UNIVERSITÉ DE FRIBOURG
UNIVERSITÄT FREIBURG
FACULTÉ DES LETTRES ET DES SCIENCES HUMAINES
DÉPARTEMENT DES SCIENCES DE L'ÉDUCATION ET DE LA FORMATION

# Implementing Conditions of Hybrid Teaching and Learning Environment in Cambodian Higher Education and its Effects on Students' 21st Century Learning Skills: A Case Study on Early Adopters

**Sopheap Kaing**

**Cambodgien**

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Approuvé par la Faculté des lettres et des sciences humaines sur proposition des professeur-e-s Bernadette Charlier (directrice de thèse et première rapporteure), Murray Saunders (deuxième rapporteur) et Claire Peltier (troisième rapporteure)

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**List of Abbreviations**

ERIC (Education Resources Information Center)
GDP (Gross Domestic Product)
HEIs (Higher Education Institutions)
HTLE (Hybrid Teaching and Learning Environment)
ICT (Information Communication Technology)
KPRP (Khmer People's Revolutionary Party)
MoEYS (Ministry of Education, Youth and Sport)
P21 (Partnership for 21st-Century Skills)
PBL (Problem Based Learning)
RGC (Royal Government of Cambodia)

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**Abstract**

Higher Education (HE) in Cambodia has relied on a conventional teaching and learning approach; however, this was disrupted by the closure of HEI in 2020 due to the Covid-19 pandemic and the move to online learning. This has resulted in major changes to HE in Cambodia. Therefore, the purpose of this thesis is to explore the implementation conditions experimented by early adopters of Hybrid Teaching and Learning Environment (HTLE) in Cambodian Higher Education, taking into account the changes related to the situation created by the Covid-19 crisis. This research also evaluates from the perspective of lecturers and students the effects of the hybrid teaching and learning environment on students' 21st-century skills. These skills are called 7Cs including *Critical thinking and problem solving; Creativity and innovation; Collaboration, teamwork, and leadership; Cross-cultural understanding; Communications, information, and media literacy; Computing and ICT literacy; Career and learning self-reliance.*

To identify and describe the HTLE learning design, it adopted the questionnaire from the European research project HY-SUP. There were 20 Cambodian lecturers identified as early adopters from 6 higher education institutions participating in this research using online semi-structured interviews from June to September 2020. A categorical analysis was applied to teachers' discourses. One hundred six students from 9 lecturers also participated through online questionnaires to express their perspectives on the effects of HTLE on 21st-century learning skills development.

Results discussed in the light of a systemic model indicated that the main implementation conditions were related to lecturers' characteristics, such as technological knowledge, engagement, intrinsic and extrinsic motivations, openness to innovation, and self-confidence in HTLE even though they received little support or no support from their institutions. Other conditions were related to the profile of students, home learning facilities, and profile of the university. The Covid-19 crisis appears to be an event that favours the deployment of HTLE according to them.

The result also indicated that most of the lecturers (N=20) agreed HTLE positively affects 21$^{st}$-century learning skills. Moreover, according to students' opinions (N=106), HTLE seems to impact applying technology effectively and becoming self-directed learners positively. However, students disagreed that HTLE can improve problem-solving, access and

evaluation of information, improve collaboration, critical thinking, and working in diverse teams.

This thesis could contribute to re-design teaching and learning in the post Covid-19 in Cambodian higher education.

# CHAPTER 1: INTRODUCTION

## 1.1 Overview of Cambodian Higher Education Institutions [1]

Higher education institutions in Cambodia were first born in the 1940s. It was considered a glory period in the 1960s (Mak, 2015). However, educational infrastructure and human resources were ruined because of the civil war during the 1970s (Ayres, 2000). The entire education system was abolished and destroyed, including educational facilities, and more than 3/4 of all university teaching staff and 96 percent of students were massacred at that time (Chet, 2006). Then, the rehabilitation of higher education started in early 1979. However, it was a big concern for the new regime to rehabilitate higher education due to the country's chronic shortfalls of technicians and leaders in economics, politics, and culture. Noticeably, the education at that time aimed to promote socialism. A Central Committee of KPRP (Khmer People's Revolutionary Party) highlighted, "the main objective of higher education and technical education is to provide good political training and good technical training. Good political training should be concerned with serving and protecting the nation leading to the socialist way and following the objectives of socialism" (Ayres, 2000 p.139). Based on the Cambodia Qualifications Framework, the current learning outcomes of higher education in Cambodia are to provide knowledge, cognitive skills, interpersonal skills and responsibility, ICT (Information Communication Technology), and numerical skills (MoEYS, 2012).

Higher education in Cambodia refers to formal education and training activities in post-upper secondary schooling, which takes four years of study full-time either in public or private Higher Education Institutions (HEIs) to get awarded a degree. There are two types of higher education in Cambodia: university and institute (You, 2012). However, according to Chet (2009), higher education is divided into three types: university, institute, and royal academy. The royal academy is anticipated to play a crucial role as a think tank; however, it does not serve its original purpose due to the lack of human resources. As a result, it cannot engage in research or offer expert advice. This problem links to funding for higher education because the primary source of funding for both private and public HEIs is from students' tuition fees. Therefore, McNamara and Ahrens (2013) addressed that Cambodian higher education has been viewed as a private rather than a public good. This creates unpleasant

[1] This part was extracted to publish in the book chapter "Impacts of COVID-19 Pandemic's Distance Learning"

implications and consequences to access and quality, core services of public HEIs, higher education improvement, and socio-economic. They explained in the following:

> HE is understood as a private good (the student gets the degree, gets a better job, and higher wages) and is regarded as decreasing government support for the individuals who attend universities. Suppose HE is understood more as a public good (e.g. benefits to society of higher educated citizens, attracting more overseas investment because of worker quality). In that case, the government must support quality tertiary education to the highest level. (McNamara & Ahrens, 2013, p. 3)

Notably, the distinction between university and institute is that an institute primarily offers training in a particular field but does not provide a wide range of research or training in multi-disciplinary subjects. Additionally, it specializes in professional fields such as engineering, medicine, agriculture, education, etc. However, the university is the most popular and preferable for Cambodian perception. Higher education institutions (HEIs) are supervised by 14 ministries (You, 2012) (see Table 1). Each ministry supervises different universities and institutes based on fields of experts. In my opinion, there are several reasons to share different supervisions with many ministries, such as to share control and responsibility due to many HEIs and to seek opportunity costs.

According to the Ministry of Education, Youth and Sport (MoEYS, 2019), *Education Strategic Plan 2019—2023*, HEIs increased from 110 in 2014 to 125 (48 public; 77 private) in 2018. There were 1,947 lecturers with bachelor's degrees (15.5% of all lecturers), 8,751 with master's degrees (69.8 %), and 1,090 with PhDs (8.7%) in 2018. Sadly, student enrolments decreased by 15%, from 249,092 to 211,484. The decrease in student enrolment is probably related to a sudden reform of the Grade 12 national examination in 2014 to strengthen the quality of education. This reform caused the number of passing students to dramatically decline from approximately 80% (2012-2013) to 26% in the August 2014 national exam results. With this low passing rate, the MoEYS allowed those who failed the first national exam a second chance to retake the exam in October of the same year. In total, the passing rate reached 44 % in 2014 (Maeda, 2021). However, the number passing the Grade 12 national exam increased in the following years. In an optimistic view, the quality of education has been improving through this reform to get qualified students to enter higher education.

**Table 1**

*Number of Higher Education Institutions under their Parent Ministries*

| | Parent Ministries | Number of HEIs | |
|---|---|---|---|
| | | **Public** | **Private** |
| 1 | Ministry of Education, Youth and Sports (MoEYS) | 8 | 49 |
| 2 | Ministry of Labor and Vocational Training (MoLVT) | 9 | 10 |
| 3 | Ministry of National Defense (MoND) | 5 | 0 |
| 4 | Ministry of Agriculture, Forestry and Fishery (MoAFF) | 3 | 0 |
| 5 | Ministry of Religious Affairs (MoRA) | 2 | 0 |
| 6 | Ministry of Health (MoH) | 2 | 0 |
| 7 | Ministry of Interior (MoI) | 2 | 0 |
| 8 | Ministry of Culture and Fine Arts (MoCFA) | 1 | 0 |
| 9 | Ministry of Economy and Finance (MoEF) | 1 | 0 |
| 10 | Ministry of Public Work and Transportation (MoPWT) | 1 | 0 |
| 11 | Ministry of Social Affairs, Veterans and Youth Rehabilitation | 1 | 0 |
| 12 | Ministry of Industry, Mines and Energy | 1 | 0 |
| 13 | National Bank of Cambodia (NBC) | 1 | 0 |
| 14 | Office of the Council of Ministers (CoM) | 1 | 0 |
| | **Total = 97 HEIs** | **38** | **59** |

Source: (You, 2012, p. 3)

The former public Cambodian higher education has been converted into an uncommon model which was 80% privately funded, mostly from students' tuition fees, a contradiction to a typical developing country private funding level of 20% only. An estimation of public expenditure on higher education was around 0.09% of Gross Domestic Product (GDP) by 2008, while private expenditure was responsible for 0.49%. The combination of both expenditure rates reached 0.58%, which was still under the world average of 1% (McNamara & Ahrens, 2013). According to the World Bank (2012), Cambodia has the lowest rate of public higher education expenditure in the East Asia region, at 0.05% of GDP. The next lowest is Laos, with 0.21% of GDP expended on higher education, which equals four times the Cambodian government investment in higher education.

According to the MoEYS report, Cambodian HEIs challenge enhancing the quality of higher education to improve teaching-learning and research to produce qualified graduates who meet market and social demand for international standards (MoEYS, 2014, 2019). Additionally, an analysis of the current situation in higher education (MoEYS, 2014) divulges an alarming career mismatch between education and employment. For instance, Cambodian university students' popular areas of study are social sciences and business-related fields. In contrast, a small percentage of students study science, engineering, and agriculture, considered vital skills to promote Cambodia's economy. Higher education plays a significant role in developing human capacity and economic development. In this 21st century, universities worldwide try to advertise their universities to attract local and international students by providing scholarships and innovative teaching and learning. Besides this, higher education quality is considerably concerned with stakeholder involvement. Like other countries, Cambodia also pays close attention to higher education quality improvement in teaching and learning to build teacher capacity through the 'Higher Education Quality and Capacity Improvement Project' funded by the World Bank (2018). Additionally, MoEYS (2019), *Education Strategic Plan 2019—2023*, is promoting digital education in the following:

- Integrate ICT into a tool for teaching and learning, and to share knowledge across the whole education sector. Equip students with knowledge and skills on ICT to transition into 21st-century employment
- Adopt new management and administrative processes to modernize performance and increase the efficiency, transparency and effectiveness of governance and performance monitoring in the education sector
- Ensure all students complete formal education with knowledge and skills on ICT to support their further education and professional work
- Increase the efficiency and effectiveness of teaching and learning in teacher training centres, schools and other educational institutions by using ICT tools and e-resources
- Use e-learning to support the delivery of education services to all sub-sectors in education, and develop institutional capacity for life-long learning
- Increase the efficiency and capacity of institutions for evidence-based decision making and knowledge sharing through systematic use of information. At the same time, promote their capacities in educational administration, operation, and data collection through digital systems.

- Create standards for infrastructure and network connections at national and subnational levels by integrating systems into a single internal network
- Provide the necessary financial resources to support ICT in the education sector using the Royal Government of Cambodia (RGC) budget. Coordinate public-private partnerships and development partner support for both capital and recurrent costs. (pp. 60—61)

MoEYS (2018) also raised the policy and strategy on ICT in education that "MoEYS will integrate ICT as a teaching, learning, and knowledge sharing tool across the education sector to equip students with ICT knowledge and skills to transition to the 21st-century world of work" (p.2). To promote digital education mentioned above, the hybrid teaching and learning environment in higher education may be part of a solution because it involves using a techno-pedagogical environment consisting of complex forms of mediatization and mediation. In a sense, teachers and students will use technologies to teach, learn, share, collaborate and engage their learning in a productive way. The following paragraphs will introduce and explain hybrid teaching and learning environment in detail.

