has two overall aims. The first is to create knowledge about how school principals and teachers construct, develop, and maintain collective competence and quality in the local school activity. Consequently, we are aiming to identify potentials for collective learning. The second aim is to use this knowledge in attempts to create systems and models in order to promote collective learning.

The project has two leaders; the academic researcher (i.e., associate professor) who is responsible for the scientific quality and goal fulfilment in the project; and the administrative manager who is responsible for developmental work and is a member of the managerial board in the department of the local authorities. The interactive approach means that researchers and practitioners (e.g., administrative manager, principals, and teachers) work together on school development with the goal of promoting and enhancing principals' and teachers' collective competence. Principals for all the 17 schools in the municipality are organised in four teams with a purpose to strengthen collective reflections in order to elaborate joint models for evaluation, quality assessment, and development. We have collected data from all the teams, which have also been used as focus groups concerning development of quality assessment documents. Since 1997, all municipalities and compulsory schools in Sweden have been obliged by the Governments to annually prepare quality assessment documents. These are intended to be an instrument to promote quality work in the schools in order to improve the school effectiveness (Skolverket, 2006). The annual quality assessment documents for every school have been analysed as part of the research project. Furthermore, the researchers have conducted interviews with the school principals during the project period. (These comprise a total of 24 interviews including follow-up interviews with a smaller sample.) Another part of the method is an ongoing case study of three schools in which we observed meetings and interviews with both principals and teachers, including about 20 interviews with teachers at different levels. In one of the case schools, we have observed several meetings in the local school's managerial group consisting of the two principals and six team leaders. We also have made some observations of teachers' everyday work in their classroom and we have carried out several feedback seminars for collective reflections and follow-up interviews.

#### 13.5.1.1 Findings

Initially, in interviews, the school principals complained about the difficulties they experienced in conducting analyses for and writing the quality assessments reports. Some principals claimed that the quality work was functioning well in their school, yet they could not explain the kind of fact or observations on which they based those claims. Other problems the school principals experienced were that they often worked alone and were quite isolated, and were engaged in both analyses of activity and writing the document. They collected information from the teacher teams, but they felt insecure in the analyses of the information. One of the headmasters said: 'We need tools if we want to identify these qualities that are so difficult and almost impossible to measure.' Analyses of the written documents confirmed the problems school principals had expressed. The documents were vague in structure and more descriptive than analytical, and there were weak connections between a description of a problem and plans and strategies for future actions. Based on these facts, the project leaders started a new process to identify a structure for the analyses of the activity in the local schools. Working collaboratively with the principals teams, we developed in order to analyse the schools' activities a revised model that had four main dimensions that provided a new structure for the quality assessment. The four dimensions were: (i) learning environment, (ii) personnel, (iii) specific interventions, and (iv) results. Some of the principals claimed that they preferred to use the national curriculum as a structure for their analyses. But the point with the new model was that it also included an analysis of the conditions needed for the professionals to carry out their missions and tasks, and not only analyses of pupils' results and learning. Through a series of seminars, where both the researcher and the other project leaders participated and led the interventions, the discussions about the new model's strengths and weaknesses continued, and finally it was accepted as the basic structure for all the quality assessments for the local schools. In the follow-up interviews with six of the principals, all of them told that they now had discussed issues of quality much more in their schools. One of them said: 'Yes...I think it works better now...we have done a great job. I feel that our analysis of quality is more practice-based than before.'

However, through the case studies we found other problems in the process of quality construction, between the teacher teams and the principal at the local school level. Many teachers described the quality assessment as poorly developed, and they had no dialogue with the principal. Also, some of the teachers complained that they had no opportunities to constructively criticise the leadership. Furthermore, some of the teachers indicated that no collaborative efforts in the teacher teams were made in order to discuss quality in everyday work and possible indicators for measurement in the quality assessment. It was apparent from the data that the teachers tacitly resisted invitations for collaboration and to engage in a critical dialogue on quality or competence in the everyday work. The teachers tended to avoid to use the dialogue to draw attention

to each other's actions and ideas on how to handle the problem by such reflective questions as 'what is a good treatment?' and 'what is quality in everyday work?' Some of the teachers mentioned that the problem had to do with lack of commitment concerning the team's or the local school's collective work, and also a described 'here-and-now' character of the teacher role.

The analyses of the school's activities show that although the principals and the teachers formally organised team work and collaboration concerning quality assessment and competence development, they simultaneously avoided and refrained from effective collaboration. Invitations or directives regarding collaboration were neglected through a mutual and non-reflected avoidance whereby the teachers maintained their work as individual tasks. This avoidance covers the potential conflicts between team members, concerning attitudes to collective work, ambitions, and intentions. During the second and third year of the ongoing project, the researchers and the staff (principals and teachers) in one of the case study schools carried out several meetings and seminars where these problems and possible solutions were discussed. In the last round of follow-up interviews with the teachers and the two principals in the case school they all referred to a positive change in their way of working with analyses of quality. They described that during the last months they discussed in a more intensive and detailed manner the strengths and weaknesses of the quality reports. One of the teachers said: 'Yeah…at last we have now reached a meaning with all these words…a shared meaning…we believe we have been better able to see qualities in everyday work…together.' In the interview she elaborated this by taking an example from discussions in her own team. She described that in the last months they had discussed different aspects of qualities. An example here was how they worked with basic democratic values in their practical everyday work, which is one of the cornerstones in the national curriculum. She mentioned that her team earlier had low estimations of these aspects in their self-evaluations. She described: 'But now…this year…we have started discussions on how we treat our pupils…how we as teachers express democratic values through our own actions and different ways of dealing with situations and solve problems. I mean such things that you observed when you were here (she refers to the researchers' observations and conversations in her classroom about 5 months earlier). Things that you usually don't talk about…or even not are aware of…it is always difficult to see yourself…but now we have reflected together upon that stuff.'

One of the principals confirms this and showed how these change were documented. He explained that he had asked teachers to construct items in their questionnaire for self-evaluation as criteria of practical work with democratic values. These criteria were now supposed to be used in all the teacher teams' discussions as well as in the local school's quality assessment as indicators of the school's 'learning environment.' Observations of the managerial group's meetings showed further discussions about these attempts to operationalise the actual quality. Through interactive dialogue with the researchers they are planning for how to proceed in order to structure and institutionalise this collective work with

quality and competence development. In this way it can be seen that, through guided interactive research activities, productive professional development and remaking of professional practice can be realised.

## 13.6 The Practice-based Model – Collective Construction of Professional Development

The project seems to have given rise to several important learning experiences among the participants. Through critical reflections between researchers and practitioners new opportunities for action have been identified, and new ways of understanding tasks and constructing strategies have been developed. It seems plausible to describe these processes as collective learning processes whereby shared understanding, agreements through reflective dialogues, and in some cases written documents, are manifested as outcomes. Although participation in these social activities is necessary for effective learning, a more detailed analysis shows other qualities that are valuable for learning in the interactive processes between researchers and practitioners. Three critical collective learning qualities are identified here: (i) the identification of tacit aspects of teachers' skills and competence in everyday practice through combined observations and conversations; (ii) the transformative and reflective link between concrete actions and the conceptual understanding of practice; and (iii) joint construction and institutionalisation of tools necessary to the strategic work with competence development. These qualities can be described as steps in the collective learning processes.

### *13.6.1 Identifying Practice*

The interactions between researchers and practitioners provide opportunities to illuminate and appraise practice, and in doing so identify moments in everyday work that are hidden or tacit. Although having common experiences and knowledge based on many years in teacher education programmes, the teachers and principals in our study expressed a lot of differences concerning views on competence, interpretation of tasks, and interest and engagement in developmental work. Usually, they did not talk with each other about these differences. This means that some aspects of performance of everyday work tasks seemed to be known for the individual, but unknown or not reflected at a collective level as a part of the collegial work.

Principals and teachers have a strategic task and responsibility to plan and evaluate their activity and identify urgent competencies. In the project described above, it was strategically important to identify a more adequate structure for the principals' and teachers' analyses of the school's activity and to generate

important indicators of quality that were able to be described and measured. The researchers' main aim for the interactive process was to produce answers to some relevant research questions, and our efforts to identify presumed differences required certain methods, and our experience was that interviews and dialogues were insufficient for this task. We needed to observe concrete actions in everyday work, and the interactive design provided good and legitimate opportunities to do that through a combination of observations and conversations. Following the individual teachers in their daily work activities gave rise to curious questions, such as: How do you know what to do in this situation? What is your thought about the problem you solved? Through observations and linked conversations the researchers and practitioners together identified essential aspects of everyday work competence, for example, tacit knowledge and nonreflected actions taken for granted. A plausible interpretation is that these heedful jointly identifications afford reflective activities which provide starting points for learning processes and professional growth (Weick & Roberts, 1993).

### *13.6.2 Reflective Transformation*

The second quality of learning identified in the interactive process between researchers and practitioners is a reflective feedback moment. The researchers offer to the teachers and principals critical reflections and plausible interpretations based on analysis of collected data. The aim is to identify critical aspects of everyday work and to provide a reflecting mirror for the practitioners. Through interaction and communication at meetings the researchers supported the principals in their inquiry and helped them to reflect critically upon expressed suggestions and ideas. It is adequate to describe this step in the process as pedagogic interventions from researchers. By employing pedagogic interventions to draw attention and give expression to the perspectives of different actors, we – as researchers – contribute to highlighting and giving voice to the questioning, thinking, and acting of the participants.

In the project, these feedback meetings were organised regularly with the principal teams as well as with the staff in the local case-study school. The researchers' conceptualised observations, presented at the feed back meetings, led to reflective talk about tacit dimensions of competence and thereby provided opportunities to collectively make accessible aspects of everyday work that otherwise might be neglected or taken for granted. Relying only on verbal dialogue appeared insufficient with regard to securing shared understanding and the development of collective knowledge. Instead, access to the practice of concrete actions was also required. This came to the fore in described examples from the case-study school where the observations of teachers' everyday practice showed usually tacit aspects, which then were put into words through discussions of quality indicators and criteria for evaluation. In other examples from the

project, the researchers' observations and questions started in the principals' teams collective reflections upon what constituted quality in teachers' work, and what characterised a reasonable analysis. In this process, people often experience a new way of seeing something; a 'real' learning experience. As exemplified in the 'quality-project,' some of principals experienced a new view on quality assessment when they were asked to analyse more than describe, or to find more practice-based quality indicators.

Through the interactive meetings and joint reflections the participants were able to contextualise. To contextualise the conceptual meaning of something is to understand with regard to one's own practice and usual way of handling situations and solving tasks. This is a step of joint sense-making; processes of making sense and learning together (Dixon, 1994; Weick, 1995). These processes can be described as transformative links between concrete actions in practice and talk about practice; they potentially enable transfer of experiences from one setting to another (Evans, Hodkinson, Rainbird, & Unwin, 2006) and bridge the presumed gap between what Argyris (1999) describes as espoused-theory and theory-in-use. Through collaborative activities, researchers and practitioners came to identify and understand significant aspects of teachers' practice. Conceptualising and contextualising through dialogue appear as core processes in this transformation. Theoretically, the transformations provide links between the practice of concrete actions in daily work and the dialogue practice established in researchers' and practitioners' meetings.

### *13.6.3 Joint Construction and Institutionalisation of Tools*

The third learning quality appears critical and yet is associated by difficulties. It concerns the collective constructions of tools and instruments that serve as expressions of shared understanding that comprise externalised and institutionalised knowledge in the local organisation (Nonaka & Takeuchi, 1995). This seems as a final step in the collective learning process and is an orientation towards future actions. It concerns a proactive dimension in the learning process by providing potentials and preparedness for the practitioners' future problem-solving and handling of tasks. Based on reflective analyses of identified problems, new suitable solutions will be constructed and institutionalised. In the project, the new structure and instrument for quality assessment is one such example. Another example is the case school where principals and teachers together identified indicators of quality and discussed strategies for collecting information. These represent a step of construction of new measurements or instruments necessary to the strategic work with competence development. During these processes, the researchers act like critical reflectors supporting the practitioners with critical advises. Based on findings in our project we propose that construction and institutionalisation of tools aimed at jointly analysing of qualities and competencies in everyday work are vital to teachers' and principals' professional growth.

### *13.6.4 Professional Growth and Remaking of Practice*

The interactive design in the described interactive research project provides a model of practice-based competence development (Figure 13.1). The development of competence involves both the individual and collective learning processes through which the participating teachers and principals grow in their professions, and the ongoing remaking of their professional practice. This means that new ways of working and doing things are established through the project, and in turn change beliefs and notions of what competence is and thereby offer shared understanding and new affordances for acting and learning (Billett, 2004; Löfberg, 1989).

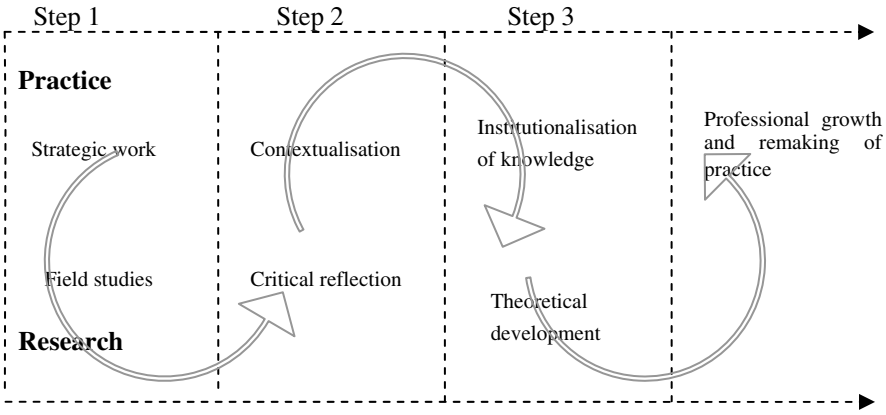


**Fig. 13.1** Model of practice-based competence development as professional growth and remaking of professional practice

In conclusion, an important task for the researchers is to analyse their data in order to create knowledge about the processes and outcomes of the project. The researchers have as their main aim the production of new knowledge by answering the research questions. This means that the researchers need to conduct a kind of meta-analysis of how the collective learning processes proceed and of the critical conditions for these processes in order for its conceptual premise to be elaborated. The meta-analysis and the researchers' interpretations provide a growing conceptual understanding of the actual phenomenon. This means that the researchers have an interest beyond the specific case or the specific project. Their goal is to contribute to theoretical development of the phenomenon they were trying to illuminate. This is to emphasise the idea of the researcher as someone who conducts research both with and on the practitioners. We believe that our interactive research design, although problematic and deeply challenging in many respects, provides opportunities to study learning processes and competence development in context and thereby contributes mutually to research and practice

development. In all, this model of practice-based learning offers a means by which much of which occurs as tacit practice can become accessible to others, and be discussed and reflected upon, and may potentially lead to changes in practice, including the development of shared understanding amongst practitioners.

## References

Aagard Nielsen, K., & Svensson, L. (Eds.). (2006). *Action and interactive research. Beyond practice and theory*. Maastricht, the Netherlands: Shaker Publishing.

Argyris, C. (1999). *On organizational learning*. Malden, MA: Blackwell.

Biesta, G. (2007). Why "what works" won't work: Evidence-based practice and the democratic deficit in educational research. *Educational Theory, 57*(1), 1-22.

Billett, S. (2004). Workplace participatory practices. Conceptualising workplaces as learning environments. *The Journal of Workplace Learning, 16*(6), 312-324.

Billett, S. (2006). Relational interdependence between social and individual agency in working life. *Mind, Culture, and Activity, 13*(1), 53-69.

Day, C., Fernandez, A., Hauge, T. E., & Möller, J. (Eds.). (2000). *The life and work of teachers. International perspectives in changing times*. London and New York: Falmer Press.

Dixon, N. (1994). *The organizational learning cycle. How we can learn collectively*. London: McGraw-Hill Book Co.

Ellström, P.-E. (2001). Integrating learning and work: Problems and prospects. *Human Resource Development Quarterly, 12*(4), 421-435.

Evans, K., Hodkinson, P., Rainbird, L., & Unwin, L. (2006). *Improving workplace learning*. London and New York: Routledge.

Fullan, M. (1993). *Change forces:probing the depths of educational reform*. London: Falmer.

Genat, B. (2009). Building emergent situated knowledges in participatory action research. *Action Research, 7*(1), 101-115.

Goodson, I., F., & Hargreaves, A. (Eds.). (1996). *Teachers' professional lives*. London: Falmer Press.

Habermas, J. (1984). *The theory of communicative action*. Cambridge: Polity Press.

Harteis, C., & Billett, S. (2008). The workplace as learning environment: Introduction. *International Journal of Educational Research, 47,* 209-212.

Johansson, A. W. (2008) Kritisk reflektion och handling i interaktiv forskning [Critical reflection and action in interactive research]. In B. Johanisson, E. Gunnarsson, & T. Stjernberg (Eds.), *Gemensamt kunskapande. Den interaktiva forskningens praktik*. (Acta Wexionensia nr. 149/2008.) Växjö: Växjö University Press.

Kemmis, S., & Smith, T. J. (Eds.). (2008). *Enabling praxis. Challenges for education*. Rotterdam: Sense Publishers.

Kolb, D. (1984) *Experiential learning. Experience as the source of learning and development*. New Jersey: Englewoods Cliffs, Prentice-Hall inc.

Korthagen, F., & Vasalos, A. (2005) Levels in reflection: Core reflection as a means to enhance professional growth. *Teachers and Teaching: Theory and Practice*, *11*(1), 47-71.

Lave, J., & Wenger, E. (1991). *Situated learning. Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.

Lortie, D. (1975). *Schoolteacher: A sociological study*. Chicago: University of Chicago Press

Löfberg, A. (1989). Learning and educational intervention from a constructivist point of view: The case of workplace learning. In H. Leyman & H. Kornbluh (Eds.), *Socialization and learning at work* (pp. 137-158). Aldershot: Avebury.

McCotter, S. S. (2001). Collaborative groups as professional development. *Teaching and Teacher Education, 17*, 685-704.

Mulford, W. (1998). Organizational learning and educational change. In A. Hargreaves, A. Lieberman, M. Fullan, & D. Hopkins (Eds.), *Extending educational change: International handbook of educational change* (pp. 336-361). London: Kluwer Academic Publishers.

Nonaka, I., & Takeuchi, H. (1995). *The knowledge creating company*. Oxford University Press: Oxford.

Ohlsson, J. (2002). Learning organization in theory and practice: Ongoing organizing and collective learning in teacher teams. In A. Bron & M. Schemmann (Eds.), *Social science theories in adult education research* (pp. 242-269). Münster: LIT Verlag.

Orland-Barak, L. (2006). Convergent, divergent and parallel dialogues: Knowledge construction in professional conversations. *Teachers and Teaching: Theory and Practice*, *12*(1), 13-31.

Parsons, M., & Stephenson, M. (2005). Developing reflective practice in student teachers: Collaboration and critical partnerships. *Teachers and Teaching: Theory and Practice*, *11*(1), 95-116.

Rosenholtz, S. J. (1989). *Teachers' workplace. The social organization of schools*. New York & London: Longham

Rönnerman, K., Moksnes Furu, E., & Salo, P. (Eds.). (2008). *Nurturing praxis. Action research in partnerships between school and university in a Nordic light*. Rotterdam: Sense Publishers.

Salo, P., & Johnson, P. (2008). Action research and the paradox of school reform: Lessons from Finland. In K. Rönnerman, E. Moksnes Furu, & P. Salo (Eds.), *Nurturing praxis. Action research in partnerships between school and university in a Nordic light*. Rotterdam: Sense Publishers.

Senge, P. (1990). *The fifth discipline. The art & practice of the learning organization***.** New York: Doubleday.

Schein, E. (1993). On dialogue, culture, and organizational learning. *Organizational Dynamics*, *22*(2), 40-51.

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.

Skolverket. (2006) *Allmäna råd och kommentarer för kvalitetsredovisningar*. Nr: 06:950, Skolverket.

Svensson, L., Ellström, P-E., & Brulin, G. (2007) Introduction – on interactive research. *International Journal of Action Research, 3*(3), 233-249.

Svensson, L., Eklund, J., Randle, H., & Aronsson, G. (2007). Interactive research – An attempt to analyse two change programmes. *International Journal of Action Research, 3*(3), 250-277.

Verloop, N., van Driel, J., & Meyer, P. (2001). Teacher knowledge and the knowledge base of teaching. *International Journal of Educational Research*, 35, 441-461.

Vähäsantanen, K., & Billett, S. (2008). Negotiating professional identity. In S. Billett, C. Harteis, & A. Eteläpelto (Eds.), *Emerging perspectives of workplace learning* (pp. 35-49). Rotterdam: Sense Publishers.

Weick, K. E. (1995). *Sensemaking in organizations*. Thousand Oaks, California: Sage.

Weick, K., & Roberts, K. (1993). Collective mind in organizations. Heedful interrelating on flight decks. *Administrative Science Quarterly, 38*, 357-381.

Wenger, E. (1999). *Communities of practice. Learning, meaning, and identity*. Cambridge University Press.

# Chapter 14
# The Relationship between Coach and Coachee: A Crucial Factor for Coaching Effectiveness

**Marianne van Woerkom**

Tilburg University, Netherlands

**Abstract** Coaching, and especially executive coaching, is one of the fastest growing industries in recent years and is being used more and more often for the development of workers. This chapter seeks to explain the effectiveness of the relationship between the coach and the coachee in collegial coaching. For this purpose 35 coachees and their coaches were interviewed. The coachees were all managers working for the Dutch government. Their coaches were also managers who were trained to coach their colleague managers from other departments within the government. The findings show that coachees attributed the effectiveness of their coaching to a large part to the relationship they had with their coach. Receiving unconditional acceptance and respect from the coach was not only a facilitative condition, but also directly responsible for change. Furthermore, the findings indicate that although there should be a certain distance between the coach and the coachee, a purely formal unilateral helping relationship is less effective than a mutual relationship in which a deeper personal connection exists between the coach and the coachee. Also, the findings suggest that while differences between the coach and coachee in terms of personality may lead to useful challenge, when it comes to beliefs and values more similarity between coach and coachee is desired.

## 14.1 Coaching

In the past decade or so, the popularity of coaching in organisations has risen considerably as an alternative to conventional training approaches, such as attending courses (Feldman & Lankau, 2005). Coaching is seen as an experiential, individualised development process through one-on-one interactions (Stern, 2004). It is held to provide a more flexible and responsive approach to individuals' diverse development needs rather than the 'one size fits all' training approach (Jarvis, 2004).The coaching approach is especially important when the purpose is personal development or the development of communication and interpersonal skills. This latter form of development, in particular, requires a process of close guidance by another, who can guide, monitor, and assist directly with this kind of development. Moreover, whereas many development approaches are often targeted at 'fixing what is broken,' coaching can facilitate learning instead of

S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2_14, 

teaching, and the discovery of untapped potential that leads to greater effectiveness (Goldsmith, Lyons, & Freas, 2000). Just as in the past, when the word 'coach' was used to refer to a carriage that carried passengers to their destination, coaching in the contemporary context also refers to carrying persons from one point to another (Stern, 2004). In the context of organisations (e.g., workplace settings), coaching is often used to refer to a helping relationship between a client and a consultant who uses a variety of behavioural techniques and methods to assist the client (i.e., coachee) achieve a mutually identified set of goals to improve his or her professional performance and personal satisfaction (Kilburg, 1996). Although the terms coaching and mentoring are often used interchangeably, mentoring is often used to refer to a more long-term, informally developed relationship between a more experienced and a less experienced employee, across working lives. In contrast, coaching relationships are usually held to be shorter in duration (e.g., 6-18 months) and are formally contracted (Feldman & Lankau, 2005). In this way, it almost has a clinical connotation. Also, where mentoring is generally aimed at professional development with mentors trying to help their mentees with their knowledge and experiences, coaching is held to be focused more on specific goals and the development of specific practices by helping coachees to improve awareness of their behaviour (Truijen & Van Woerkom, 2008). In this chapter, the term coaching is used for a formally contracted helping relationship between a coachee and a so called 'colleague coach'; that is, a colleague working for other departments within the organisation and who was trained to be a coach, as in the same kind of clinical supervision role that is familiar in practice of social workers, counsellors, and psychologists. For these reasons, the type of coaching that was central in this study can be seen of as a mix between external and internal coaching, and between peer coaching and professional coaching.