### 1.2 Background of Hybrid Teaching and Learning Environment

Modern Higher Education Institutions (HEIs) apply various teaching and learning models to inspire a learning environment to achieve a better course outcome. Many courses have introduced learning environments using ICT, including e-learning, open distance learning, web-based learning, blended learning, or hybrid learning. These types of new supporting, teaching and learning environments may allow learners to learn anywhere, anytime with a computer and e-learning application (Eliveria et al., 2019).

Harding et al. (2005) defined hybrid teaching and learning environment (HTLE) as an online learning complement to conventional teaching and learning method (face-to-face instructional method). A hybrid learning environment provides learning interactions and experiences from different places at once. It can be asynchronous group discussion, where one learner sits at home, and another participates in the discussion from a cafe. At the same time, the teacher joins in from a classroom at campus (Nørgård, 2021). These definitions of HTLE may be very limited and reduced to one or two dimensions (*i.e.*, modalities of diffusion: face to face and distance or several learning places or technologies (tools used).

On the contrary, Charlier et al. (2006) provided a more complex definition integrating five dimensions and enabling to distinguish specific learning designs: "A hybrid teaching and learning environment is characterized by the presence in a learning environment of innovative dimensions linked to distance learning activities. Hybrid teaching and learning environment (HTLE) is based on complex forms of mediatization and mediation because it involves the use of a techno-pedagogical environment" (p.481). This definition represents better the creation of a new entity, referring to the meaning of hybridization in biology. Therefore, hybrid teaching and learning environment is more than integrating technology into teaching and learning. It requires namely knowledge of mediatization, mediation and techno-pedagogy. The term 'mediatization' concerns the process of designing, producing, and implementing media communication devices. The other term 'mediation' refers to transforming human behaviour and knowledge through their interactions with objects (symbolic or concrete). Charlier et al. (2006) distinguished 4 types of mediation: semio-cognitive, pragmatic, relational and reflexive. Furthermore, this definition of HTLE, theoretically grounded, gave the initial framework to identify the typology of hybrid learning courses designed empirically by the HY-SUP research. These are the reasons why we have chosen this definition.

The hybrid teaching and learning environments have been studied under the HY-SUP research project to describe hybrid teaching environments, understand their effects on students' learning and teacher's engagement, and get a better understanding of the technological learning environment. According to a mixed-methods study (174 questionnaires and 77 interviews with professors in higher education), through a factorial analysis, 14 factors were identified, comprising in-site active participation; active distance participation; learning support tools; management, communication and interaction tools; multimedia resources; multimedia works; synchronous collaboration tools; comment and annotate online documents; reflexive and interpersonal goals; methodological support; metacognitive support; support by students; freedom of choice, teaching and learning methods; and the use of external resources and actors. Then, a cluster analysis enabled the classification of six types of learning design of HTLE. These types are described in summary below using metaphors (Charlier & Lambert, 2019; Deschryver & Charlier, 2012; Lebrun et al., 2014). As seen below, each type of hybrid teaching and learning environment requires different levels of support and techno-pedagogy (the art of incorporating technology in designing teaching and learning experiences to enrich the learning outcome). Therefore,

understanding each type of HTLE will allow us to describe the current teaching and learning environment.

1. Type 1 (the Scene): This metaphor presents a space where the teacher plays a central role, and textual resources play a predominant role. Teachers favour classroom teaching but provide educational resources for students to download.
2. Type 2 (the Screen): This metaphor represents a space of reinstitution of the information, and the student is only a spectator. It introduces technologies and media. Teachers mainly use the teaching and learning environment to make textual and multimedia learning resources for their students.
3. Type 3 (the Rural Gite/Cottage Country): This metaphor denotes a traditional place that welcomes guests from various backgrounds to visit and stay, while connotation refers to a combination of tradition and openness content of teaching-learning resources and stakeholders outside the academic world. It emphasizes the organization and management of the course. Teachers use most of the potential of technological tools to manage their teaching and interaction with students. Therefore, it results in the frequent use of tools to integrate into teaching resources.
4. Type 4 (the Crew): This metaphor represents a group of people pursuing a common goal, such as arriving at the port safely or winning the race. To achieve this goal, the Crew must work together, help each other, and communicate effectively within the group. Similarly, teachers pay special attention to students' progress by offering interpersonal and reflexive tools to support learning, communication, and collaboration.
5. Type 5 (the Metro): The Metro metaphor is where guidance is essential, and freedom is possible. In this sense, teachers focus on supporting and guiding students, being open to external resources and actors, and leaving some freedom to select methods and learning pathways. To sum up, the learning focuses on openness, freedom of choice, and guidance.
6. Type 6 (the Ecosystem): This metaphor represents a place of exchange of living matter to ensure balance and development of life. Teachers make use of all dimensions identified to characterize hybrid teaching and learning, such as students' active participation (in-class and remotely), frequent and diversified use of technological tools, availability and production of multimedia documents, peer interaction, and openness of the system to external resources and actors, etc. This type 6 is the one that makes the most use of the techno-pedagogical potential offered by hybrid dimensions.

## 1.3 Effects of Hybrid Teaching and Learning Environment on Student Learning

According to HY-SUP research focused on learning, hybrid teaching and learning environment (HTLE) has significant effects on student learning according to the perception of students and teachers. These effects include student motivation, learning resources, developing new skills, increasing more opportunities to interact with group discussion and lecturers, diverse learning activities, and improving student learning outcomes (Deschryver & Charlier, 2012). Linder (2017), in the article *'Fundamentals of Hybrid Teaching and Learning*', also indicated that a hybrid learning environment helps learners become self-paced learners in terms of flexible time, materials, and learning experiences. It assists learners to learn to assess credible online information, get themselves used to online resources and research tools, and learn and utilize new technologies in a facilitated environment. Students also took new roles as topic contributors, meaning negotiators, information providers, strategic communicators, and monitors, according to the studies on *the changing roles of teachers and students in hybrid* at the Hong Kong Institute of Education among teaching staff and students based on questionnaire surveys about three courses offered in hybrid mode (Xu & Wang, 2010).

Mirriahi et al. (2015) mentioned that hybrid learning is growing popular in higher education institutions because it improves pedagogy, enhances students' learning performance, and improves cost-effectiveness. However, according to Charlier et al. (2015), these impacts may differ according to student characteristics. These variables consist of learner cognitive skills, academic background, level of pre-existing knowledge to learning field, and conceptions of knowledge and learnings (Charlier et al., 2019) in their article describing and understanding learning in hybrid learning courses.

### *1.3.1 Effects of Hybrid Teaching and Learning Environment on HE Teachers' Professional Development*

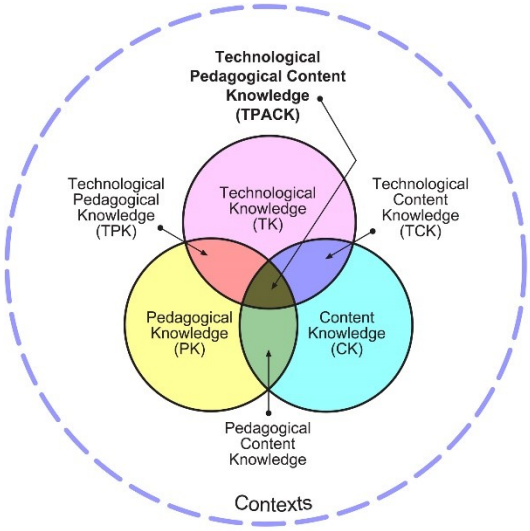
Hybrid teaching and learning environment (HTLE) is essential in promoting academic professional development in the 21$^{st}$ century of teaching and learning in higher education. Indeed, the digital environment has potential effects on contemporary education. Linder (2017) highlighted lecturers use technology to enhance activities for students to engage outside the classroom, for instance, a flipped classroom. It also affects teachers' professional development on differentiated instruction. Teachers acknowledge students' learning

preferences, previous subject experiences, and current passions to actively engage students and design learning activities for diverse learning groups. In addition, teachers can encourage students to engage with the course content through "incorporating online learning communities, synchronous and asynchronous discussion, and a variety of online collaboration methods which encourage students to interact with the course materials, their instructors, and their peers in a variety of ways (Linder, 2017, p. 12)". Xu and Wang (2010) also highlighted hybrid effects on teachers' role as expert learners, facilitators, course designers, and organizers.

The changing role of the teacher from pedagogy to andragogy principles (teaching methods for adult learners) is essential for the hybrid teaching class because it stresses autonomous and independent learning, which happens outside class time. So, teachers must prepare activities ahead of time to motivate and encourage students to be more self-directed in their learning. Teachers often need to design the whole course of learning resources before the course commencement to ensure the alignment of content delivery, activities, assignments, and assessments in and outside class (Linder, 2017).

**Figure 1**

*Technological Pedagogical Content Knowledge*




Koehler and Mishra (2009) provided the concept of TPACK (Technological Pedagogical Content Knowledge) as a framework to help guide teachers to understand and integrate plan technology into the classroom and stressed the need for teachers to be accordingly trained in classroom technology to use technology at the course design level. TPACK identified knowledge relationships with pedagogy, content, and technology to assist teachers in better

assessing their strengths and weaknesses (see Figure 1). The interaction of these bodies of knowledge, both theoretically and in practice, produces the types of flexible knowledge needed to successfully integrate technology use into teaching (Koehler & Mishra, 2009, p.60).

### *1.3.2 Effects of Hybrid Teaching and Learning Environment on Higher Education Institutions*

Hybrid teaching and learning environment (HTLE) makes it possible for institutions to apply a learner-centred approach to teaching. Students are given the flexibility to experience online learning activities by maintaining interaction with teachers and students in the classroom (Hughes, 2007). However, according to the HY-SUP project finding, hybrid teaching and learning environment (HTLE) had minor effects at an institutional level. For instance, institutional leaders do not set a clear policy in this area even though institutions produce learning resources available to teachers and acknowledge the high impact of a hybrid environment (Deschryver & Charlier, 2012). In my view, the hybrid teaching and learning environment (HTLE) significantly affects the institutional level due to Covid-19. The pandemic of Covid-19 in early 2020 forced the education system to adopt hybrid teaching and learning, especially distance and online learning. The abrupt change of the education system from a traditional teaching approach to distance learning or online learning makes it difficult for university managers, lecturers, and students due to insufficient learning facilities, resources, technical teams, and LMS (Learning Management System).

## 1.4 Problem Statement

As discussed above, the literature supports using hybrid teaching and learning environment (HTLE) in higher education. However, Garrison and Kanuka (2004) highlighted that rethinking and redesigning the teaching and learning relationship in the transformative potential of hybrid learning needs to be carefully thought. For example, Karabulut-Ilgu and Jahren (2015) conducted a research study on "faculty perspectives on benefits and challenges of hybrid learning" with four professors implementing hybrid teaching, using semi-structured interviews. The result of the study indicated that there are challenges for them to implement hybrid teaching, such as time-consuming course development and technical issues. Wallace and Young (2010) also highlighted that training and development of technological skills usually arise when teachers shift from a classroom instructional approach to a hybrid

environment. In this sense, the role of faculty members needs modifications when hybrid teaching and learning method is applied. They need to teach learners how to use innovative technologies and new programs. Before they can do so, faculty members often have to overcome their technological shortcomings. In technological pedagogical content knowledge, Koehler and Mishra (2009) confirmed that teaching and learning would be difficult if teachers and learners struggled using technology tools essential for hybrid courses. In my view, internet connectivity and internet speed are crucial for implementing hybrid teaching and learning environment because they help bridge learners with learning tools or devices. These problems can become a stumbling block for lecturers to instruct a hybrid course.

Indeed, it is crucial to provide the present context of Cambodian higher education institutions since different hybrid teaching and learning environment approaches would have different issues and require different solutions. So far, Cambodian higher education institutions offered neither distance learning nor online learning courses until the pandemic of Covid-19 in early 2020, forcing the Cambodian education system from primary to higher education to adopt distance learning and online learning. However, some early adopters had started to apply hybrid teaching and learning environment in their courses before the Covid-19 outbreak, but not online learning or distance learning. Therefore, this research study invited early adopters implementing hybrid teaching and learning environments and their students to participate in the research study to talk about their experiences, based on their description of the conditions in which they have innovated, to infer recommendations to improve Cambodia's hybrid teaching and learning environment. To deepen the analysis, we reflect on the teaching approach based on each learning environment, such as types 1, 2, 3, 4, 5, and 6. Each type of HTLE may have required different support and conditions to implement. Following Fullan's (2007) contextual conditions in his book entitled "the new meaning of educational change", the term 'conditions' here refers to the contexts, circumstances, or situations in which early adopters have adopted a hybrid teaching and learning approach to their class.

### 1.5 Objectives of Research [2]

The key objectives of this research study are to explore and interpret the conditions experimented by early adopters of the hybrid teaching and learning environment in Cambodian higher education. Due to the Covid-19 crisis, this research extends to explore the

[2] This part was extracted to publish in the book chapter “Impacts of COVID-19 Pandemic’s Distance Learning”

type of HTLE developed before and during Covid-19. The key objectives are broken down into the following:

- To identify early adopters who have introduced a hybrid teaching and learning environment and describe these environments.
- To explore the conditions that early adopters encounter when implementing a hybrid teaching and learning environment.
- To understand how they implement hybrid teaching and learning environment.
- To evaluate and understand the lecturers and students' perceptions of the effects of these hybrid teaching and learning environments on students' 21st-century skills.

### 1.6 Aims of Research [3]

Higher Education Institutions (HEIs) keep developing and updating their quality of teaching and learning. The benefits of implementing HTLE have been shown by previous research. Therefore, this study examines the present conditions of implementing HTLE in Cambodian higher education according to early adopters. In the absence of research studies on HTLE in Cambodian higher education, this study contributes new knowledge to *provide solutions to implement hybrid teaching and learning environment* in Cambodian Higher Education Institutions. Four research objectives have been framed to achieve this aim, such as identifying, exploring, understanding, and evaluating hybrid teaching and learning in Cambodian higher education from the perspective of early adopters and their students.

### 1.7 Research Question[4]

Two main research questions are created followed by sub-questions to achieve the objectives above.

1. According to them, in which conditions are Cambodian Higher Education early adopters implementing hybrid teaching and learning environment?
    A. Are these conditions different according to the type of environment developed according to lecturers?
    B. Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?
    C. How was this innovation process supported according to them?

[3] This part was extracted to publish in the book chapter "Impacts of COVID-19 Pandemic's Distance Learning"
[4] This part was extracted to publish in the book chapter "Impacts of COVID-19 Pandemic's Distance Learning"

2. What are the effects of hybrid teaching and learning environment on students' 21st-century skills according to perceptions of lecturers and students?
   A. How could we understand those effects?
   B. Are those effects different according to the type of environment developed?

A systemic model of the university innovation process (Depover & Strebelle, 1997; Strebelle et al., 2003) described in Fig 2, is used to analyse conditions of implementing HTLE such as reasons to innovate, intrants, process, and extrants. In addition, a systemic perspective of circular causality (Charlier et al., 2015) is adopted to understand the effects of hybrid teaching and learning environment (HTLE) on students' outcomes (extrants). It consists of individual student characteristics, characteristics of the digital learning environment, the interaction between students and the environment, and students' learning outcomes. Both models are elucidated in the literature review.

The other term is '21st-century skills'. It has been provided by Trilling and Fadel (2009), they highlighted 7Cs skills of 21st-century learning in the following:

- Critical thinking and problem solving
- Creativity and innovation
- Collaboration, teamwork, and leadership
- Cross-cultural understanding
- Communications, information, and media literacy
- Computing and ICT literacy
- Career and learning self-reliance (p. 176)

By applying HTLE into the course, students may improve their 21st-century learning skills, such as problem-solving, accessing and evaluating information, collaborating with others, thinking creatively, applying technology effectively, becoming self-directed learners, and working effectively in diverse teams. This hypothesis will be examined through an analysis of the point of view of the students and lecturers (see chapter 6).

### 1.8 Significance of the Study

The solutions and recommendations inferred from the findings of this research can be used as a guide to assist universities and institutions to implement hybrid teaching and

learning courses. The research findings will also help lecturers and learners promote culture and style of learning to use knowledge tools and technology to continue learning and developing their talents throughout life, leading to self-regulated learning and lifelong learning. Trilling and Fadel (2009) underlined that "one of the education's chief roles is to prepare future workers and citizens to deal with the challenges of their times. Knowledge work—the kind of work that most people will need in the coming decades—can be done anywhere by anyone who has the expertise, a cell phone, a laptop, and an internet connection. But to have expert knowledge workers, every country needs an education system that produces them; therefore, education becomes the key to economic survival in the 21century" (p.6). In my view, this statement becomes true in the era of Education 4.0 for Industrial 4.0.

This research also responds to (MoEYS, 2018) policy and strategy on information and communication technology, which has the vision to enhance teaching and learning to produce creative, innovative, and ethical learners who are able to navigate information, and knowledge economy and society by integrating ICT as a lecturing, learning, and sharing knowledge tool in order to equip learners with ICT knowledge and skills in the 21st century of the working environment. In this regard, achieving education's goals in contemporary society, especially in the knowledge age, has shaped accelerated use of powerful technologies for learning, collaboration, and communication to contribute to work and society, to fulfil personal talents, to fulfil civic responsibilities, and to carry forward their traditions and values. So, this research study will provide significant outcomes for Cambodian higher education institutions where hybrid courses apply in the following:

- To contribute to understanding how Cambodian higher education institutions adapt to society in the 21st century of teaching and learning.
- To cultivate knowledge and skills of pedagogical practices in the service of quality improvement in higher education.
- To provide recommendations to higher education institutions where hybrid teaching and learning environment is implemented.

# CHAPTER 2: LITERATURE REVIEW

This chapter discusses literature reviewed on hybrid teaching and learning environment (HTLE) from different sources, such as ERIC (Education Resources Information Center), Web of Science, Google Scholar, RERO (library network of Western Switzerland), ScienceDirect, International Journal for Academic Development, Education Journal, JSTOR, ELSEVIER, Springer, websites HY-SUP, and Library Genesis. Keywords used to find the articles include *hybrid teaching and learning environment in higher education, pedagogical innovation, effects of hybrid teaching and learning environment, and blended teaching and learning in higher education*. The term 'hybrid teaching and learning environment' is used instead of 'blended learning environment' in this research study because it relates to the signification of new forms of teaching and learning as defined by the statement: "*A hybrid learning environment is characterized by the presence of innovative dimensions linked to distance learning. The hybrid learning environment is based on complex forms of mediatization and mediation because it involves the use of a techno-pedagogical environment*" (Charlier et al., 2006, p. 481). The term 'mediatization' is the engineering of training and design pedagogic (functions of device training). It concerns designing, producing, and implementing media communication devices. Another term is 'mediation', which transforms human behaviour and knowledge. Charlier et al. (2006) distinguished 4 types of mediation: semio-cognitive, pragmatic, relational and reflexive. The other term 'presence' is used in this definition to describe a hybrid device at the moment. It represents a moment in the hybridization process that can be considered an innovation. This definition, theoretically grounded, gave the initial framework to identify the typology of hybrid learning courses empirically.

## 2.1 What Is Innovation in Higher Education?

The term 'innovation' has been discussed and given different definitions by different authors. So, it is not easy to define because different contexts leads to different definitions. Therefore, we will discuss this term as used by different authors and conclude with the term "innovation" favoring the educational context.

### *2.1.1 Theory of Innovation in an Educational Context*

Innovation is generally denotative meaning to technological progress in pure science or technology; indeed, it is similar to the words such as adjustment, improvement, development,

experiment, modernization, reform, or renewal (Walder, 2014a, 2014b). On the contrary, Charlier and Peraya (2003) explained that 'innovation' is caused by intended action to modify something seen as deficient, inadequate, or less than optimal to reach set targets. In this sense, not only is pedagogical innovation an idea or intention to change, but also it needs to result in the transformation to a change in positive ways.

OECD (2016) defined innovation as "the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations" (p. 15), and identified four types of innovation in educational organizations (schools, universities, training centres, or education publishers) in the following:

1. *Production Innovation*: introduce new products and services (a new syllabus, textbooks, or educational resources)
2. *Process Innovation*: implement new processes for delivering services (using ICT in e-learning services)
3. *Marketing Innovation*: implement new marketing techniques, for example, differential pricing of postgraduate courses.
4. *Organization Innovation*: implement new ways of organizing activities (ICT to communicate with students and parents)

Christensen and Eyring (2011), in their book, *The Innovative University: Changing the DNA of Higher Education from Inside Out*, defined two types of innovation. They are Sustaining Innovation and Disruptive Innovation. *Sustaining innovation* is a process, system, or modification that advances a current product or system to make it better, bigger, further efficiency gains and provide additional benefits to the end-user, for example, a new or updated model of a car with better gas mileage. *Disruptive innovation* develops significant changes or replaces the original complicated product to make it accessible for all. On the other hand, Fullan (2007) defined innovation in his book, *The New Meaning of Educational Change*, as *multidimensional*. There are at least three components or dimensions at stake in implementing any new program or policy:

1. The possible use of new or revised materials (instructional resources such as curriculum materials or technologies)

2. The possible use of new teaching approaches (i.e., new teaching strategies or activities)
3. The possible alteration of beliefs (e.g., pedagogical assumptions and theories underlying particular new policies or programs) (p. 30)

As discussed above, in defining the term 'innovation', we favour (Charlier & Peraya, 2003; Fullan, 2007; OECD, 2016) because they provided a rich and precise definition of innovation in an educational context even though they used different vocabulary such as 'intended action or implementation new things' to describe innovation. So, we define *innovation as the driving of intended action or action to implement new things that we believe will provide a positive change in teaching, learning, and managing the education system. This innovation can be at the individual level, meso-level, or macro-level. It can be disruptive or sustaining, touch technical tools, teaching and learning process, marketing, the image of the institution or organization.*

Saunders et al. (2005) also identified two types of innovation: service and technical innovation. The term service innovation includes pedagogical innovation. Pedagogical innovation not only improves students' learning but also prepares them for job prospects in the outside world by modifying the concept of teaching, pedagogical approaches, tools, support schemes, interdisciplinary, cross-cultural understanding, and professionalization (Walder, 2014a). University professors implement pedagogical innovation to attract and underpin students to enhance their learning, tackle particular issues, adjust teaching, and communicate effectively with students (Walder, 2014b). Walder (2014a) conducted a qualitative on 'the Concept of Pedagogical Innovation in Higher Education' among 32 professors in the University of Montreal Excellence in Teaching Award. Then, she provided an updated definition of pedagogical innovation in the following:

> It is a new way of teaching, unlike those commonly used; it is bespoke and surprises students. Consequently, it heralds a change driven by a transitory adaption to pedagogical objectives and the new student profile. It stems from a reflection that is pedagogical, intellectual, creative, psychological and sustained, and that shapes itself progressively through a multi-level and multi-impact process linked both to the audience and the discipline or the technology that aims to improve quality, like a desire to make the subject understood and foster success. Unlike technological innovation, the innovation is only pedagogical if it is constructed by pedagogical

> thinking, in particular in human relations at the will of the personality of the devoted professor. (p. 200)

Pedagogical innovation is seen as any new teaching practice that varies from conventional teaching to improve learning outcomes. Pedagogical innovation is invalid (not considered pedagogical innovation) when it is widely used within a department or university. For instance, starting using slideshow presentation software while other departments have used it for a long time is no longer an educational innovation (Walder, 2017). Pedagogical innovations can be treated as individuals or collectives. They contribute to the quality of learning and professional teaching practices; however, innovations depend on individual factors such as teachers' motivations, their conception of teaching, and their creative potential (Deschryver & Charlier, 2012). Hannan and Silver (2000), based on qualitative research in 15 universities in the UK, indicated three primary stages of pedagogical innovation in HEIs: individual innovation, institutional funding of innovation, and requirements of the academic institution innovation. Suppose teachers are to make a rapid change to adopt new pedagogies. In that case, they need support from other working peers to identify effective practices and push new thinking and innovative practices (Fullan et al., 2018).