Although a growing body of practitioner literature has emerged on coaching, research on executive coaching has lagged far behind the practitioner literature and there is little theoretical research that examines how or why coaching works (Feldman & Lankau, 2005). While there has been a trend of investigating the relationship between coaching and interpersonal and intrapersonal factors, the coach-client relationship has received scant attention, in spite of the fact that the coaching literature suggests that the coaching relationship can be seen of as a tool of change (O'Broin & Palmer, 2006). Although we know from research into psychotherapy that the relationship between therapist and client is an important explanatory factor for the effectiveness of the treatment, we do not know to what extent this is also the case for the coaching relationship, and also what aspects of this relationship play a role in the outcomes of coaching..

This chapter proposes that the relationship between the coach and client is an important explanatory factor for understanding coaching effectiveness, and that mutual trust between the coach and the coachee is a basis for greater disclosure and self-exploration by the coachee, and thereby fosters a more effective coaching relationship. First, the literature on the coaching relationship is briefly discussed,

and literature on the therapist-client relationship is drawn upon. Next the findings of interviews with 35 coachees working for the Dutch government are reported. The coachees who participated in this study were working at the same organisation as their coaches (the Dutch government) but not at the same department. The coaches were coach as a second profession, next to their regular job, but were nevertheless assessed and trained on their coaching skills. The most crucial aspects of the coaching relationship based on the interviews are presented in conclusion.

### *14.1.1 The Coaching Relationship*

Given the kinds of factors that characterise coaching, at the heart of effective coaching practice is the relationship between the coach and the coachee. Besides establishing an intervention agreement, creating and maintaining expectations of success, providing experiences of mastery and cognitive control, and evaluating and attributing coaching success and failures, building a coaching relationship is an important component of coaching (Kilburg, 1996). Coaching is, just like therapy, based on an ongoing, confidential, one-to-one relationship between the practitioner and the client (Hart, Blattner, & Leipsic, 2001), and because coaching and therapy are based in similar theoretical constructs similar issues in the relationship between the practitioner and the client may arise (Hart et al., 2001). Rogers was the first to argue that it is the empathy, congruence, and unconditional positive regard offered by the therapist that is central to the effectiveness of therapy, not only the techniques that therapists apply (Horvath, 2000). The findings of the many studies that followed Roger's claim have repeatedly demonstrated that non-specific aspects of helping, such as the relationship, may create most of the positive impact for change, regardless of the conceptual foundations espoused by different practitioners (O'Broin & Palmer, 2006). The alliance comprising this relationship is not a characteristic of the therapist, but a 'real' bidirectional relationship that involves agreements and collaboration between the therapist and the client (Horvath, 2000). A good alliance with the client includes not only a positive, empathetic disposition by the therapist, but also a partnership in which clients see themselves as active, collaborative, respected participants and actively endorse the activities forming the core of therapy. Bordin (1994) defined the alliance between therapist and client in three interlocking components: i) bonds, referring to interpersonal attachments, liking, trusting, and so on, ii) tasks, agreements, or consensus between therapists and clients with respect to 'what is to be done' in therapy and how various activities in therapy will contribute to the resolution of clients' problems, and iii) goals, consensus on the short- and long-term outcome expectations between therapists and clients. Bordin argued that the alliance is both a facilitative condition for the effective

implementation of a variety of therapeutic tasks and a beneficial therapeutic agent in its own right. All three of these components are premised on bilateral relations.

However, although coaching and therapy have several features in common, Hart et al. (2001) identify three differences between coaching and therapy. Where the focus in therapy is often retrospective, dealing with unconscious issues and repair of damage from earlier experiences, coaching is prospective, goal-directed, and action-based. Also, where remaining distant is a concern for therapists, it is less so in coaching relationships. In therapy relationships boundaries are usually rigid and impermeable, while there is more humour and greater flexibility within the coaching relationship. Also, where therapists are seen as experts and healers, coaching implies more collaboration between coach and client. Psychologists who work both as a therapist and as a coach describe the coaching relationship as 'having a skilled friendship' or 'partnership' while they report to be more distant and protective and not to develop friendships with their therapy clients (Hart et al., 2001). On the other hand, some authors (Feldman & Lankau, 2005; Sperry, 1993) argue that compared to mentor relationships, the interactions between coaches and clients tend to be more formal and structured in nature and coaching does not require the development of close, personal bonds.

Compared to counselling, the coach-client relationship is seen as more collegial, more collaborative, and egalitarian, and as involving less need for self disclosure by the client (O'Broin & Palmer, 2006). Therefore, consensus between the coach and the coachee about the goals of the coaching and what is to be done to achieve those goals (Bordin's (1994) tasks and goals) is usually less of an issue in coaching compared to therapy. In most cases, the coachees formulate their own coaching goals while the coaches are there only to assists in making these goals more concrete, and in helping coachees to achieve these goals. Tasks like assignments and writing reflection reports are often mutually agreed upon. Consequently, the quality of the coaching relationship is central to effective coaching performance.

## 14.2 Coachees' Accounts of the Coaching Relationship

To elaborate the qualities of coaching relationship, and how they affect the perceived effectiveness of the coaching process, interviews with 35 coachees, working for the Dutch government as managers or who are operating at a consultative or policy-making level are drawn upon. These coachees were coached by so called 'colleague-coaches' who were also employed with the Dutch government. These colleague-coaches were, therefore, not fulltime professional coaches, but had coaching as 'a second profession' (Dijkstra, 2007). They acted as a coach on a voluntary basis and were assessed and trained on skills in listening, questioning, confrontation, and relationship building for this role. The coaching interludes lasted on average 7 months with an average of six coaching sessions.

Coaches and coachees were matched on the basis of an intake interview with the coachee. In this interview a consultant from the intermediate organisation would have a conversation with the person who was looking for a coach to find out the issues for which this person wanted to be coached and whether the coachee had a preference for a specific coach (for instance in terms of gender, age, work experience, personality etc.) Also, it was ensured that coach and coachee would never be working at the same department so they could not meet each other in their daily work. The coaching interludes always commenced with an introductory meeting after which both the coach and the coachee could decide if they wanted to continue with each other. The 35 coachees started the coaching trajectories with various coaching goals in the area of leadership skills, personal effectiveness, career counselling, and work-life issues.

The coaching relationship was explored through interviews with the coaches and coaches. Examples of interview questions are: 'What has been the most important factor in the effectiveness of your coaching interludes?' 'How do you look back on the coaching relationship you and your coach had?' 'To what extent does the coaching relationship still contribute to your current development?' The interviews were conducted 1 year after the coaching interludes had been completed and, as such, allowed the former coaches to reflect, retrospectively, upon their experiences.

Coachees were asked whether the most important factor in the effectiveness of their coaching trajectory had been: i) their personality, ii) the coach's personality, iii) features and activities related to the coaching trajectory, iv) the fact that the coach was a colleague-coach who was well acquainted with their work environment, or v) the relationship between the coach and the coachee. The majority of the coachees chose the latter option: the relationship between the coach and coachee. A coachee said: 'If the relationship is not good, the rest won't work either.' Trust is held to be of crucial importance according to many coachees. There must be the absolute confidence that the coaching sessions are strictly confidential. A coachee:

> I know that my boss's wife is a colleague of my coach. So they talk to each other in the lunch break. But he made me clear right from the start that our conversations would be strictly confidential and that he would not communicate with anybody else about it.

But also on a deeper level, trust presented as the precondition for a successful coaching process. If there is no trust between the coach and the coachee, coachees are not likely to open up.

> You come to speak about things that are very close to you as a person, why do you act like you do? Why do you find some things important? If you don't trust your coach, you are not going to open up.

Another coachee claimed: 'You make yourself very vulnerable because you are there to focus on your weaknesses in the presence of a total stranger. If there is no trust than no way that I am going to outpour.'

There were also some indications that the unconditional acceptance and respect the coaches received from their coach was not only a facilitative condition, but also directly responsible for change. A coachee:

> At a certain moment, my coach said, the government should be very pleased if more people like you would want to work for them. From than on I felt like, OK, I don't have to proof myself to anyone. I am here to learn and I can be vulnerable without being judged.

Another coachee: 'Whatever I told him, he was never judgmental. Never like "You did that all wrong." Everything I told him was OK. This gave me lot of confidence.' Also, the fact that the coaches, who were very busy managers themselves, were completely focused on the coaching task and would not let themselves be disturbed by the phone, for instance, was mentioned by several coachees as a signal that gave them the feeling that they were important.

Some coachees also indicated that trust is a prerequisite for honest feedback from the coach. 'I can be very long winded and speak in superlatives. He confronted me with that. I appreciated that because in real life not many people are so honest with you.' Another coachee:

> He told me he would nag me and tease me and hold a mirror for me. I'm very demanding towards myself, then I think I am not as good as others are. He asked me why I kept on stirring in the same pot, always again and again. Suddenly I realised I did that, that insight came as a lightning so clear. And from than on I have learned to let that go.

Several coachees also indicated that trust means more than that the coachee should trust the coach, but that there should be mutual trust. Coaches should also have the confidence that their coachees act upon the things they have discussed in the coaching sessions, so that they do not have the feeling they are wasting their time. Also, several coachees indicated that they prefer a mutual relationship with their coach instead of a one-way relationship. A coachee confided:

> He kept on asking me questions, and I felt a bit naked. It felt like I was in the hearing room. I asked him, please tell me a bit more about yourself. What are the issues that you deal with yourself? He asked me why that was so important to me, a coach is not supposed to tell about himself. But for me, it kind of broke the ice.

Another coachee indicated that the feeling of a one-way relationship with her coach would have made her feel uncomfortable and that she needed to have indications that she was also trusted by her coach.

> It is not just that I have to trust my coach. That would have made me feel uncomfortable. He also should trust me. It should be a mutual relationship. A number of times we exchanged confidential information, more than was strictly necessary for my learning goals. But to me that indicated that we really trusted each other and that was important for me.

A third coachee claimed:

> Our relationship developed into some kind of friendship. We also talked about our home situation and our holidays etc. Or we would send each other short e-mails 'Hey, how are you doing?' That is not a bad thing. I think that is important for coaching to be successful.

A fourth coachee proposed that:

> It was not always me who opened up to him, he did that too sometimes. To show me, well, I don't know, but it showed me it that our trust was mutual and it felt like we were equal. So in that sense this was very functional.

A fifth coachee indicated that building a personal relationship with the coachee, can develop the professional relationship more easily:

> The professional click was there earlier than the personal click. My coach was functionally interested in me and in everything that could bring my coaching goal closer. But I think he should learn to make that personal click sooner, so that the professional click follows more easily.

These statements show that a purely formal unilateral helping relationship is perceived as less effective than a mutual relationship in which there is a deeper personal connection in which coachees can feel safe. It seems that the coaching relationship can be seen as an exchange relationship in which coachees want something back in return for their personal confessions from their coach (Campbell Quick & Macik-Frey, 2004).

On the other hand, coaches may need to be careful that the problems and needs of the coachee remain central in the coaching relationship. They also should not empathise too much with the coachee because they have to hold a mirror to the coachee. A coachee who sought to find out his career path and wanted to know if he should become a manager or a consultant stated:

> I expect a coach not to give the answers, but only pose you questions. He did that, but what he also did was making his experiences and his story central. Sometimes he gave the feeling that I should do it as he had done it. And that doesn't work for me.