### *2.1.2 Technological Innovation and Service Innovation*

To begin with, we would like to reiterate the term 'innovation' by Charlier and Peraya (2003). They explained that 'innovation' is caused by intended action to modify something seen as deficient, inadequate, or less optimal to reach set targets. Jason (2013) additionally stressed that innovation not only focuses on doing something new or different, but also meets the user or customer's need that might not have been enjoyed before.

The term 'technological innovation' is defined as the successful implementation (in commerce or management) of a technical idea new to the institution creating it. On the other hand, the 'service innovation' expands activities beyond the services itself to the users; for example, new channels for user interaction, new business models, or new service applications (OECD, 2012). However, we are not intended to look into the terms technological innovation and service innovation but to provide an overview of the two terms because they both provide changes to pedagogy and services to learners. In the case of teaching, a service innovation will change the way the service of teaching is offered to the learners, contrary to

technological innovation, which does not necessarily change the teaching process and outcomes.

### 2.2 What Are the Implementing Conditions of Innovation in Higher Education?

Technological innovations reshape the education environments in which schools operate by opening up learning environments to the digital world, and the physical and social environment (OECD, 2016). However, it is essential to bear in mind that innovation needs an open-minded environment, which allows errors as well as learning from them (Fullan et al., 2018). Innovation requires openness and interactions between systems and their environments, especially in education. Schools need support from policies, actors, and stakeholders to make a process of transformation (OECD, 2016).

Walder (2017) highlighted “the reasons for which professors innovate their teaching at university are connected to student learning improvement, adaptation to their new profile, satisfaction of accreditation body requirements, internal restructure or changes, general motivation, stimulation, inspiration and encouragement, and considering themselves innovators" (p. 72). Many teachers are agreeable to implementing change at the individual classroom level under the right conditions, such as clear and practical innovation, administrative and principal support, opportunity to discuss with other teachers, advocacy from the union, and external resource help (Fullan, 2007). However, altering teaching approach or style to implement new materials is not easy if new skills or new instructional activities are required, and changes in beliefs are even arduous because they are against individuals’ core values regarding the purposes of education (Fullan, 2007). Ely (1999), in his article *conditions that facilitate the implementation of educational technology innovation*, also highlights eight implementing conditions in educational technology in the following:

1. Unhappiness with the status quo: it refers to an emotional discontent in the use of current processes or technologies which are seen as not up to par, for example, inefficient, ineffective, or uncompetitive.
2. Existent knowledge and skills: it refers to the acquiring or processing of new knowledge and skills to adopt innovation by the users.
3. Resources refers to the accessibility and availability of resources needed to implement innovation. They include hardware, software, teaching materials, technical support, and financial resources.

4. Sufficient time: implementers need time to learn new skills and knowledge in order to use innovation. So, the organization needs to prepare a budget for their professional development or capacity building.
5. Incentives or rewards refer to either extrinsic or intrinsic rewards, which is the outcome of using innovation.
6. Participation refers to shared decision-making, discussing with all stakeholders to adopt and implement innovation.
7. Commitment refers to a tangible and continuous underpinning of the innovation process by key stakeholders and primary stakeholders.
8. Leadership refers to the level of key stakeholders' support, such as the leadership of the school executive officer and project leadership to manage the daily activities of the implementing innovation.

In this research, we do not use the term conditions described by Ely as a requirement or a norm to be respected but in a more descriptive perspective. The word condition describes the situation in which people are to innovate (adopt, implement or routinize) innovative teaching practices. Thus, the question to be answered is when, in which circumstance, early adopters decided to change their teaching practices, with which intentions, support, perceived effects, etc. Thus, we follow Fullan's perspective (2007), considering that it is more important to know the conditions people are to innovate than to describe innovation itself.

### *2.2.1 A Systemic Model of University Innovation Process*[5]

This research study employs (Depover & Strebelle, 1997; Strebelle et al., 2003) model to describe and understand conditions experimented by early adopters of HTLE (see *Figure 2*). The model starts with *'Reasons to innovate*'. It is placed and identified before the 'INTRANTS' because it associates with discontent with the current status quo when it is perceived as inefficient, ineffective, or uncompetitive. In contrast, the 'INTRANTS' is considered the input of resources from different stakeholders to make innovation possible. After defining particular reasons to innovate, the process moves to 'INTRANTS, PROCESS, and EXTRANTS'. These terms were similar to Input evaluation, Process evaluation, and

[5] This part was extracted to publish in the book chapter "Impacts of COVID-19 Pandemic's Distance Learning"

Product evaluation, which Stufflebeam (2003) coined in the CIPP model (Context evaluation, Input evaluation, Process evaluation, and Product evaluation) for evaluation.

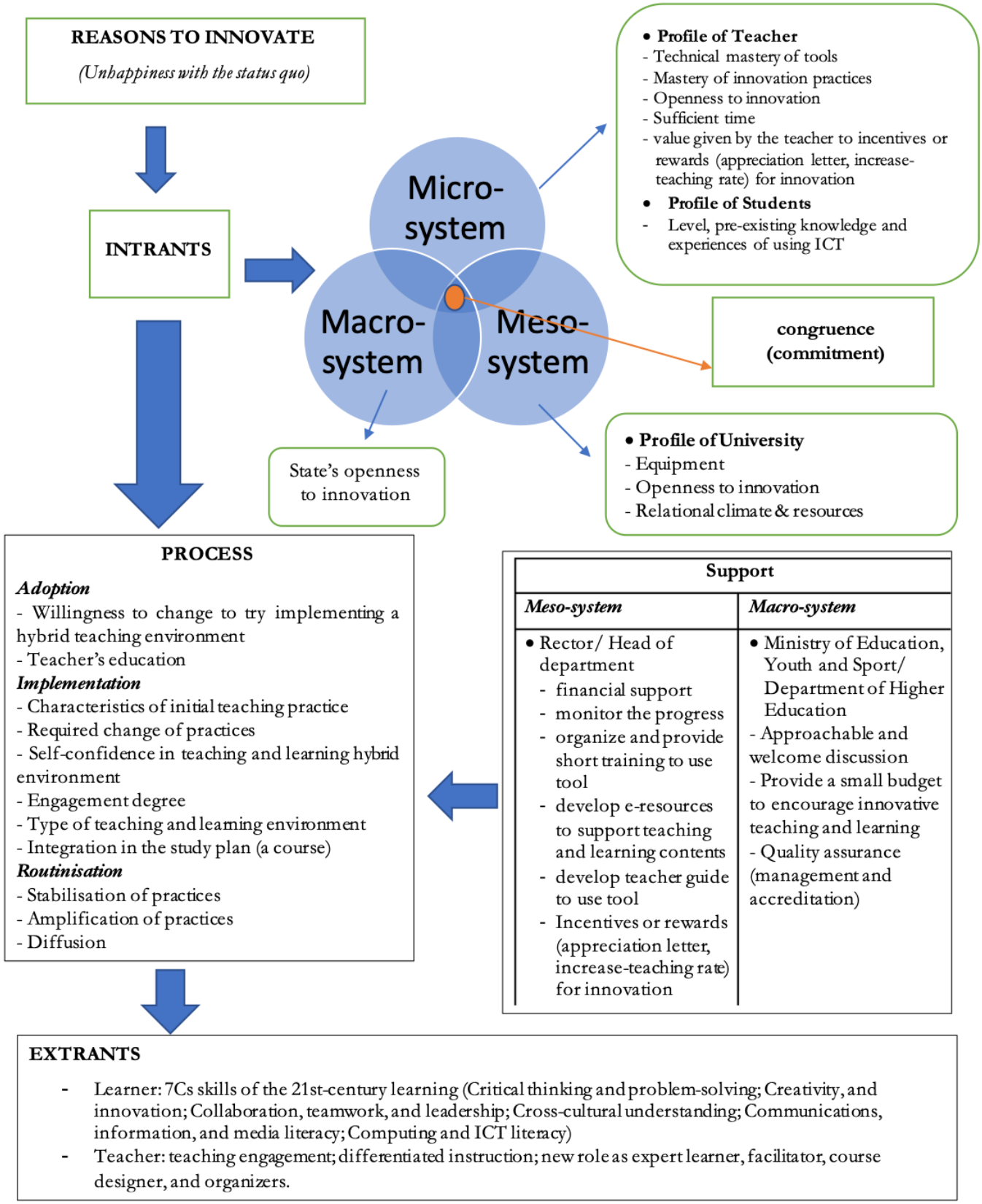
**2.2.1.1 The 'INTRANTS'**. According to Depover and Strebelle (1997) and Strebelle et al. (2003), the INTRANTS' can be considered at the system's Micro, Meso, and Macro levels. They are concerned with available resources to start innovation. The characteristics of 'INTRANTS' are explained in the following:

(1)*Micro-system level (teacher and students)*: At this level, there are certain variables to look at, such as the level of mastery of IT tools and innovative methodological practices by teachers, and their receptivity to innovation (openness to innovation), plus the students' ability and experience in the use of ICT. When learners' current knowledge and experience are far behind in applying technology in the classroom, we (implementor, teacher, head of the department, IT team) need to provide short training to learners to support their difficulty. In this micro-system, implementors also need to consider teachers' current knowledge and skills to master innovation practices (Depover & Strebelle, 1997). If the level of innovation is too far beyond lecturers' and learners' capacity, the innovation will be less successfully implemented. Ely (1999) added that we need to think about the availability of time for teachers to learn and implement innovation. The value given by the lecturers toward incentives and rewards (letter of appreciation, increased teaching rate) also may play a vital role in catalysing innovation because innovation might break the teachers' comfort zone for a while.

(2)*Meso-system level (school/ institution)*: This level concerns the school profile or facilities such as computer equipment, the openness to innovation, and school climate. Rectors and managers need to prepare and manage a sufficient budget for the physical environment related to implementation. These include internet and WIFI, official email for lecturers and students, a learning management system to engage students, and the level of freedom for lecturers to exercise innovation.

**Figure 2**

*A Systemic Model of the University Innovation Process*



(1) *Macro-system level (system/ society/ nation/ state)*: At this level, it concerns the state's role to do innovation. This Macro-system might have less involvement in the innovation input if the state offers full authority and decision to the university to innovate itself but still supports the university if needed. On the contrary, universities might not have enough power to innovate in the centralized education system, especially in developing countries. They need to go through internal to external discussions such as the university itself, Department of Higher Education, and Ministry of Education, Youth and Sport (MoEYS).

For us, the focal point 'commitment' of micro-system, meso-system, and macro-system plays a central role in making real innovation successful and long lasting because it could need to be congruent. For example, the school manager or program manager may be committed to introducing innovative teaching and learning to the teaching staff. However, the teaching staff could have less commitment and motivation to adopt new innovative teaching methods due to their own reasons. As a result, the innovation could not happen or happens only for a short time. Vice versa, if the teaching staff have a strong commitment to innovate their teaching, but the school manager has less commitment, this also leads to unsuccessful implementation.

**2.2.1.2 The 'SUPPORT'**. The change "Processes" of innovation consists of three phases: adoption, implementation, and routinization. The main objectives of supporting these phases are maintaining commitment, solving problems on time, providing feedback on an activity, and planning a budget. All phases need active support or facilitation from the meso-system and macro-system in the process of innovation.

*Meso-system support*: university rectors, program managers, and heads of departments play significant roles in providing funding, supporting, and monitoring the process until the end. The support and monitoring can be done through fortnightly meetings or monthly discussions. This approach could be related to the "Process Evaluation" in the CIPP model for evaluation by Stufflebeam (2014) to monitor, document, and give constructive feedback to strengthen program implementation. The university can provide teachers with training, professional development, and technical services. These activities serve as a vehicle to support the innovation processes, such as developing e-resources to support teaching and learning content, developing teacher guides to using tools, and organizing training to use tools for lecturers and students. Additionally, incentives or rewards (appreciation letter,

increased teaching rate) should be considered to motivate and encourage lecturers to implement innovation.

*Macro-system support*: The Ministry of Education, Youth and Sport (MoEYS) and Department of Higher Education (DHE) need to be approachable, transparent, accountable, and welcome discussion when the university needs support. Furthermore, the ministry should provide inspection and technical help to ensure the quality of innovation, including management and accreditation to HEIs. Moreover, MoEYS can create a small budget package to provide funding to universities where innovation is implemented to promote higher education quality, accessibility, and engageability.