Another coachee indicated that there should be a certain distance between the coach and the coachee because only then the coach can be stringent and keep the coachee to their promises about homework et cetera. In this way, there has to be a balance between a friendship relationship and a professional helping relationship in an effective coaching relationship.

The majority of the coachees also indicated that for them it was important that their coach was a colleague coach - with work experience in an organisation similar to their own. A woman who used to be a judge but who had recently accepted a management position at court indicated that it was very important that her coach was also a judge, so that she understood what she was talking about. 'It would have been so different if she would have been a manager in for example the manufacturing industry; that is so completely different from the legal context.' Pertinent expertise was also sought by one coachee who was a deputy manager and wanted to find out if he really wanted to be a manager. He wanted to talk to an experienced manager within the government who could ask him the right questions. 'This type of work is so hard to explain to some one who doesn't know the political context. You have to talk to someone who knows how it works within the government.' Another coachee pointed out that it was important for him to know if his coach had children too:

> Just to know if he would understand me if I would talk about my work-life balance issues. I am a father of two children and that sometimes brings about issues related to the work-life balance. If he would not have had children himself I would talk about these issues differently than if he would have children.

It is important that the coach is similar to the coachee in some respects, and has affinity with the issues with which the coachee is dealing. One coachee concluded:

> I think we are similar in some respects. I want to stimulate innovation at my department and he wants that too. The coaching trajectory would have been much harder, and not very motivating if he would have been a typical conservative civil servant.

In another example of coachees wanting coaches who aligned with their interests, a coachee indicated that she felt no match with the coach that was initially appointed to her:

> He worked for the ministry and had no feeling whatsoever with the local government which I work for. He also was much older and much more experienced than I am. It was terrible, I felt so uncomfortable, and I kept on thinking, 'I don't want this.'

She was appointed a new coach and with this person there was an immediate bond:

> We had a very nice first meeting at the railway station. We went to a café to have a cappuccino and we kept on talking and talking. Like me he was unconventional and was not startled when I said something funny, beside the beaten track. If people get scared when I say or do something strange I think, 'Oh how boring.'

These examples indicate the importance of shared values for the success of the coaching. In the latter example, while the coach who was initially appointed to the woman had no feeling for the situation in which she was working for the local government and was different in terms of age, gender and experience, the new coach shared the coachee's value of being unconventional which made her feel at ease and provided a good basis for the coaching interludes. However, whether a compatible work experience was really important depended of the coaching question. Some issues were felt to be so universal that the work context does not really matter. A coachee: 'If it would have been someone working in the private sector than we would have had the same conversations. These problems are not only relevant in the public sector.'

Also, several coachees indicated that it had been beneficial for the coaching relationship that the coach had a different personality than themselves. A female coachee talked about her coach being even more contemplative than herself.

> She told me I was too quick with something. That amazed me. After the coaching session was over I went for a cup of coffee, and I kept on thinking about it. And after a while I thought, yeah, she is right, it is one of my weaknesses to keep on going and to bulldozer over things and sometimes also over people.

Another coachee about his coach:

> He is very decisive while I need more time to think things over. His decisiveness helped me during the our conversations, he analyses quickly, and then poses the next question, that speeds things up and is good for the coaching process.

Another coachee stated that her coach was a very quiet person, while she used to talk a lot.

> He can be as sharp as a knife with just a few words. That is what I have learned from him. Being more effective by using less words. I have had an employee that caused problems again and again. I was so fed up with it. And my coach taught me not to keep on talking to her but just to ask her why she was doing that and to lean back and listen.

These findings show that differences between the coach and the coachee in terms of their personality may be an important source of learning. When the coach has a different personality than the coachee, this makes it easier to challenge the coachee's assumptions and routines, and thus leads to more effective coaching sessions.

## 14.3 Conclusion: Crucial Aspects of an Effective Coaching Relationship

Although some authors argue that coaching is a more formal and structured process than mentoring and that the development of close, personal bonds is not necessary (Feldman & Lankau, 2005; Sperry, 1993), the findings here indicate that for many coaches the mutual trust between coach and coachee is an important element in the coaching process. Formally, coaches are there to help the coachees. The coaching relationship, therefore, might be seen as constituting a formal and unilateral relationship. However, many coachees indicate that a formal coaching relationship in which the personality of the coach remains invisible and the process is purely focused on their own learning goals is not the basis for building a relationship through which guidance can best be provided, because they want to engage in a more 'holistic' way with those who guide them. Although compared to counselling the coach-client relationship is sometimes seen as involving less need for self disclosure by the client (O'Broin & Palmer, 2006), the findings show that coachees attach so much importance to mutual trust because it facilitates their self-disclosure. Self-disclosure by the coach elicits greater disclosure by the coachee, enhancing the possibilities for coachee self-exploration and encouraging an atmosphere of honesty and understanding between the coach and the coachee, fostering a stronger and more effective coaching relationship (Barrett & Berman, 2001). Most coachees in this study prefer a relationship that has the features of a mutual relationship as in a critical friendship. A critical friend understands the context of the work presented and the learner's desired outcomes, listens well, offers value judgments on the learner's request, and responds honestly (Arthur & Kallick, 1993). This empathetic stance is consistent with the relational view that is informed by the feminist literature, which proposes that by forming mutual and meaningful connections with others, individuals may gain a greater sense of purpose, vision, and self-understanding (Parker, Hall, & Kram, 2008). It is also consistent with Barrett and Berman's (2001) findings that show that clients from

therapists who modestly disclosed personal information during psychotherapy in response to comparable self-disclosures by the client report lower levels of symptom distress and also liked their therapist more, thereby improving both the quality of the therapeutic relationship and the outcome of treatment. It is concluded that coaches need to be able and willing to show their own personality in the coaching relationship although there will remain a tension between the development of a friendship, on the one hand, and the distance that is required for honest feedback and keeping coachees to their promises, on the other hand (Parker et al., 2008).

Another implication of this study is that the match between the coach and the coachee also seems to be extremely important for the development of an effective coaching relationship. This study indicates that differences in personality between the coach and the coachee are not necessarily problematic and might even be a source of learning. This is consistent with the results of a study of Scoular and Linley (2006), who investigated 120 coaching sessions of 30 minutes. The coach and coachees had never met before and were randomly allocated. Both coaches and coachees completed personality questionnaires. Scoular and Linley found that when coach and coachee differed on temperament, outcome scores were significantly higher (indicating greater benefit of the coaching session). An explanation for this might be that when the coach and coachee differ on temperament, the coach may instinctively come from a different perspective, and challenge coachee assumptions more, with this more complex interaction leading to higher performance outcomes (Scoular & Linley, 2006).

However, in terms of values more similarity between coach and coachee is desired. When coachees perceive that their coach is similar to themselves in terms of beliefs, expectations, and values, they are more likely to assume that they have 'common ground' and therefore that their coach will understand their goals (Dryer & Horowitz, 1997). Coaches should at least have affinity with the issues with which the coachee is dealing; being coached in how to achieve more innovation in your department may be not very inspiring when the coach himself does not value innovation. This is consistent with Arizmendi, Beutler, Shanfield, Crago, and Hagaman (1985) who found that both therapist and patient ratings of the therapy outcome were enhanced by similarities in values being placed on humanistic and philosophical concerns. Also, Kelly and Strupp (1992) found that patient–therapist dyads whose values were moderately similar showed the most improvement. It is also in line with Hersoug, Høglend, Monsen, and Havik (2001) who found that similarity of values in terms of something that is personally or socially preferable, such as tolerance, honesty, obedience, et cetera predicted the patients' ratings of the alliance. In all, these propositions suggest that when making the match between coaches and coaches, attention should be paid not only to the personality of the coach, but also to the values of coach and coachee to ensure that coach and coachee have enough 'common ground.'

This study has shown that internal coaching may be a powerful tool for fostering individual development processes. Coaching as a process of human

development is still mostly accessible for senior leaders (Plunkett & Egan, 2004), because it is often seen as too expensive for other employees. By involving internal coaches who volunteer to serve as a coach as a part of their job, and who are trained for this role, coaching could be made available to more employees. The experiences within the Dutch government show that many high-ranked managers showed an interest in coaching younger professionals and volunteered to be trained as a coach. They also indicated to have benefitted from being a coach in terms of their leadership skills and their own personal development. So when coaches are carefully matched to their coachees and are trained in building effective mutual relationships with them, internal coaching may be a process that contributes not only to the development of the coachee, but also to the development of the coach.

## References

Arizmendi, T. G., Beutler, L. E., Shanfield, S. B., Crago, M., & Hagaman, R. (1985). Client–therapist value similarity and psychotherapy outcome: A microscopic analysis. *Psychotherapy: Theory, Research, Practice, Training, 22*, 16-21.

Arthur, C. L., & Kallick, B. (1993). Through the lens of a critical friend. *Educational Leadership, 51*(2), 49-52.

Barrett, M. S., & Berman, J. S. (2001). Is psychotherapy more effective when therapists disclose information about themselves? *Journal of Consulting and Clinical Psychology, 69*, 597-603.

Bordin, E. S. (1994). Theory and research on the therapeutic working alliance: New directions. In A. O. Horvath & L. S. Greenberg (Eds.), *The working alliance: Theory, research, and practice* (pp. 13-37). New York: Wiley.

Campbell Quick, J., & Macik-Frey, M. (2004). Behind the mask: Coaching through deep interpersonal communication. *Consulting Psychology Journal: Practice and Research, 56*, 67-74.

Dijkstra, T. (2007). *Coachen als tweede beroep* [Coaching as a second profession]. Zaltbommel: Schouten en Nelissen.

Dryer, D. C., & Horowitz, L. M. (1997). When do opposites attract? Interpersonal complementarity versus similarity. *Journal of Personality and Social Psychology, 72*, 592-603.

Feldman, D. C., & Lankau, M. J. (2005). Executive coaching: A review and agenda for future research. *Journal of Management, 31*, 829-848.

Goldsmith, M., Lyons, L., & Freas, A. (2000). *Coaching for leadership*. San Francisco, CA: Jossey-Bass/Pfeiffer.

Hart, V., Blattner, J., & Leipsic, S. (2001). Coaching versus therapy: A perspective. *Consulting Psychology Journal: Practice and Research, 53*, 229-235.

Hersoug, A. G., Høglend, P., Monsen, J. T., & Havik, O. E. (2001). Quality of working alliance in psychotherapy. Therapist variables and patient/therapist similarity as predictors. *The Journal of Psychotherapy Practice and Research, 10*, 205-216.

Horvath, A. O. (2000). The therapeutic relationship: From transference to alliance. *Journal of Clinical Psychology/In Session: Psychotherapy in Practice, 56*(2), 163-173.

Jarvis, J. (2004). *Coaching and buying coaching services. A guide*. London: CIPD.

Kelly, T. A., & Strupp, H. H. (1992). Patient and therapist values in psychotherapy: Perceived changes, assimilation, similarity, and outcome. *Journal of Consulting and Clinical Psychology, 60*, 34-40.

Kilburg, R. R. (1996). Toward a conceptual understanding and definition of executive coaching. *Consulting Psychology Journal: Practice and Research, 48*, 134-144.

O'Broin, A., & Palmer, S. (2006). The coach-client relationship and contributions made by the coach in improving coaching outcome. *The Coaching Psychologist, 2*(2), 16-19.

Parker, P., Hall, D. T., & Kram, K. E. (2008). Peer coaching: A relational process for accelerating career learning. *Academy of Management Learning, 7*, 487-503.

Plunkett, B. L., & Egan, T. M. (2004, February). *Application of psychology-based theoretical approaches to executive coaching. A summary and exploration of potential utility.* Paper presented at The Academy of Human Resource Development, Bowling Green, OH.

Scoular, A., & Linley, P. A. (2006). Coaching, goalsetting and personality type: What matters? *The Coaching Psychologist, 2*(1), 9-11.