**2.2.1.3 The 'PROCESS'**. As stated above about the focal point of the three systems, the commitment of the stakeholders' involvement to support the process of innovation is crucial to make innovation happen. This commitment can be seen through direct or indirect action such as implementing, monitoring, and evaluating by providing an ongoing check on a plan's implementation and processes, such as the adoption phase, implementation phase, and routinization phase.

The *adoption phase* is determined by teachers' willingness to change and implement HTLE either by internal or under the external pressure of the meso-system, demanded by the students, the university management, or the inspectors. It is essential to identify the source of change either from the teacher's initiation or from outside imposition because the decision to change has distinct psychological consequences on the teachers' implementation. Another variable that closely influences the adoption phase's decision is the 'teachers' education' because it mainly relies on teachers' mastery and confidence in using new tools in innovative practices.

The *implementation phase* is the first experience of intention to put ideas or reform into actual practice. This phase is generally modified from the original ideas at the level of educational practices and in the context (environment) where the practices are set up. The first variable of this implementation phase is *characteristic of initial teaching practice.* This includes openness and freedom (students feel free to ask a question without being judged as stupid), knowledge of innovation, responsiveness, and approachability that teachers offer to students. The second variable is the *change of teachers' practices*, including support and teaching methods when shifting from a face-to-face classroom to a hybrid course. Students might need more support, guidance, responsiveness, and approachability during innovative implementation. The third variable is the teachers' *self-confidence in teaching and learning*

*hybrid environment*s. In this sense, teachers need to be knowledgeable about innovation. The fourth variable is the *teachers' engagement degree* which associates with approachability inside and outside schools in academic study. The next variable is the *teaching and learning environment* that the teacher is implementing. The higher level of hybrid type (type 1-6), the more complex support and methods are used. The last variable is *integration practice into a course.* This variable requires flexibility and adjustability based on student knowledge, skills, and study background.

The term 'routinization' would rather be used instead of 'institutionalization' because 'institutionalization' is a more direct remark as an official acknowledgment (Strebelle et al., 2003). There are three main elements in routinization, such as stabilization of practices (innovation can be implemented in the long term at the level of the educational practices), amplification of practices (the new practices are regularly employed and integrated into the daily basis school activities without external help from research or pedagogical team), and diffusion (differential access to information).

**2.2.1.4 The 'EXTRANTS'.** The Extrants refer to various types of results and can be generally seen as the degree of improvement at macro-system, meso-system, and micro-system levels. For example, a micro-level improves student new knowledge, skills, and attitudes; improves satisfaction on the part of lecturers and school staff; or improves the school's problem-solving capacity as a whole. Because the outputs of the HTLE are more focused on the effect of micro-level such as learners and lecturers, we do not explain meso-level and macro-level in this context. For learners, the innovation may help them improve their 21st-century learning skills, namely Critical thinking and problem-solving; Creativity and innovation; Collaboration, teamwork and leadership; Cross-cultural understanding; Communications, information and media literacy; Computing and ICT literacy; Career and learning self-reliance. These skills were called "7Cs 21st-century learning skills" (Trilling & Fadel, 2009). The second part of our research focuses on analyzing these effects on students' 21st-century learning skills when applying HTLE. For lecturers, the innovation could improve teaching engagement, differentiate instruction, and develop a new role as expert learner, facilitator, course designer, and organizer, leading to the satisfaction of students' needs.

## 2.3 What Are the Effects of Hybrid Teaching and Learning?

Digital technologies have impacted all spheres of life, such as society, economy, and politics in the 21st century. Such digital technologies dramatically change the ways people

interact, communicate and function in society. Additionally, they provide access to information for people and raise opportunities for individuals to share and build knowledge. The following paragraphs focus on the effects of hybrid teaching and learning environments on the individual (student learning and teaching engagement) and the program level.

### *2.3.1 Effects of Hybrid Teaching and Learning Environment on Individual: Student Learning and Teaching Engagement*

Education plays an essential role in socio-economic development and personal growth. This can be seen through developing new knowledge, skills, and attitudes. Interestingly, the introduction of integrated technology into education positively impacts students' learning. According to Deschryver and Charlier (2012), hybrid teaching and learning environment affects students' learning, such as motivation, learning resources, acquiring new skills, enhancing more chances for peers and lecturers to interact, various learning activities, and boosting students' learning outcomes. Similarly, Charlier et al. (2019) conducted a research study, using online questionnaires, on "describing and understanding learning in hybrid learning courses" with 52 students enrolled in hybrid learning courses. Students were asked about their perceptions of the effects on their learning. The result indicated that students perceived effects on their learning such as motivation, information, activities, interaction, and production were relatively high. In the same way, Karabulut-Ilgu and Jahren (2015) conducted a research study on "faculty perspectives on benefits and challenges of hybrid learning" with four professors implementing hybrid teaching by using semi-structured interviews. The result of this study revealed that a hybrid teaching and learning environment offers students "free time for complex problem solving, flexibility, self-paced learning, increased students' engagement, and increased student empowerment" (p. 6).

### *2.3.2 Effects of Hybrid Teaching and Learning Environment on Institution*

Educational institutions have been developing their pedagogies, learning performances, and educational practices to underpin new teaching and learning methods in a complex world due to globalization's impacts, new demand for working skills, and surges of information technology. Learners are anticipated to take part in and provide knowledge and skills to the society framed by rapid change, global networks, creativity, innovation, and co-creation (Lievonen et al., 2016). Notably, there is little evidence in a research study to indicate the effects of hybrid teaching and learning environment on the institutional level. According to the Hy-Sup project findings, hybrid teaching and learning environments have minor effects at

an institutional level (Deschryver & Charlier, 2012). However, during the pandemic of Covid-19, hybrid teaching and learning environment (HTLE) impacts higher educational institutions because the learning process happens over distance and online. As a prediction, the growth and usefulness of technology will continue to impact society, culture, and education at all levels in the future.

### *2.3.3 The Roles of Digital Technology in Education*

Digital technologies have potential effects for transforming teaching and learning practices in schools and opening new boundaries to 21st-century teaching and learning; however, integrating new types of instruction to achieve this transformation is more complicated than overcoming technological barriers. According to OECD (2016), it is indisputable that digital technology can facilitate the following:

> - Innovative pedagogic models, for example based on gaming, online laboratories and real-time assessment, which have been shown to improve higher-order thinking skills and conceptual understanding and in many cases have enhanced students' creativity, imagination and problem-solving skills.
> - Simulations such as remote or virtual online laboratories, providing relatively low-cost flexible access to experiential learning.
> - International collaborations, overcoming barriers of geography and formal classroom hours. These give students insight into other cultures and experience multicultural communication, and closely emulate the collaborative nature of today's professional environments.
> - Real-time formative assessment and skills-based assessments, allowing teachers to monitor student learning as it happens and adjust their teaching accordingly. It may also enable the active participation of more students in classroom discussions. Technology supported assessment enables skill development to be monitored in a more comprehensive way than is possible without technology.
> - E-learning, open educational resources and massive open online courses, mainly aimed at autonomous learners. (p. 10)

## 2.4 The 21st Century Skills

Education, in the past, was primarily seen to focus on content knowledge of different subjects and measured by different assessing methods. Higher education assessments have been generally seen through formal examinations, coursework, project work, or reports. However, higher education institutions around the globe have started to change formal examination assessment procedures to be sure of the validity and reliability of applying knowledge and skills in more realistic situations. It is believed that no single assessment can assess the full range of student knowledge, skills, and competencies in higher education (Entwistle et al., 2020). Due to the evolution of society in the 21st century, we need to help students go beyond knowledge acquisition by providing them not only knowledge but also the skills and expertise learners need to work and live outside school. These consist of three sets of skills (Table 2): "*learning and innovative skills*, *digital literacy skills*, and *career and life skills*" (Trilling & Fadel, 2009, p. 176).

**Table 2**

*P21 (Partnership for 21st-century skills) and 7Cs Skills*

| P21 skills | 7 Cs Skills |
|---|---|
| ***Learning and innovation skills*** | |
| • Critical thinking and problem solving<br>• Communications and collaboration<br>• Creativity and innovation | • Critical thinking and problem solving<br>• Communications, information, and media literacy<br>• Collaboration, teamwork, and leadership<br>• Creativity and innovation |
| ***Digital literacy skills*** | |
| • Information literacy<br>• Media literacy<br>• ICT literacy | (included in Communications)<br>(included in Communications)<br>• Computing and ICT literacy |
| ***Career and life skills*** | |
| • Flexibility and adaptability<br>• Initiative and self-direction<br>• Social and cross-cultural interaction<br>• Productivity and accountability<br>• Leadership and responsibility | • Career and learning self-reliance<br>(included in Career and learning self-reliance)<br>• Cross-cultural understanding<br>(included in Career and learning self-reliance)<br>(included in collaboration) |

Source: (Trilling & Fadel, 2009, p. 176)

However, to make it easier to remember, Trilling and Fadel (2009) called these skills' 7Cs' because they begin with the letter C. These sets of skills are almost the same as the core skills highlighted in (van Laar et al., 2017) a systematic literature review of 21st-century skills and digital skills, such as technical, information management, communication, collaboration, creativity, critical thinking and problem solving, and five contextual skills (ethical awareness, cultural awareness, flexibility, self-direction, and lifelong learning). These skills are essential in the era of Education 4.0.

### *2.4.1 Learning and Innovative Skills*

Students are normally conferred their degree certificate to represent their academic knowledge and skills. However, higher education has been encouraging additional skills required by employers, such as oral communication, collaboration, and initiative skills into the learning curriculum (Entwistle et al., 2020). Such learning and innovation skills are essential to prepare students for more complex life and work environments in the future. They focus on critical learning skills and innovation in three dimensions, *critical thinking and problem solving* (expert thinking), *communication and collaboration* (complex communicating), *creativity and innovation* (applied imagination and invention) (P21, 2019). These skills are essential to unlocking lifelong learning and creative work (Trilling & Fadel, 2009).

First, Trilling and Fadel (2009) highlighted that *critical thinking and problem-solving skills* could be learned differently, such as inquiry and problem-solving activities. Nowadays, the power of technology gives quick thinking skills in the 21st century to access, search, analyse, store, manage, create, and communicate information to underpin critical thinking and problem-solving. According to P21 (2019, p. 4), these critical thinking and problem-solving skills help learners to reason effectively and solve problems in the following:

*Reason effectively*

- Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation
- Use systems thinking
- Analyse how parts of a whole interact with each other to produce overall outcomes in complex systems
- Make judgments and decisions

- Effectively analyse and evaluate evidence, arguments, claims, and beliefs
- Analyse and evaluate major alternative points of view
- Synthesize and make connections between information and arguments
- Interpret information and draw conclusions based on the best analysis
- Reflect critically on learning experiences and processes

*Solve problems*

- Solve different kinds of non-familiar problems in both conventional and innovative ways
- Identify and ask significant questions that clarify various points of view and lead to better solutions.

Second, *communication and collaboration skills* can be learned from various methods. However, the best method is to learn socially by direct communication and collaboration with others either face-to-face or through technology. For example, learners in contemporary society can engage experts by email, text message their learning group, or work collaboratively online (Trilling & Fadel, 2009). This can be clearly seen during the pandemic of COVID-19 because all education systems around the world adopted online communication and collaboration. According to P21 (2019, p. 5), these skills help learners to be able to communicate clearly and collaborate with others in the following:

*Communicate clearly*

- Articulate thoughts and ideas effectively using oral, written, and nonverbal communication skills in a variety of forms and contexts
- Listen effectively to decipher meaning, including knowledge, values, attitudes, and intentions
- Use communication for a range of purposes (e.g. to inform, instruct, motivate, and persuade)
- Utilize multiple media and technologies, and have the know-how to judge their effectiveness as a priority as well as assess their impact
- Communicate effectively in diverse environments (including multi-lingual)

*Collaborate with others*

- Demonstrate ability to work effectively and respectfully with diverse teams
- Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal
- Assure shared responsibility for collaborative work, and value the individual contributions made by each team member.