Sperry, L. (1993). Working with executives: Consulting, counseling, and coaching. *Individual Psychology, 49*, 257-266.

Stern, L. R. (2004). Executive coaching: A working definition. *Consulting Psychology Journal: Practice and Research, 56*, 154-162.

Truijen, K. J. P., & Van Woerkom, M. (2008). The pitfalls of collegial coaching. An analysis of collegial coaching in medical education and its influence on stimulating reflection and performance of novice clinical teachers. *Journal of Workplace Learning, 20*(5), 316-326.

# Chapter 15
# The Development of Airline Pilot Skills through Simulated Practice

**Timothy J. Mavin and Patrick S. Murray**

Griffith University, Australia

**Abstract** Pilot education and training has historically been centred on knowledge of aircraft systems and flying skills. Additions to pilot training syllabi over the years have generally occurred due to advances in technology that have required new skills and knowledge to be taught. However, research into aviation accidents over the last 30 years has identified disconnects between current syllabi and pilot needs in the work place. Despite the new perspectives of required pilot skills, traditional habits within training are still embedded in modern training syllabi and, more importantly, the current practice-based methods. Changes are needed in pilot training programmes to improve areas such as team skills, decision making, and communication. These changes are likely to see an increasing use of simulators of varying levels of sophistication to allow authentic practice-based training activities for pilots. Importantly, there is also a need to improve assessment methods for practice-based activities.

## 15.1 Pilot Training

Sometimes it is difficult to pinpoint a time that could be recognised as the birth of an occupation and identify how skills for that occupation were first developed. Aviation, however, can be traced to a precise date – 17 December 1903. On that day, two brothers, Orville and Wilbur Wright, successfully flew a heavier-than-air aircraft across the hills of Kittyhawk, North Carolina. It was there and then that aviation was born and the occupation of piloting begun (Mondey, 1977). From that day onwards, individuals began the process of developing aircraft flying skills. As outlined in the introduction to this book, tradition has heavily influenced current practices in developing occupational knowledge. This chapter discusses the historical development of that process and current progress in aviation training. Over the years, the occupational standing of piloting has fluctuated between 'trade' and 'profession.' In the early years, as with many trades, the training of professional pilots concentrated mainly on technical manipulative skills. The recent development of competency-based standards for these skills reinforced the trade links. Additionally, government regulatory authorities in most countries set and maintain standards for the occupation of piloting, as opposed to regulation by a professional body – as with many professions. However, in the

S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2_15, 

past 30 years there has been a progressive change in the emphasis and approach to education and training of pilots – particularly airline pilots. This new emphasis places an ever-increasing importance on the so-called 'nontechnical skills' (NTS), which include decision making, communication, and teamwork. Development and practice of these skills through simulation has assumed a new level of importance. Additionally, there is a changing prominence, whereby universities today are playing a greater role in pilot education and training than they did previously.

Aviation is an intriguing and sometimes difficult profession to understand. This chapter attempts to unravel some of the mystery by expanding upon various historical trends and current practices in aviation education and training, whilst focusing on contributions of practice-based experiences. An early perspective of pilot training is included that is still, to an extent, embedded in modern training practice. Also reviewed are reasons for significant changes in training that occurred when research during the 1980s discovered that 'human factors' were the cause of the majority of aviation accidents. What follows is a discussion about some of the useful practice-based learning methodologies utilised in modern aviation training to improve outcomes for pilot performance. These include use of simulation, improved metrics for assessing both individual and crew performance, and methods for training pilots for rapid promotion to airline captain in times of fast expansion. In all, the chapter proposes that sustainable training of professional pilots is based on environments in which knowledge is integrated into practice-based models that have an ever-increasing reliance on simulation.

## 15.2 Early Flight and Pilot Training

Since the first flight, the training of pilots has centred on three main areas. Firstly, pilots began by learning about the fundamentals of flight. This included an understanding of what was known at that time of aerodynamics and flight control systems. Ground instruction embraced the workings of systems, such as engines, related to flight. In many ways, it was learning based on technical components of an aircraft. Equally important to technical knowledge was an understanding of rules associated with operation of aircraft. However, early regulations were scant, to say the least. Only when larger numbers of aircraft began to fly were 'rules of the air' developed, and ground instruction on these new regulations was required.

The second area concerned the physical skills required to manipulate aircraft on the ground and in the air. This included rudimentary ground instruction with a focus on actual 'hands on' flying. It comprised techniques such as starting aircraft by utilising what was known as the 'hand start.' This encompassed a pilot being at the controls of the aircraft (usually), whilst another pilot or engineer would physically rotate the propeller to start the engine – leaping away to avoid contact with the swinging propeller. Somewhat less dangerous activities included the ability to manipulate aircraft on the ground – a skill that was called 'taxiing.'

Training soon advanced to practising take-off and landing skills, as well as general handling techniques. This embraced manoeuvres like turning, stalling, and forced landings to cope with engine failures (which occurred frequently). What was striking at this time in aviation history was that some of the initial training was conducted solo by the student (Moroney & Moroney, 1999). This solo flying was (and generally still is) considered important for consolidation of both competence and confidence. There was little standardisation of methods of training or pilot competence, and this was reflected in the losses of pilots and aircraft during World War I. One of the main critics of these practices was Major Smith-Barry of the Royal Flying Corps, and in 1916 he committed his views to paper. Smith-Barry's system was based not on avoiding potentially dangerous manoeuvres, as was common, but on exposing students to them in a controlled manner so that they could learn to recover from them, thereby gaining confidence and skill. Smith-Barry wanted a school for flying instructors, where all instructors would have their flying brought up to the high standard necessary to enable them to teach with confidence and ease. Furthermore, he aimed to standardise instruction methods and provide the basis for developing training programmes. He also recommended the introduction of dual controls in aircraft so that pupils could learn to fly to the limits of their aircraft, whilst the instructor could intervene if flight manoeuvres became dangerous. Smith-Barry was brought home from the war in France and given command of a squadron at Gosport, England, where he could put his ideas into practice. He soon had his new 'Central Flying School' operating on dual-controlled aircraft such as Avro 504Js, Bleriots, and Bristol Scouts, and he developed a syllabus of basic flying exercises. The standard of flying improved even further after the introduction of the 'Gosport Tube,' which enabled the instructor to converse easily and comfortably with his pupil during flight, something that had previously not been possible.

Between the world wars, advances in aircraft systems and range placed demands on pilots' navigational skills. In the 1930s, progress in aircraft instrumentation enabled pilots to fly with sole reference to instruments inside the aircraft, allowing aircraft for the first time to fly in poor weather (Koone, 1999). These initial complexities required additional advanced training. Consequently, in fewer than 30 years, aviation had developed training programmes that took pilots from basic manipulative skills through to advanced operations in poor weather. Yet most training at this point was practice-based training in real aircraft. The onset of World War II heralded a major change in pilot training. One of the factors that had to be considered was further advances in aircraft size, speed, and range. For example, aircraft with larger engines and higher speeds developed increased levels of vibration, creating crew fatigue. Aircrew (a term that developed as aeroplanes were now crewed by more than just a single pilot) were required to operate aircraft at high altitudes and extremely cold temperatures for long periods. Training began to embrace the implications of aeromedical 'human factors' and team skills training. As the level of classroom instruction increased, the amount of practice-based learning began to decline. Around this time, some of the first

university research and training programmes also began (Koone, 1999). This early research was largely based upon aeromedical issues and classical military 'leadership' programmes.

Despite the enormous advances in aircraft technology and systems that have occurred until today, the legacy of Smith-Barry's very early training approach remains embedded in current pilot training programmes. Around the world, pilots continue to follow a comparable programme in their early careers, similar to those of previous generations. This training programme focuses upon ground-based training that is generally related to the practice-based activities that will be undertaken in the aircraft.

## 15.3 Pilot Education in the Jet Age

After World War II, there were huge enhancements to aircraft propulsion systems. One of the major changes affecting both military and civil aviation was the introduction of jet engines. Intercontinental and oceanic flights halved their travel times. What also came with jet propulsion was reliability. Departing aircraft were now more likely to arrive at the destination safely, which was an excellent marketing tool for airlines. Airline travel expanded exponentially and continued to grow strongly for the next 50 years. This growth was halted only in 2001 as a result of the terrorist activities in the United States, and in the latter part of 2008 due to the world economic downturn. It is interesting to note that, despite the enormous increase in airline travel during the 50 years after WWII, a proportional increase in accidents and incidents did *not* occur. If anything, the opposite trend was observed (refer Figure 15.1). This can be attributed to the high levels of reliability that were inherent in jet aircraft (Helmreich & Foushee, 1993). During this period of expansion, pilot training still focused on flying skills and technical knowledge that was embedded from early training programmes. Up until this point, those skills had assisted in dealing with malfunctions that were prevalent during the early development of these aircraft. However, pilot training programmes were to change, following a number of accidents and major loss of life that occurred in the 1970s.

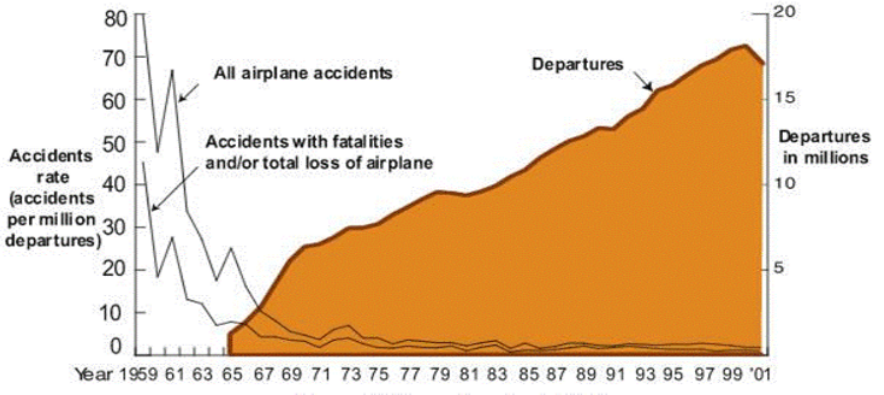


**Fig. 15.1** Accident rates and onboard fatalities by year. Worldwide Commercial Jet Fleet – 1959-2004 (Source Boeing, 2002)

## 15.4 Influences on Major Aviation Training

Although general trends in aviation accidents had been improving for more than 60 years, it was the reasons behind them that brought aviation training programmes into the spotlight. Two accidents in particular influenced new training programmes well into the future. The first occurred in 1972, when Eastern Airlines Flight 401, operating a Lockheed L-1011[20] aircraft on descent into Miami, USA, reported to air-traffic control that the crew were unable to obtain an indication in the flight deck that the forward landing gear was extended. At 23:34 local time, the crew made a request to fly the aircraft in a racetrack pattern at 600m (2,000 feet) whilst they determined the reasons for this problem. The following is an overview of the decision making and crew coordination.

| Time | Overview |
|---|---|
| 23:37 | The captain[21] began discussions with the second officer to enter the aircraft's lower forward electronics bay to assess the alignment of the nose wheel. During this time, the captain and first officer discussed the likelihood that an indicating light for the nose wheel may have been faulty and required replacing. There was an apparent |

[20] The Lockheed L1011 is an aircraft that weighs around 200,000kg. It is considered a large commercial airliner, capable of carrying more than 250 passengers. By way of contrast, the Boeing 747 weighs just under 400,000kg and carries around 380 passengers.

[21] Most commercial airliners engage one captain who has ultimate responsibility for the aircraft. That pilot is supported by other pilots, including a first officer and, if required, second officers. Older aircraft, such as the L-1011, also carry non-pilots called 'flight engineers.'

difficulty with the actual bulb being jammed in the indication assembly.

23:38 The captain directed the second officer to enter the lower electronics bay. The captain and the first officer continued to discuss the light bulb indication.