Third, *creativity and innovation skills* are highly demanded 21st-century skills because they can continuously improve new services, processes, and products for the global economy and creative knowledge work. These skills can be developed through a supportive learning environment, such as questioning, patience, openness to new ideas, trustworthiness, and learning from mistakes and failures. They can be improved through repeated practice. One of the most effective ways to improve creative skills is to design challenging projects to solve real-world problems (Trilling & Fadel, 2009). According to P21 (2019, p. 4), creativity and innovation skills can help learners to be able to think creatively, work creatively with others, and implement innovations in the following:

*Think creatively*

- Use a wide range of idea-creation techniques (such as brainstorming)
- Create new and worthwhile ideas (both incremental and radical concepts)
- Elaborate, refine, analyse, and evaluate their own ideas in order to improve and maximize creative efforts

*Work creatively with others*

- Develop, implement, and communicate new ideas to others effectively
- Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work
- Demonstrate originality and inventiveness in work and understand the real-world limits to adopting new ideas
- View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

*Implement innovations*

- Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur.

### *2.4.2 Digital Literacy Skills*

The Knowledge Age has arrived making people able to place, assess, and represent new information quickly. With this Knowledge Age, 21st-century learners require appropriate skills to access, evaluate, utilize, manage, and accumulate information and media with digital technology. This digital technology helps learners to be able to strengthen their thinking, learning, communication, collaborating and creative skills. However, they need to learn appropriate skills to manage massive amounts of information, media, and technology (Trilling & Fadel, 2009). Therefore, digital literacy skills consist of *information literacy, media literacy, and ICT literacy*.

*Information Literacy*: In the 21st century, everyone needs to raise their level of information literacy and fluency in order to increase their ability to access information efficiently and effectively, evaluate information critically and competently, and use information accurately and creatively. More importantly, learners need to ensure that the information is credible, accurate, and reliable. They also need to decide which information is essential, valuable, and organizable (Trilling & Fadel, 2009). According to P21 (2019, p. 5), information literacy can help learners access and evaluate information, and use and manage information in the following:

*Access and evaluate information*

- Access information efficiently (time) and effectively (sources)
- Evaluate information critically and competently

*Use and manage information*

- Use information accurately and creatively for the issue or problem at hand
- Manage the flow of information from a wide variety of sources
- Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information.

*Media Literacy*: 21st-century learners need to know the best ways to use the media resources available for learning and utilize media creation tools to build fascinating and effective communication products, such as videos, audio podcasts, and Websites (Trilling & Fadel, 2009). Media Literacy has been defined thus: "Media Literacy is a 21st-century approach to education. It provides a framework to access, analyse, evaluate, and create messages in various forms—from print to video to the internet. Media literacy builds an understanding of a role of media in society as well as essential skills of inquiry and self-expression necessary for citizens of a democracy" (Thoman & Jolls, 2003, p. 21). Similarly, Institute for the Future (Davies et al., 2011) defined media literacy as the "ability to critically assess and develop content that uses new media forms, and to leverage these media for persuasive communication" (p. 10). As a result, media literacy helps learners become competent, critical, and literate in all forms of media by controlling the interpretation of what they hear or see. To become media literate, learners need to go beyond memorizing facts or statistics about the media by learning to raise the right question about what they are watching, reading, or listening to, which is called "critical autonomy or ability to think for oneself" by Len Masterman (Thoman & Jolls, 2003). Media literacy, according to P21 (2019, p. 5), can help learners to be able to analyse media and create media products in the following:

*Analyse media*

- Understand both how media messages are constructed, and for what purposes
- Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviours
- Apply a fundamental understanding of the ethical/legal issues surrounding the access to and use of media.

*Create media products*

- Understand and utilize the most appropriate media creation tools, characteristics, and conventions
- Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments.

Another form of digital literacy is *ICT Literacy*. ICT (Information and Communication Technology) has become a vital skill in the 21st century in school and outside school because learners need to learn how to effectively apply technological tools to deal with complex learning and creative tasks (Trilling & Fadel, 2009). According to P21 (2019), ICT literacy helps learners apply technology effectively by using technology as a tool to research, organize, evaluate, and communicate information. It helps learners use digital technologies, communication/ networking tools, and social networks appropriately to access, manage, integrate, evaluate, and create information to successfully function in a knowledge economy. Furthermore, it helps learners apply a fundamental understanding of the ethical/ legal issues surrounding accessing and using information technologies.

### *2.4.3 Career and Life Skills*

Career and life skills are essential for students to deal with complex life and work environments in the competitive information age because they require learners to possess more than thinking skills and content knowledge (P21, 2019). They consist of subskills, such as *flexibility and adaptability, initiative and self-direction, social and cross-cultural interaction, productivity and accountability, and leadership and responsibility*.

*Flexibility and adaptability*: Personally speaking, the outbreak of Covid-19 in late 2019 forced the world to be flexible and adaptable to work, learn, and communicate with each other through ICT. This reflects that flexibility and adaptability now play an essential role in learning, working, and citizenship in the 21st century. Trilling and Fadel (2009) highlighted that adjusting and adapting strategies to accommodate new circumstances are vital for people to develop new ways of communicating, learning, working, and living. According to P21 (2019, p. 6), flexibility and adaptability help learners to adapt to change and be flexible in the following:

*Adapt to change*

- Adapt to varied roles, job responsibilities, schedules, and contexts
- Work effectively in a climate of ambiguity and changing priorities

*Be flexible*

- Incorporate feedback effectively
- Deal positively with praise, setbacks, and criticism

- Understand, negotiate, and balance diverse views and beliefs to reach workable solutions in multi-cultural environments.

*Initiative and self-direction*: The demands of life in the 21st-century encourages schools to prepare students to develop a sense of initiative and self-direction skills in school and outside school; however, helping students become more independent and autonomous learners is not easy. Technology plays a crucial role in developing self-reliant and independent skills by providing tools for researching and learning online (Trilling & Fadel, 2009). According to P21 (2019, p.6), initiative and self-direction help learners to be able to manage goals and time, work independently, and be self-directed learners in the following:

*Manage goals and time*

- Set goals with tangible and intangible success criteria
- Balance tactical (short-term) and strategic (long-term) goals
- Utilize time and manage workload efficiently

*Work independently*

- Monitor, define, prioritize, and complete tasks without direction oversight

*Be self-directed learners*

- Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise
- Demonstrate initiative to advance skill levels towards a professional level
- Demonstrate commitment to learning as a lifelong process
- Reflect critically on past experiences in order to inform future progress.

*Social and cross-cultural interaction*: Students generally develop social and cross-cultural interaction through online and face-to-face interaction. Perhaps emotional intelligence, which consists of intrapersonal and interpersonal intelligence, is the most crucial skill to improve social and cross-cultural interaction. Of course, cultural relativism and acculturation new culture are essential in the 21st century of learning and working to promote creative ideas and tackle problems. Trilling and Fadel (2009) expressed that working with team members or classmates culturally and effectively is an essential life skill in the 21st century. According to P21 (2019, p. 6-7), social and cross-cultural interaction help learners to

be able to interact effectively with others and work effectively in diverse teams in the following:

*Interact effectively with others*

- Know when it is appropriate to listen and when to speak
- Conduct themselves in a respectable, professional manner

*Work effectively in diverse teams*

- Respect cultural differences and work effectively with people from a range of social and cultural backgrounds
- Respond open-mindedly to different ideas and values
- Leverage social and cultural differences to create new ideas and increase both innovation and quality of work.

*Productivity and accountability* are essential skills for students and teachers to accomplish their school, work, and life in the 21st century because productive workers and learners are required in business and education. Today, technology makes it easy for people to be accountable by tracking and sharing work done and lessons learned with each other (Trilling & Fadel, 2009). According to P21 (2019, p. 7-8), productivity and accountability skills help learners to be able to manage projects and produce results in the following:

*Manage projects*

- Set and meet goals, even in the face of obstacles and competing pressures
- Prioritize, plan, and manage work to achieve the intended result

*Produce results*

- Demonstrate additional attributes associated with producing high-quality products, including working positively and ethnically, managing time and projects effectively, multi-tasking, participating actively (being reliable and punctual), presenting oneself professionally and with proper etiquette, collaborating and cooperating effectively with teams, and being accountable for results.

*Leadership and responsibility*: Responsible leadership is crucial because it makes development sustainable and plays into the interests of many stakeholders. If a leader does not take responsibility for action, there will be lost trust among the stakeholders. According to P21 (2019, p. 8), leadership and responsibility help learners to guide and lead others and be responsible to others in the following ways:

*Guide and lead others*

- Use interpersonal and problem-solving skills to influence and guide others toward a goal
- Leverage strengths of others to accomplish a common goal
- Inspire others to reach their very best via example and selflessness
- Demonstrate integrity and ethical behaviour in using influence and power

*Be responsible to others*

- Act responsibly with the interest of the larger community in mind.

### *2.4.4 Summary 7Cs and Variable for This Research*

Table 3 below gives brief information about 7Cs skills and their variables and variables to keep for this research study. 7Cs skills have been named to make it easy to remember when talking about 21st-century skills because it begins with the letter *C*. The variables for this research have been intentionally selected according to two reasons.

**Table 3**

*Summary 7Cs Skills and Variables for this Research*

| **7Cs skills** | **Variable for this research (perception)** |
|---|---|
| Critical thinking and problem solving | • Solve problems |
| Communications, information, and media literacy | • Access and evaluate information |
| Collaboration, teamwork, and leadership | • Collaborate with others |
| Creativity and innovation | • Think creatively |
| Computing and ICT literacy | • Apply technology effectively |
| Career and learning self-reliance | • Be self-directed learners |
| Cross-cultural understanding | • Work effectively in diverse teams |

First, it is related to time constraints to conduct all variables; therefore, we decided to choose more relevant variables in our study. Second, some variables are already included in other variables; for example, "Reason effectively" in critical thinking and problem-solving has been mentioned in "Access and evaluate information" in information literacy. We expected the hybrid teaching and learning environment to provide hidden 7Cs skills to learners as a hidden curriculum. Students might develop, increase, or sharpen valuable skills such as solving problems, accessing and evaluating information, collaborating with others, thinking creatively, applying technology effectively, being self-directed learners, and working effectively in diverse teams. So, we will use these variables to evaluate the skills developed by the students while or after they take a hybrid learning class. We also want to see whether different types of HTLE provide a different effect on students' 21st-century learning skills.

## 2.5 Specific Conditions Related to Hybrid Teaching and Learning Environment

This section explicitly links implementing conditions of innovation in higher education to specific conditions to implement the hybrid teaching and learning environment. These conditions are based on a systemic model of the university innovation process. We also divide these conditions into three categories: individual conditions, program conditions, and system conditions. Each category may play a crucial role in making hybrid teaching and learning environments happen in the short or long run.

### *2.5.1 Individual Conditions (Micro-level)*

The individual conditions here refer to the teacher and student. The hybrid teaching and learning environment is strongly relevant to teachers' knowledge and skills in using innovative tools to adopt new teaching styles. This knowledge and these skills could be improved and mastered through training, peer support, and sufficient time to explore complex forms of mediatization and mediation. Additionally, incentives or rewards are vital to motivating teachers to move out of their comfort zone. On the other hand, students' pre-existing knowledge and skills to adopt new learning methods should be considered. A significant gap between students' schemata and new innovative teaching might lead to unsuccessful implementation. This is supported by Stephen Krashen's theory of comprehensible input (i + 1). The 'i' is learners' current knowledge, and the '1' is the task slightly beyond current learners' knowledge and skills. If the task is too difficult to follow for

the learners, learners will lose their motivation to study. If the task is too easy for them, they will feel bored learning.

### *2.5.2 Program Conditions (Meso-level)*

The program conditions here refer to the school or organizational level. They include school supports, such as equipment, openness to innovation, and relational climate. It is unarguable that such an innovation could not happen without equipment support from school because school plays a central role in offering learning support tools and freedom of choice teaching and learning methods, which links to the dimension of the hybrid environment. Next, the openness of the school environment and rational climate to innovation is indispensable. It, of course, provides a degree of freedom of choice in teaching and learning, supportive teaching and learning environment, and ongoing assessment and monitoring of innovation.

### *2.5.3 System Conditions (Macro-level)*

The system conditions refer to the state level. They concern the degree of openness of MoEYS, or Department of Higher Education to individual universities to do innovation, which is one of the dimensions of hybrid teaching and learning environment. Finally, other conditions such as commitment, motivation, and support for hybrid teaching and learning environment to the lower levels are significant to make hybrid teaching and learning environment happen in the long term.

## 2.6 Types of Hybrid Teaching and Learning Environment

Some essential methods are used to communicate and represent tools to deliver content in conventional learning environments, such as didactic delivery in a big lecture hall, practical experience in a lab, and print learning resources in distance education. In this sense, it is vital to identify the type of course because each type has unique ways to move along the hybridization pathway. According to Boora et al. (2010), there are three categories that courses may fall into, such as 'High Think', 'High Tech' and 'High Touch'. Table 4 is the summary of the two integrations.

'High Think' courses are almost the same as the traditional approach 'chalk and talk' in which instructors play the role of leader while students are mainly passive learners unless the instructor proposes Q & A, pair work, or small group work. Such courses are good for multimode delivery with online supplementary materials to learners and increase the

interaction with the students to be hybridized. When hybridized, the courses are similar to many modern distance education course offerings worldwide (Boora et al., 2010). These 'High Think' courses are perhaps similar to three of the types of hybrid environment: the Scene, the Screen, and the Rural Gite identified in the HY-SUP project because they are becoming more teacher-centred. According to Deschryver and Charlier (2012), in (type 1) the 'Scene', teachers prefer to use classroom teaching but make educational resources for their students to download, such as articles and exercises. In (type 2) the 'Screen', teachers primarily use the teaching and learning environment to make textural and multimedia learning resources available to their students. In (type 3) the 'Rural Gite', teachers use most of the potential of technological tools to manage their teaching and interaction with students. This results in the frequent use of tools to integrate into teaching resources.

**Table 4**

*Types of Hybrid Teaching and Learning Environments in Summary*

| Types of Hybrid Environment | | Characteristics |
|---|---|---|
| High Think | Type 1<br>“the Scene” | Content-oriented “teaching” configuration, characterized by support courses and the availability of primarily textual resources |
| | Type 2<br>“the Screen” | Content-oriented “teaching” configuration, characterized by support on-site courses and the availability of numerous multimedia resources |
| | Type 3<br>“the Rural Gite” | “Teaching” configuration oriented to the organization of courses eased by the use of management tools and sometimes integration of interpersonal and reflexive targets |
| High Tech | Type 4<br>“the Crew” | “Learning” configuration focused on supporting the process of knowledge building and on interpersonal interactions |
| | Type 5<br>“the Metro” | “Learning” configuration focused on various form of support and openness |
| | Type 6<br>“the Ecosystem” | “Learning” configuration characterized by exploiting a large number of technological and educational opportunities offered by hybrid systems |
| High Touch | Courses are associated with a virtual lab environment where learners manipulate equipment and materials as part of their learning process | |

'High Tech' courses are described as student-directed teaching, which originally follows instructional designs in distance education. These courses virtually make use of classroom technologies to supplement other synchronous or asynchronous tools, which are the part of CMS (content management system) and LMS (learning management system) to host the courses. These 'High Tech' courses might fall into another three types of hybrid environment, namely, the Crew, the Metro, and the Ecosystem, because they focus more on student-centred

learning. According to Deschryver and Charlier (2012), in (type 4) the 'Crew', teachers pay special attention to students' learning progress by using interpersonal and reflexive tools to support learning, communication, and collaboration. In (type 5) the 'Metro', teachers focus on supporting and guiding students, being open to external resources and actors, and leaving some freedom to select methods and learning pathways. In (type 6) the 'Ecosystem', teachers make use of all the dimensions identified to characterize hybrid teaching and learning, such as students' active participation (in-class and remotely), frequent and diversified use of technological tools, availability and production of multimedia documents, peer interaction, and openness of the system to external resources and actors, etc.

'High Touch' courses are classified as Lab-based courses that require specialized tools. These courses are not ideal for learners to do wholly online because learners need to use actual tools in physical labs to gain practical experiences.

### *2.6.1 How Were They Evaluated? With Which Methods?*

The hybrid-learning environment has been evaluated through the systemic perspective of circular causality proposed by HY-SUP and INTENS projects (Figure 3) to understand the effects of digital learning environments on individuals' learning. The framework indicated that human learning interactively occurs within four sets of characteristics: *individual student characteristics*, *characteristics of the digital learning environment*, *characteristics of the interactions due to the interactions between students and the environment,* and *the learning outcomes*—this result influences individual and environmental characteristics in turn (Charlier et al., 2015).

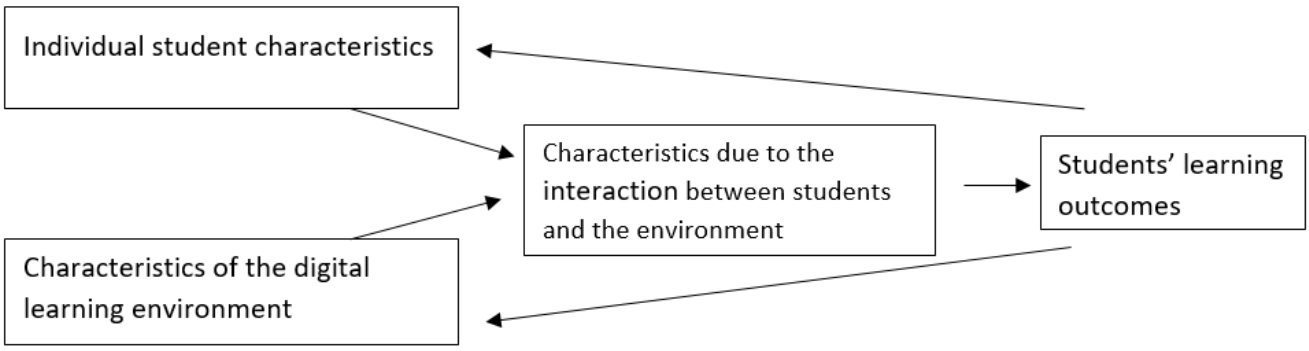
*Individual student characteristics* impact individual success in academic life, especially in higher education. Those characteristics are cognitive skills, past academic studies, schema (an initiative of knowledge associated with the subject of learning), conceptions of knowledge and learning (what it means to learn, learning to acquire knowledge and to self-transformation), and disposition to understand oneself (Charlier et al., 2015).

The *characteristics of the digital learning environment* could be better understood through the HY-SUP project. A mixed-methods study on "describing hybrid learning environments and understanding their effects" has been employed (174 questionnaires and 77 interviews with professors in higher education), which enables us to identify of 14 factors. They are *in-site active participation; active distance participation; learning support tools; management, communication and interaction tools; multimedia resources; multimedia*

*works; synchronous collaboration tools; comment and annotate online documents; reflexive and interpersonal goals; methodological support; metacognitive support; support by students; freedom of choice teaching and learning methods; and use of external resources and actors* (Deschryver & Charlier, 2012).

**Figure 3**

*The Systemic Perspective of Circular Causality*




Source : (Charlier et al., 2015, p. 382)

The *interaction between students and their learning environment* can be described through the students' representation of the learning environment, for example, by using the Hy-Sup self-positioning tool and through self-regulation strategies. Other mediating variables such as self-efficacy (self-belief), the orientation of goals (concerned with achievement on a particular aim), and approaches to learning (skills and experiences that they use to engage their learning) can be used (Charlier et al., 2015).

The *student's learning outcome.* Bloom's taxonomy's dominant theory probably plays an essential role in curriculum development, instruction, and assessment when talking about learning outcomes. So, it is essential to grasp the big picture of learning outcomes, for example, program learning outcomes, course learning outcomes (subject learning outcomes), and lesson learning outcomes. A lesson learning outcome is a stepping-stone to achieving a course learning outcome which is a step toward achieving a program learning outcome. The learning outcome needs to be aligned with learning activities and assessment pieces. According to the European Association for Quality Assurance in Higher Education, learning outcomes have been defined as a product of learning using assessment tools with specific criteria, leading to enhanced pedagogical practice in education and improved student learning

practice (Gallavara et al., 2008). Based on the Cambodia Qualifications Framework (MoEYS, 2012), there are five major domains of learning expected of students in higher education. These are:

1. Knowledge: the ability to recall, understand, and present information including
- knowledge of specific facts
- knowledge of concepts, principles and theories
- knowledge of procedures
2. Cognitive skills: the ability to apply understanding of concepts, principles, theories and procedures in critical thinking and creative problem solving, both when asked to do so and when faced with unanticipated new situations.
3. Psychomotor skills: the ability to
- Perform one or more skills with ease and becomes automatic with limited physical or mental exertion
- Combine more than one skill in sequence with harmony and consistency
- Reproduce a skill with accuracy proportion, exactness and usually performed independent of original source
- Perform skills according to instruction rather than observation.
4. Interpersonal skills and responsibility: the ability to
- take responsibility for their own learning, and continuing personal and professional development
- work effectively in groups and exercise leadership when appropriate
- act responsibly in personal and professional relationships
- act ethically and consistently with high moral standards in personal and public forums
5. Communication, information technology and numerical skills: the ability to
- Communicate effectively in oral and written form
- Use information and communications technology
- Use basic mathematical and statistical techniques (p. 6)

The outcomes of implementing HTLE could help improve students' 21st-century learning skills. These skills are called 7Cs: Critical thinking and problem-solving; Creativity and innovation; Collaboration, teamwork and leadership; Cross-cultural understanding; Communication, information and media literacy; Career and learning self-reliance;

Computing and ICT literacy. These skills are consistent with the Cambodia Qualifications Framework, such as cognitive skills, interpersonal skills, communication, information technology, and numerical skills.

### *2.6.2 Summary of Variables for This Research*

As our research questions focus on the perceived effects of HTLE on students' 21st-century skills, understanding students' learning characteristics is essential. In this sense, individual characteristics which may determine success or failure in school have been defined by various variables such as student background (age, gender, location), academic performance (academic past), behavioral factors (misbehavior activities, low-class attendance and less involvement in in-class participation), and psychological factors (educational aspiration, self-esteem and motivation) (Heng et al., 2016). However, there are certain variables to investigate in the hybrid learning context. For example, Bowyer (2017) provided a framework for evaluating hybrid learning for individual learners' variables, such as attitude towards computers/ technology, attitude towards learning, attitude towards teaching, motivation towards the course taken, study routine, technological experience, prior knowledge and learning experience, perceived enjoyment, and usefulness. These variables are similar to student's individual characteristics (student's biographical data, entry motives, prior knowledge, conception of knowledge and learning, and disposition to understand oneself) and technological experiences highlighted in the digital learning environments (Charlier et al., 2015). Therefore, they are valid for HTLE. Significantly, Kintu et al. (2017), a survey study with 238 students in a Ugandan university, indicated that computer competence is essential for student characteristics of hybrid learning effectiveness. In my view, one of the significant personality characteristics (Costa Jr. & McCrae, 2008) is the openness to experience in learning because it develops a positive attitude and motivation towards using technology. So, I keep openness and curiosity as variable personalities to be effective in hybrid learning.