23:40 A company maintenance representative on the flight also entered the electronics bay to assist the second officer investigating the nose wheel problem. During this time, a noise sounded, indicating that the aircraft had deviated 90m (250ft). Due to the crew being engrossed in the nose wheel problem, not one crew member noted the warning and no action was taken.

23:41 Miami air-traffic control requested that the aircraft make a turn on a southerly heading.

23:42 The first officer at this time noted that an altitude inconsistency existed. He also enquired as to who was flying the aircraft.

23:42 Seven seconds after the first officer had noted the flight path discrepancy, the aircraft struck the ground while travelling at more than 340km/h. At that moment the aircraft disintegrated, causing an eventual 99 fatalities.

The most striking probable cause of this accident was that, while dealing with the relatively minor malfunction, no member of the flight crew was actually flying the aircraft. Although crew coordination, communication, and teamwork did not appear to be contributing factors, the failure of at least one crew member to maintain awareness of the flight path of the aircraft was clearly an issue (National Transport Safety Bureau, 1973).

The second incident, which remains the worst in aviation history, occurred at Teneriffe, Canary Islands, in 1975.[22] Due to terrorist bombings at Las Palmas, many aircraft, including two Boeing 747s from PanAm and KLM, had diverted to Teneriffe. The KLM 747, after taking on fuel and passengers, taxied at a similar time to the PanAm 747 and on the same runway, amid poor weather conditions and reduced visibility. When the KLM aircraft reported ready for take-off, it was issued departure instructions, but not yet cleared for take-off. The crew of KLM repeated the departure instructions and then added, 'We are now at take-off.' Aware that the PanAm was still on the runway, air-traffic control immediately radioed KLM to 'standby for take-off'; while at exactly the same moment, the

[22] Aviation accidents do not include war-related accidents, Eastern Bloc aircraft, and acts of terrorism.

concerned crew of the PanAm aircraft also radioed that they were still on the runway. Given the two simultaneous transmissions, KLM received only a loud squeal over their radio. As the KLM 747 incorrectly began its take-off, air-traffic controllers urgently radioed the PanAm 747 to report clear of the runway. The flight engineer of the KLM 747 heard this transmission and asked his captain if the PanAm 747 was, in fact, clear – to which the KLM captain replied emphatically, 'Oh, yes.' During the take-off, the KLM 747 impacted the rear of the PanAm 747, completely destroying it, before pitching into the runway and bursting into flames. As a result, more than 583 people lost their lives.

Investigations into the shocking accidents outlined above raised questions regarding the effectiveness of current pilot training and annual assessment programmes. The ensuing research centred on accident causation. It was discovered that raw flying skills no longer played a significant part in aviation accidents. As illustrated in Figure 15.2, advances in technology and engineering saw a decline in the proportion of accidents that could be related to machine causes (such as aircraft structure or engines). Yet the accidents attributed to human causes (such as decision making, communication, or teamwork) were, as a percentage of total accidents, now on the increase. It was acknowledged that in the early days of aviation, most accidents were attributable to flawed aircraft design, airframes, and engine and systems reliability, requiring systems knowledge and flying skills. However, over time, these causes were reduced. Similarly, accidents caused by manipulative errors on the part of a pilot were also on the decline. What was now a significant factor in accidents were failures in areas such as crew coordination and communication (Helmreich & Foushee, 1993). Consequently, human-related factors increased as a percentage of the total cause of accidents (Nagel, 1988).

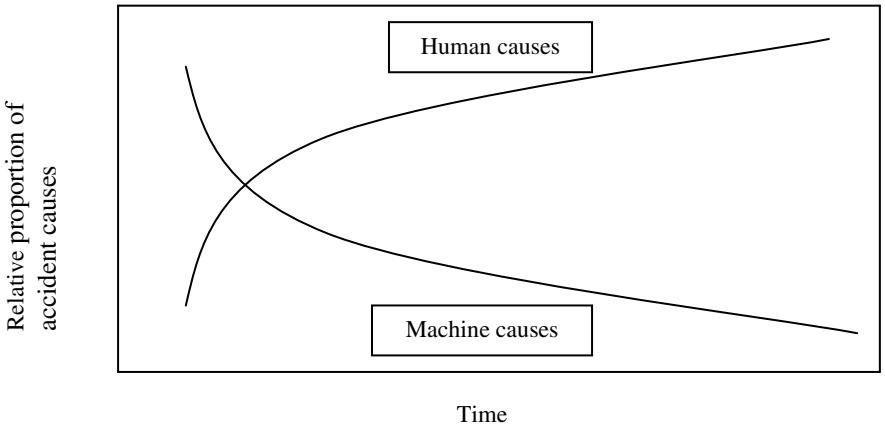


**Fig. 15.2** Trends in causality of aviation accidents (Nagel, 1988, p.266)

Until now, pilot training had focused on machine-related malfunctions and flying skills, but research into accidents gradually began to identify significant disconnects between required outcomes and pilot training. A change was needed in existing pilot training programmes to improve such areas as team skills and communication. The focus of all pilot training was to change from this point onwards.

### *15.4.1 Crew Resource Management (CRM) and Nontechnical Skills (NTS)*

As recently as the 1980s, pilot training heavily reflected conventional training methods, and thus dealt with flying skills, knowledge of aircraft systems, meteorology, navigation, flight, and planning. To address the identified concerns associated with accidents caused by human factors, and to provide an antidote, 'cockpit resource management' evolved. This was later relabelled 'crew resource management' (CRM). It involved a paradigm shift in the way that pilot training was conducted. The content of these new courses was based on getting airline crew to increase the timely and effective use of all available resources (Helmreich, Merritt, & Wilhelm, 1999). Very early CRM programmes involved pilots attending courses reflecting 'human factors' content. Originally, these courses were based upon conference-style classroom activities and it is fair to say that they were viewed with some scepticism by many of the pilots (Helmreich et al., 1999). The main objective was to integrate the theory of CRM into a successful practice-based model, so that crew members could effectively learn these skills. CRM moved through several 'generations,' eventually arriving at the current 'sixth generation.' Here, the areas of communication, teamwork, and decision making have moved from being ends in themselves to being reframed as countermeasures to achieving sound 'threat and error management' (Maurino & Murray, 2009). During the evolution of CRM training, the process of integration of communication, decision making, and teamwork was incorporated into simulator training under what was referred to as 'line orientated flight training' (LOFT). It differed from previous practice-based models, in that the focus was largely on normal (as opposed to emergency) operations. Crews were required to carry out a training session in a simulator, replicating an everyday flight. These everyday flights included normal flight planning, weather considerations, fuel requirements, and even passengers. The instructors would act in the roles of cabin crew via interphone, and air-traffic control via radios, in order to make the simulated exercises as realistic as possible. During LOFT exercises, instructors would deliver systems malfunctions, weather scenarios, or a passenger illness, and require crew to manage the problem in real time. Prior to the LOFT exercise being introduced, training had focused upon pilots demonstrating proficiency in their flying ability alone, with specific problems being assessed in shorter, less realistic,

scenarios. Many of these scenarios relied less upon decision making, teamwork, and communication for effective performance. However, it had been identified during LOFT training that the skills involved were more difficult to assess and, because it was universally agreed that crews would be trained in 'nonjeopardy' circumstances, initial LOFT scenarios were not assessed at all. This lack of assessment was championed by pilots' associations and unions, but created some level of concern with regulatory authorities and airlines.

CRM became integrated into pilot practice-based training and recurrent training programmes, although the ability to measure performance was based upon subjective views of instructional staff. In the later stages of CRM training, with the accident rate in commercial aviation still showing 70% of aviation accidents being linked to human influences, questions were being asked about the overall effectiveness of this form of training (Edkins, 2005). Nevertheless, findings from other industries, such as nuclear, rail, and petrochemical industries, identified similar percentages of accidents related to human factors. These findings were from major studies into nuclear accidents such as Chernobyl and Three Mile Island, the space shuttle Challenger disaster, and accidents in several other professions (Flin, O'Connor, & Crichton, 2009).[23] The adage that 'it is impossible to manage something that is not measured' was certainly a problem in CRM training. In order to better understand how individuals and teams were trained, and how they worked together, new measurement tools were developed and adopted to improve the performance dimension of pilots undergoing annual and biannual training and assessment.

The metrics that were developed to measure performance of teams and individuals during CRM exercises saw the job tasks being split into two groups. The first set of metrics was referred to as 'technical skills.' For most industries and professions, these skills are already detailed or very easy to develop. They consist of domain-specific knowledge required to understand a particular job area. They are the skills that define differing occupations, such as flying. For pilots, the knowledge may include the typical knowledge that would be covered in any commercial pilot licence, similar to what had been taught for almost a century. Yet, as we have seen in the previous examples, the evidence gathered from major air accidents did not point to failures in technical skills as the main causes of accidents. It was the area of CRM, or what was now referred to as 'nontechnical skills' (NTS), that required improvement.

The second metric that was developing was based on the need to measure NTS. In Europe, the Joint Aviation Authority (JAA) promulgated rules that mandated the assessment of NTS for pilots undergoing initial and ongoing training. Work began during the late 1990s to investigate the structure for individual and group performance. The result was the development of a system for measuring NTS,

[23] For further expansion of accidents and incidents in a variety of industries such as armed services, medical, fire, and police services, see Flin, O'Connor, and Crichton (2009), *Safety at the Sharp End*. This text will also provide more detail on word descriptors and behavioural markers used within each element of the NOTECHS system.

called 'NOTECHS.' This measurement system split NTS into two areas: cognitive skills and social skills (Flin et al., 2003). Each of these two areas was further divided into two categories (see Table 15.1). The social area of NOTECHS was split into cooperation and leadership/management categories. The fundamental difference between the two was that cooperation relies heavily upon individuals being able to work together in teams, with less emphasis on hierarchy and authoritarian structure. As Table 15.1 demonstrates, cooperation was further divided into elements such as team building, considering others, supporting others, and conflict solving (Flin et al., 2003). Management and leadership are embedded within organisational structures that exist in most working environments, and require active and constant supervision of staff activities (Flin et al., 2009). Management was not solely a downward process because it also encouraged and required individuals in subordinate positions to speak up and question decisions made. Giving individuals the opportunity to comment on concerns about current and future decisions was seen as significant for safe operations. Management, according to the model outlined by Flin et al. (2003), was separated into elements of authority, maintaining standards, planning, and coordination, and workload management. For example, in the Teneriffe Boeing 747 accident described earlier, the KLM flight engineer did not assert himself in stating his concerns to the captain, nor was he encouraged to do so. The NTS that were causal in the Teneriffe accident could be identified as belonging to a social area. This was a leadership/management element that could be further divided into 'use of authority' element, where lack of assertiveness was identified as pivotal.

**Table 15.1** Categories of NOTECHS (Flin et al., 2003)

| Social | | Cognitive | |
|---|---|---|---|
| Cooperation | Leadership Management | Situational Awareness | Decision Making |
| Team building | Use of authority | Systems awareness | Problem diagnosis |
| Considering others | Maintaining standards | Environmental awareness | Option generation |
| Supporting others | Planning and coordination | Time awareness and predicting future events | Risk assessment |
| Conflict solving | Workload management | | Option selection |
| | | | Outcome review |

The cognitive skills referred to in Table 15.1 comprised situational awareness (SA) and decision making. SA is defined as 'the perception of the elements in the environment within a volume of time and space, the comprehension of their

meaning and the projection of their status in the near future' (Endsley, 1994, p. 31). The elements included systems awareness, environmental awareness, and time awareness, as well as predicting future events (Flin et al., 2003). Research into aviation standards recently concluded that situational awareness was an unnegotiable requirement for airline captains (Mavin & Dall'Alba, 2009). Being able to obtain information from various sources and develop mental images of what is going on around us is considered extremely important. In the Mavin and Dall'Alba research, the assessor is not trying to measure SA, but rather attempting to identify situations in which an individual has lost it. Training is then centred on developing techniques to maintain SA. For instance, trainees are taught to recognise when they are losing situational awareness and develop strategies to regain it. This may include slowing the aircraft down, entering a holding pattern, or reducing workload by 'load shedding' to other crew members. Training may even include rehearsals of management strategies designed to improve the effectiveness of crew.

The final category of the cognitive component of NOTECHS is decision making. Decision making has been identified as causal in previous aviation accidents (Flin et al., 2009; Wiggins, Connan, & Morris, 1996). One accident in particular involved a British Midlands Boeing 737, the pilots of which had accidentally shut down the wrong engine during an engine malfunction (AIAB, 1990). Early work carried out in the training process relied on the classical decision-making model, but this was found to be problematic. Research showed that individuals making decisions did not follow a risk option process (Beach & Raanaan, 1993; Klein, 1993; Orasanu & Connolly, 1993). It was stated that, by 1989, 'it was fairly clear how people didn't make decisions' (Klein, 2008, p .456). Nevertheless, the NOTECHS system still identified a need for decisions to be assessed in the form of problem diagnosis, option generation, risk assessment, option selection, and outcome review (Flin et al., 2003).

The main benefit for other industries and professions who may consider utilising these measures is that NOTECHS metrics are not aviation-specific. For example, the initial development team was required to utilise generic descriptions rather than detailed industry-based terminology (Flin et al., 2005). Measures derived from NOTECHS are currently being used in other industries, such as medicine, petrochemistry, and engineering (Flin et al., 2009). Individual instructors and educators would be able to identify the important areas of their profession and identify or reword their performance criteria. However, the Australian aviation industry is still struggling to integrate the assessment of NTS within airline operations. The benefit of having a generic assessment system is that it allows for the use of different technologies within aircraft to be assessed as technical skills and the generic NTS to be measured separately. The ability to have a level of generalisation is important in aviation, as different technologies are current in many aircraft types.

### *15.4.2 Technology*

Technology advances in aviation have been significant over the past few decades, and have been driven by economics and safety (Hawkins, 1995). Modern aircraft flight decks are now an array of Cathode Ray Tubes or LCD displays with the latest technology incorporated into the design of radios and navigational and flight control systems. Many industries, aviation included, have seen increased levels of computer-assisted technologies. Representation of information is increasingly based on 'symbolic knowledge' (Billet, 2001, p. 46). This is information that is difficult to state and is better represented as symbols. For example, some information is presented on instrument displays that have been identified as 'quickening' and 'predictive' displays. Quickening displays assist pilots in flying the aircraft by providing guidance as to where flight controls or aircraft attitude should be. Previously, the pilot would have had to use experience or a 'best guess' to determine control positioning. Predictive displays give information as to future trends of aircraft flight parameters (even 10 seconds ahead is helpful). This may include predicted airspeed or rate of climb/descent (Stokes & Wickens, 1988). Nevertheless, these advances actually created concern in pilot training with in-flight deck technology during the 1990s. In previous years, conventional instruments and dials were round like clocks with single or multiple needles indicating amounts, temperatures, pressures, and trends. With the introduction of flat computer screens replicating flight instruments, and old needle-like indicators being replaced by digital numerical presentations, numerous difficulties relating to the new instruments' interpretation arose and, in some cases, led to accidents (Hawkins, 1995).

Flight decks of older aircraft were usually designed to be operated by several crew members, including a qualified engineer. During previous normal and emergency procedures, the engineer was able to quickly access data for the captain and first officer to assist in aircraft performance, whilst giving expert advice on aircraft engineering systems. However, while advances were occurring in instrument technology, the flight engineer and navigational system were replaced with onboard flight management computers (FMC). Some older pilots found that the transition onto these newer aircraft types created difficulty and anxiety (Amalberti, 1999). Transferring onto such technologically advanced aircraft also required a greater understanding of computer systems. The use of simulation, which will be discussed next, assisted in the training regarding these issues.

### *15.4.3 Simulation*

Simulation plays an increasingly important role in aviation training. Soon after the first flight of Orville and Wilbur, the most basic form of simulation was used to

develop initial skills prior to commencing practical flying exercises. Even at that time, it was seen as a safe and efficient way of developing the skills of individual pilots. Since the inception of simulation into commercial and military flight training, the development of these teaching tools, which became known as 'simulators,' has been driven by design engineers replicating both the physical appearance and flying characteristics of the aircraft being imitated (Lee, 2005). For many years, airline pilots converting to a new type of aircraft would commence their training with several handling exercises conducted in a simulator. Once a pilot has been assessed as competent, it is generally the norm that their first flight of an actual aircraft will be with paying passengers on a regular commercial flight – albeit initially under the supervision of an instructor-pilot. In other words, it has been identified that there is no requirement for any practice-based learning in a real aircraft prior to being involved in revenue operation for an airline. This actually illustrates quite an interesting situation in the highly regulated aviation world, where regulatory authorities clearly accept the value of simulator-based training in airlines but, paradoxically, give little or no recognition to simulators used in early pilot licence training.

Simulation is simply a term that is used to describe a device that to some degree replicates the real situation, with levels of realness often referred to as the simulator's 'fidelity.' Two chairs placed side by side, facing a photograph of an aircraft's flight instruments, would be regarded as a simulator where two pilots could practise communication and checklist procedures. This type of simulator would clearly be considered a low-fidelity simulator, yet just such simulators are used extensively within airlines for pilots to learn and practise procedures. On the other hand, an identical mock-up of an aircraft flight deck, where instruments, switches, and systems feel and act in an identical manner to those in the real aircraft, may be considered high-fidelity. In these high-fidelity simulators, sounds such as rain, lightning, and wind, together with engine and aircraft noise, will be presented to the crew, utilising surround-sound methods. Modern simulators are also able to replicate motion and flight forces, with simulators being suspended on large hydraulic or electrically driven jacks. The motion systems can replicate turbulence and even acceleration and deceleration, increasing the level of fidelity even further. A study into military training identified that by replacing appropriate parts of aircraft training with simulation, costs could be reduced to around 12% of the original (Moroney & Moroney, 1999 citing Orlansky & String, 1977).

There is still a debate about the best balance between realism and effectiveness of practice-based learning in simulation. The argument is centred on learning transfer with use of simulation versus the extra expense added in the name of fidelity. The push for higher levels of fidelity generally comes from the simulator manufacturers and regulatory authorities (Moroney & Moroney, 1999). In any consideration of learning transfer, the cost and fidelity of simulation must be considered within a teaching context. Figure 15.3 illustrates this, with the greatest cost-benefit balance being obtained where the highest rate of learning transfer is gained for the lowest achievable cost (Roscoe, 1980). Clearly there is a limit to

how much transfer occurs. As simulation becomes very realistic, there is some plateau that will be reached in the rate of learning transfer. For example, during early training of pilots, the motion system of the simulator is not needed and is turned off. Some simulators used for familiarising pilots early in the training have the flight controls removed to stop pilots from trying to 'fly' the simulator. This allows them to concentrate on learning procedures and aircraft systems. Figure 15.3 also shows how modest costs can be attributed to mid-level fidelity simulation. However, as simulators become increasingly complex, the cost-fidelity return reduces. For example, a new radio system in an Australian $15 million simulator may cost AUD$200,000, although the benefits associated with the increased fidelity will be minimal. Alternatively, starting with two chairs and a wall and adding that same AUD$200,000 will obtain substantial returns on fidelity. Roscoe (1980) argues that the best advantage to an organisation is one that balances business costs and learning. As can be seen in Figure 15.3 below, this appears in the area that provides the greatest gap between fidelity and costs. Low-level simulation in aviation is an expanding area of practice-based learning. The development of relatively unsophisticated simulation devices such as 'part-task trainers' is allowing effective integration of practice-based learning at modest cost.

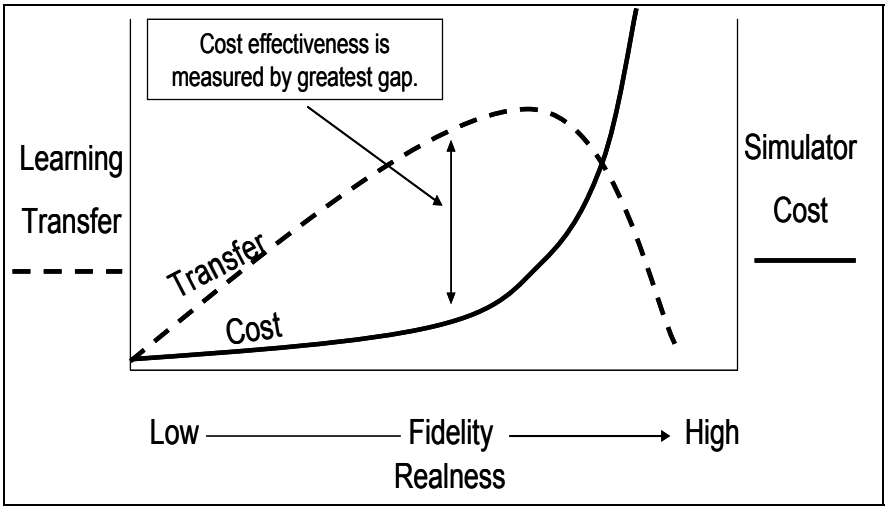


**Fig. 15.3** Learning transfer and costs of simulation (Roscoe, 1980, p.197)

Another way of looking at simulation is to examine the capacity in which it will be used for teaching. For example, the teaching may focus on either psychomotor or cognitive skills (Moroney & Moroney, 1999). During early training, general positioning of switches and dials relating to aircraft systems can be done on very simple photographic mock-ups of aircraft. Students are able to

identify particular systems and even practise simple crew coordination (psychomotor). As pilots move further down the training syllabus, they are required to integrate knowledge of systems into real-time scenarios (involving cognitive skills). For this type of training scenario, higher-fidelity simulation is more appropriate.

Along with the advantages of reduced training costs, simulation provides immense safety benefits. Some manoeuvres are so dangerous that there can be fatalities during training exercises. Anecdotal evidence suggests that more individuals have been killed while practising double-engine failures during training than in real-life situations. A case in point occurred in 1991, when a Royal Australian Air Force Boeing 707 crashed, killing all on board, while practising these manoeuvres. The benefits of simulation are that training and assessment can take place without the added risk of accidents and injuries. The examination of a serious incident involving a 30-seat passenger aircraft found that around 13 malfunctions could be practised in the real aircraft with safety. This is in contrast to the 225 malfunctions that could be practised in the simulator. In this particular incident, the lack of simulator training was considered a contributing factor in the near fuel-exhaustion of one of the engines (Australian Transport Safety Bureau, 2009, p. 34).

Other professions are also now integrating simulation as a practice-based methodology in the development of individual skills. For example, in the teaching of new anaesthesiologists, twofold improvements in training have been reported, with reductions in training time and early achievement of proficiency (Abrahamson, Denson, & Wolf, 1969/2004). The navy continues to use simulation as a tool for the development of naval officers at the beginning of their careers, as well as a means of training individuals undergoing a ship's command. Other areas, such as the police force and fire and rescue units, utilise some level of scenario replication to assist in training and retraining of personnel. There is always some uncertainty for those dedicated teachers in other fields who have considered the use of simulation as a teaching tool, yet turned away due to cost factors, or through misunderstanding how 'realistic' a simulator must be to benefit the student. In this regard, there exists an unproven perception that simulation must be a true replication of the aircraft to achieve the best learning transfer (Moroney & Moroney, 1999). Yet the lessons learnt from aviation indicate that driving towards ever-higher levels of fidelity may not always provide the answer in regard to improvements in teaching and learning practices. Consideration should instead be given to establishing which level of fidelity would necessitate an apportioned balance between learning transfer (through practice-based learning) and cost.

Although safety is an extremely important factor in aviation, there is currently still some debate on the subject of simulators. Research is constantly being undertaken to determine their most effective use in initial training programmes. A recent study in university aviation education found no compelling evidence to support the training of individual manoeuvres as individual events. For example, a student may need to practise turns and descents. In a simulator this may easily be

conducted in a short session of approximately 20 minutes. This is in stark contrast to the way it would be taught in the aircraft, where the trainee is required to conduct pre-flight preparation, take off, spend 20 minutes practising turns and descents, then return to land, conduct aircraft shutdown, and secure. The question arises whether it would be better to use the simulator to replicate a complete flight, or only specific manoeuvres – whether periods of instruction in the simulator should include all the elements of an actual flight from take-off to landing, or limit the exercise to specific manoeuvre training (Rantanen & Talleur, 2005). Perhaps there is no simple answer to this question, for it will depend on the type of learning transfer intended for the exercise. As illustrated earlier, experienced crew members are likely to benefit from 'full mission simulation,' where entire flight profiles are undertaken in relatively high-fidelity simulators to practise and develop NTS. However, the use of simulation for 'part-task training' of new pilots seems to be increasingly regarded as an effective and sustainable way of conducting pilot training into the future.

## 15.5 Pilot Training into the Future

In those early days of the last century when Major Smith-Barry was developing a pilot training course, aircraft were manned by a single pilot and, sometimes, an 'observer' who doubled as a navigator, gunner, photographer, and bomb aimer. Quite reasonably, therefore, the training syllabus that developed was based on 'single pilot' skills. Perhaps ironically, it has changed very little since then, in that pilots are still being taught to fly as 'single pilots.' The International Civil Aviation Organisation (ICAO), which is that part of the United Nations tasked with setting and maintaining international aviation standards and recommended practices, requires countries to mandate 'single pilot' type flying training. However, in recent years some luminaries within ICAO and within the airline industry raised questions about the potential value of teaching multi-crew competencies (NTS) much earlier in pilot training. Also, simulators had been in use for advanced pilot training for many years, and the recognition of the value of simulation during basic training was felt by many to be long overdue. A landmark conference in Madrid in 1999 advanced the concept of a new professional pilot licence – to be called the 'multi-crew pilot licence' (MPL) – with ICAO devising standards that supported extensive use of simulators from the earliest stages of training. In 2006, the ICAO standards were published and several trials began in Europe and Australia. The early results that emerged from these were extremely encouraging, and the MPL seems set to become the way of the future for ab initio training of airline pilots. The practice-based learning model within this programme sees a greater focus on training for airline operations by using both aircraft and simulators. Such a focus may well lead to a resolution of the paradox

referred to earlier, associated with the lack of recognition of the benefits of simulation by regulatory authorities in conventional (single pilot) training.

The worldwide aviation training system can expect many more changes and advances in the near future. Even with the economic crisis that began around 2008 and continues at the time of writing, there is an ongoing need for vast numbers of pilots. The International Airline Transport Association (IATA) forecasts the requirement for at least 200,000 new pilots to be trained worldwide within the next 9 years, with more than 350,000 being required by 2026 (IATA, 2009, p. 10). Approximately 15,000 pilots are currently being trained every year around the globe, with India alone requiring 5,000 new pilots annually (CASA, 2008, p. 8). Although aviation teaching models appear to have some degree of efficacy, there is still a distinct element of dissatisfaction. A recent report into current training programmes by IATA reported that almost 70% of all training organisations were dissatisfied with the training programmes available (IATA, 2009, p.22). Of major concern is that pilots will find a reduction in the practical training that normally occurs during the early stages of careers. They will be promoted faster and moved into larger aircraft sooner than in previous years. Comprehensive training systems are required that will allow pilots to develop sound NTS at a faster rate. It is proposed that, at the earliest opportunity, pilot training should place emphasis upon improving students' learning experiences by means of effective classroom-based instruction that is further extended through practice-based activities within simulation. Through simulators of varying fidelity levels, training institutions will be better equipped to prepare pilots for their aviation role. The aviation industry, although perceived by many to be forward thinking, has shown a relatively slow uptake of new methods, even when compelling evidence has shown that changes were necessary. It is imperative that training processes continue to be developed and refined in the future, with close scrutiny given to research, in order to ensure that the most effective and sustainable training methods are used.

## 15.6 Practice-based Learning in Aviation

At the beginning of this book, a case was argued for a need to better understand the conceptual and practical approaches to practice-based learning. Differing approaches were needed in the various professions for the preparation and development of individuals prior to and after joining the workforce. For example, chapter 3 showed how gaps are sometimes present between teaching and assessment outcomes for students, and the realities of work. Strategies identified to address these gaps have included improved methods of teaching (see chapter 4) and consideration of theoretical dimensions of learning and practice (see chapter 6). For over 100 years, aviation has developed approaches to practiced-based learning for pilots that have focused on authentic methods using both real aircraft and simulation. The traditional approach has been relatively effective by preparing

pilots to transition into the work force and continuously assessing pilot skills over their life in professional employment. However, the aviation industry has acknowledged that significant advancements in aircraft technology have created gaps in the traditional approach to pilot training and assessment, and difficulty has been experienced in closing these gaps. As well as pure flying skills, generic interpersonal skills such as those involved in team work, decision making, and communication are required to fly aircraft, and these skills have not been trained effectively. Additionally, these generic skills are difficult to assess, with the science associated with the development of robust assessment measures still evolving. Also, there is an apparent struggle in adopting the concept of using differing levels of simulation to allow cost effective bona fide practice-based activities in pilot training.

## References


Abrahamson, S., Denson, J. S., & Wolf, R. M. (2004). Effectiveness of a simulator in training anaesthesiology residents. *Quality and Safety in Health Care, 13*(5), 395-397. (Reprinted from *Journal of Medical Education, 44*, 515-519, 1969)

Air Investigation Accident Branch. (1990). *Report on the accident to Boeing 737-400, G-OBME, near Kegworth, Leicestershire on 8 January 1989* (No. 4/1990). London: Department of Transport, UK.

Amalberti, R. R. (1999). Automation in aviation: A human factors perspective. In D. J. Garland, J. A. Wise, & V. D. Hopkin (Eds.), *Handbook of aviation human factors* (pp. 173-192). London: Lawrence Erlbaum Associates.

Australian Transport Safety Bureau. (2009). *Fuel starvation Jundee Airstrip, WA - 26 June 2007 VH-XUE Empresa Brasileira de Aeronáutica S.A., EMB-120ER.* Canberra: Author.

Beach, L. R., & Raanaan, L. (1993). Why classical decision theory is an inappropriate standard for evaluating and aiding most human decision making. In G. A. Klein, J. Orasanu, R. Calderwood, & C. Zsambok (Eds.), *Decision making in action: Models and methods* (pp. 21-35). Norwood, New Jersey: Ablex Publishing Corporation.

Billett, S. (2001). *Learning in the workplace: Strategies for effective practice*. Sydney: Allen & Unwin.

Boeing, (2002). Accident rate history. Retrieved 24 November, 2009, from http://www.boeing.com/commercial/safety/pf/pf_accident_rate_history_cht.html

Civil Aviation Safety Authority. (2008, July-August). A career with altitude. *Flight Safety Australia, 74*, 8-14.

Edkins, G. D. (2005). A review of the benefits of aviation human factors training. In D. Harris & H. C. Muir (Eds.), *Contemporary issues in human factors and aviation safety* (pp. 117-131). Aldershot: Ashgate.

Endsley, M. R. (1994). Situational awareness in dynamic human decision making: Theory. In R. D. Gilson, D. J. Garland, & J. M. Koone (Eds.), *Situational awareness in complex systems* (pp. 79-97). Daytona Beach, Florida: Embry-Riddle Aeronautical University Press.

Flin, R., Martin, L., Goeters, K., Hörmann, H., Amalberti, R., Valot, C., et al. (2003). Development of the NOTECHS (non-technical skills) system for assessing pilots' skills. *Human Factors and Aerospace Safety, 3*(2), 97-119.

Flin, R., Martin, L., Goeters, K., Hörmann, H., Amalberti, R., Valot, C., et al. (2005). Development of the NOTECHS (non-technical skills) system for assessing pilots' CRM

skills. In D. Harris & H. C. Muir (Eds.), *Contemporary issues in human factors and aviation safety* (pp. 133-154). Aldershot: Ashgate.

Flin, R., O'Connor, P., & Crichton, M. (2009). *Safety at the sharp end.* Aldershot: Ashgate.

Hawkins, F. H. (1995). *Human factors in flight*. Vermont: Ashgate Publishing Limited.

Helmreich, R. L., & Foushee, H. C. (1993). Why crew resource management? Empirical and theoretical bases of human factors in aviation. In E. L. Weiner, B. G. Kanki, & R. L. Helmreich (Eds.), *Cockpit resource management* (pp. 3-46). San Diego: Academic Press.

Helmreich, R. L., Merritt, A. C., & Wilhelm, J. A. (1999). The evolution of crew resource management training in commercial aviation. *International Journal of Aviation Psychology, 9*(1), 19-32.

International Air Transport Association. (2009). *IATA training and qualification initiative (ITQI)*. Montreal: Author

Klein, G. A. (1993). A recognition-primed decision (RPD) model of rapid decision making. In G. A. Klein, J. Orasanu, R. Calderwood, & C. Zsambok (Eds.), *Decision making in action: models and methods* (pp. 138-147). Norwood, New Jersey: Ablex Publishing Corporation.

Klein, G. A. (2008). Naturalistic decision making. *Human Factors, 50*(3), 456-460.

Koone, J. M. (1999). A historical overview of human factors in aviation. In D. J. Garland, J. A. Wise, & V. D. Hopkin (Eds.), *Handbook of aviation human factors* (pp. 3-13). London: Lawrence Erlbaum Associates.

Lee, A. T. (2005). *Flight simulation: Virtual environments in aviation*. Hampshire: Ashgate.

Maurino, D., & Murray, P. (2009). CRM- A time for reflection. In J. A. Wise, V. D. Hopkin, & D. J. Garland (Eds.), *Handbook of aviation human factors* (2nd ed, pp. 215-234. Boca Raton: CRC Press.

Mavin, T. J., & Dall'Alba, G. (2009, July). *Identifying minimum standards of non-technical skills in airline pilots undergoing command promotion.* Paper presented at the Aviation Education and Research Conference, Blenheim, NZ.

Mondey, D. (Ed.). (1977). *The international encyclopaedia of aviation*. London: Octopus Books Ltd.

Moroney, W. F., & Moroney, B. W. (1999). Flight simulation. In D. J. Garland, J. A. Wise, & V. D. Hopkin (Eds.), *Handbook of aviation human factors* (pp. 335-388). London: Lawrence Erlbaum Associates.

Nagel, D. C. (1988). Human error in aviation operations. In E. L. Wiener & D. C. Nagel (Eds.), *Human factors in aviation* (pp. 263-303). London: Academic Press Ltd.

National Transport Safety Bureau. (1973). *Eastern Airlines, INC L-1011, N310EA, Miami Florida December 29, 1972*. Washington.

Orasanu, J., & Connolly, C. (1993). *The reinvention of decision making*. Norwood, New Jersey: Ablex Publishing Corporation.

Rantanen, E. M., & Talleur, D. A. (2005, September). *Incremental transfer and cost effectiveness of ground-based trainers in university aviation programs.* Paper presented at the 49th annual meeting of the Human Factors and Ergonomics society, Orlando.

Roscoe, S. N. (1980). Transfer and cost effectiveness of ground-based flight trainers. In S. N. Roscoe (Ed.), *Aviation psychology* (pp. 194-203). Ames, IA: Iowa State University Press.

Stokes, A. F., & Wickens, C. D. (1988). Aviation displays. In E. L. Weiner & D. C. Nagel (Eds.), *Human factors in aviation* (pp. 387-431). London: Academic Press.

Wiggins, M., Connan, N., & Morris, C. (1996). Weather related decision making and self-perception amongst pilots. In B. J. Hayward & A. R. Lowe (Eds.), *Applied aviation psychology* (pp. 193-200). Aldershot, England: Ashgate Publishing Ltd.

# Index



S. Billett (ed.), *Learning Through Practice*, Professional and Practice-based Learning,
DOI 10.1007/978-90-481-3939-2, © Springer Science+Business Media B.V. 2010