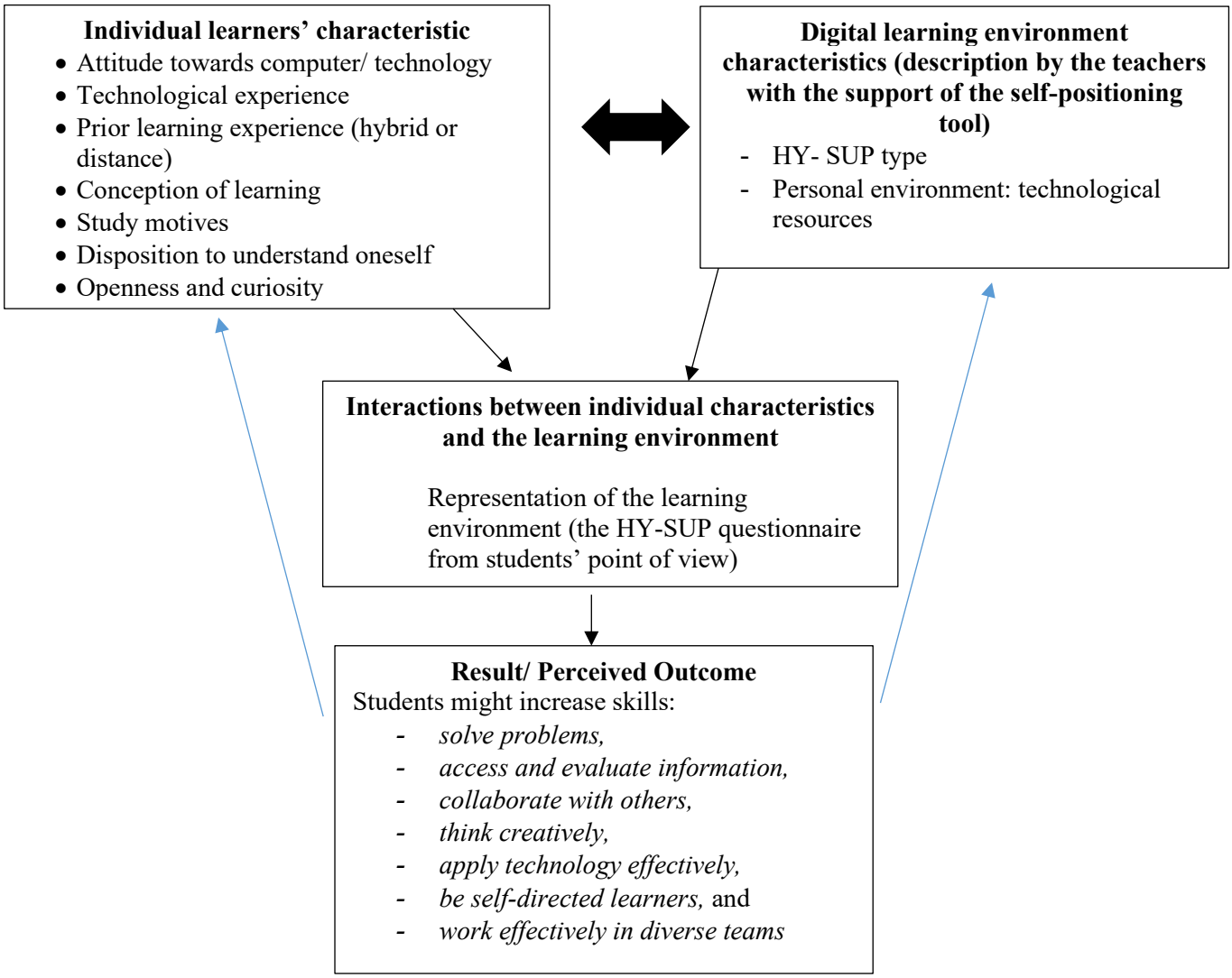
This research also keeps the 14 dimensions highlighted by Deschryver and Charlier (2012) to describe and identify the type of HTLE provided by the lecturers: in-site active participation; active distance participation; learning support tools; management communication and interaction tools; multimedia resources; multimedia works; synchronous collaboration tools; comment and annotate online documents; reflexive and interpersonal

goals; methodological support; metacognitive support; support by students; freedom of choice teaching and learning methods; and use of external resources and actors.

The interaction between individual characteristics and the digital learning environment creates a new learning process. The term 'environment' here refers to hybrid teaching and learning types, which will be analysed through the self-positioning tool of students' answers or responses (HY-SUP questionnaire). Furthermore, the interaction between individual characteristics and the digital learning environment is described through the learning strategies, perceived enjoyment, and representation of the learning environment (HY-SUP type).

**Figure 4**

*Systemic Perspective of Circular Causality for this Research*



This interaction produces specific knowledge and skills, including both hard and soft skills. These soft skills can help students solve problems, access and evaluate information, use and manage information, collaborate with others, think creatively, apply technology effectively, be self-directed learners, and work effectively in diverse teams. This model is essential to evaluate the perceived effects of the digital learning environment on students' outcomes. Figure 4 provides a recap of variables for this research on the perceived effects of digital learning environments on individuals' learning.

# CHAPTER 3: METHODOLOGY

As stated in chapter one above, the main objectives of this research study are intended to explore and interpret the present conditions of hybrid teaching and learning environment in Cambodian higher education. This research also evaluates the perceived effects of a hybrid teaching and learning environment on students' 21st-century skills. This research study was conducted through online interviews and questionnaires in Phnom Penh, Cambodia, with four universities and two institutes (table 5). To protect the reputation of the universities and institutes, we use letters "university A, B, C, etc." instead of real names.

**Table 5**

*University Involvement of Research Study*

| University/ Institute | Sector |
|---|---|
| 1. University A | Public |
| 2. University B | Private |
| 3. University C | Private |
| 4. University D | Private |
| 5. Institute A | Public |
| 6. Institute B | Private |

There were some great reasons to choose these universities and institutes due to location (Phnom Penh City), quality of teaching, availability of WIFI access and internet speed, and technological resources. The key participants of this research were both lecturers who are implementing hybrid teaching and learning in their classroom and their students (Table 6). This research study used mixed methods through online semi-structured interviews with the lecturers and questionnaires with their students to meet the objectives. Using semi-structured interviews allows the researcher to get extensive response-keying, clarify, and probing to get in-depth information from participants (Cohen et al., 2007). Mack et al. (2005) also claimed that in-depth interviewing helps researchers get profound information from personal feelings, opinions, and experiences. On the other hand, we use an online questionnaire, a combination of closed and open questions, with students to cross-check results with their lecturers' perspective, such as the types of learning environment, effects of hybrid environments on students' 21st-century skills, and understanding their individual

needs, learning characteristics and resources. Cohen et al. (2007) highlighted that a combination of closed and open questions helps a researcher get large responses in a short time, makes it easy for coding, and easy to administer.

In this chapter, we will describe research methodology and methods. We will focus and elaborate on mixed methods. Why do we decide to use such particular methods? Why are other methods inappropriate? We also explain population and sampling for data collection. How do these populations and samples represent and generate reliable and valid data for generalization? Furthermore, we illustrate data collection instruments; for example, how do we construct semi-structured interviews and questionnaire items? Next, we portray a procedure and timeframe of data collection. This includes starting and ending date data collection, procedures, informed consent form, setting, and administration methods. Finally, we will elucidate data analysis and ethical considerations.

### 3.1 Mixed Methods

As stated above, this research study uses mixed methods such as semi-structured interviews and questionnaires (mixed model) to explore individual representation, ideas, and experiences to answer research questions. These mixed methods also allow us to compare lecturers' and their students' perspectives. Therefore, mixed methods were employed in this research study. Johnson and Onwuegbuzie (2004) defined mixed methods research as “the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study” (p. 17). Mixed methods research intends to legitimize the use of multiple approaches in responding to research questions because research methods should follow research questions that give the best opportunity to get valuable answers. In many cases, the goal of using mixed methods is to complement each other and broaden one's understanding. Additionally, mixed methods can help increase the generalizability of quantitative and qualitative results and produce a more complete set of findings which is necessary to inform theory and practice. However, a mixed method is not easy for novice researchers because it requires multiple methods and approaches and knowledge of how to mix them appropriately, knowledge of how to interpret conflicting results, and it is more time-consuming than a single method.

There are some reasons that we decided to use mixed methods in our study. First, mixed methods allow us to gather data from both lecturers and their students. Second, the mixed methods help us to compare data between lecturers and their students about their

learning environment. Last but not least, mixed methods help us complement quantitative and qualitative data to generate a complete understanding of the learning environment.

### *3.1.1 Semi-structure Interview*[6]

There are some reasons which influenced us to use this particular method. First, we decided to use a semi-structured interview based on the nature of our main first research questions. Second, this interview approach allowed us to get detailed information from faculty members about the hybrid teaching and learning environment in Cambodian higher education, especially before Covid-19 and during Covid-19. The qualitative methodology allows us to talk about feelings, ideas, and experiences. The researcher (Mack et al., 2005) can understand how people interpret the world with this approach. Anderson and Arsenault (2005) also underlined the usefulness of using interviews for data collection; for example, participants are more easily engaged than just asked to fill out a questionnaire. The interviewer can clarify questions and probe the answers.

### *3.1.2 Closed and Open-ended Questionnaire*

We adopted the HY-SUP questionnaire to identify the type of learning environment. We used a close and open-ended questionnaire due to several reasons. First, we used it because of the nature of the second research question. Next, according to Anderson and Arsenault (2005), the questionnaire is highly efficient for routine data collection with many respondents in different places or locations simultaneously. It lends itself to quantitative analysis and the use of robust descriptive statistics. Additionally, it can be used with many questions and individual comments and perspectives. Last, we used an online questionnaire due to the Covid-19 situation around the world. There were positive and negative points regarding an online questionnaire. The good point is that students have sufficient time to think and answer the questions in a relaxed mood; on the contrary, it might not get many respondents because Cambodian students generally do not have university email accounts. Therefore, the lecturers use social media to engage their students, such as Facebook groups and Telegram, instead of email. Additionally, if the questionnaire takes a long time to complete, the students will lose their motivation to answer it from the bottom of their hearts. To get enough participants to complete the online questionnaire, we had to keep reminding

[6] This part was extracted to publish in the book chapter "Impacts of COVID-19 Pandemic's Distance Learning"

lecturers involved in the interview to alert their students in the group to complete the online questionnaire.

## 3.2 Population and Sampling[7]

This section will address the sample size, representativeness, and sample parameters. We also elaborate on how to access the sample and our strategy. There are two types of key participants of this research study: lecturers and their students (Table 6). We invited lecturers who have been implementing a hybrid teaching and learning environment to their classes, considered early adopters. Those lecturers have been chosen by purposive sampling based on criteria, such as location (teaching at higher education in Phnom Penh), applying hybrid teaching methods (integrating technology to teaching courses) to their classes, and using English as a medium of instruction. We use purposive sampling for both semi-structured interviews and questionnaires. The samplings were selected from four universities and two institutes in Phnom Penh, Cambodia, regardless of gender, subject areas, and faculties. With these criteria for sampling, this exploratory research produced solid knowledge based on pragmatic experiences from lecturers and their students.

### *3.2.1 Sampling of Semi-structure Interview*

First, we invited lecturers implementing hybrid teaching in their courses from four universities and two institutes in Phnom Penh, Cambodia. Most lecturers preferred to speak Khmer (Cambodian language) during the interview because they could express their feeling and flow of ideas. Therefore, we needed to translate from Khmer to English when we transcribed the data. We did pilot testing with 3 participants by online interview calls to ensure validity and reliability. The pilot testing allowed us to make an amendment and clarify unclear information on time before doing an actual interview. Twenty lecturers participated in real interviews using a snowball sample. According to Mack et al. (2005) in the book 'Qualitative Research Methods: A Data Collector's Field Guide', a snowball sample is also known as a chain referral sample, a type of purposive sampling. In this method, the potential participants will be introduced by the previously contacted participants through their social networks. Among the 20 participants, there were 16 male lecturers and 4 female lecturers. They taught different subject areas, such as Research Methodology, Survey Research, Introduction to Linguistics, Comparative Public Policy, Critical Thinking, Professional

[7] This part was extracted to publish in the book chapter "Impacts of COVID-19 Pandemic's Distance Learning"

Writing, Quantitative Research, Contemporary Politics Thoughts, English for Writing Skill, Leadership Skills, Teaching English as Foreign Language, Introduction to Theory of Public Policy, Media and Politics, Academic Writing, Business Negotiation, People Skills, Ethics, Biochemistry, English Terminology, Academic Skill Development, Core English, Introduction to Political Science, Digital Literacy, and Academic English. Then, we asked them to forward the HY-SUP questionnaire and a questionnaire about the effects of hybrid teaching and learning environment on students'21st-century skills to their students through their communication channels.

### *3.2.2 Sampling of Closed and Open-ended Questionnaire*

The participants of this online questionnaire were students of the lecturers who had interviewed with us in the semi-structured interview. The level of students' education ranked from bachelor to master's degree. We asked lectures to forward online questionnaires through group communication channels to reach their students. The most popular communication channels were Facebook groups and Telegram groups. There were 140 students' responses to this online questionnaire, with 106 completed and 34 partially completed (see table 6).

**Table 6**

*Matrix of Research Questions, Research Methods and Sampling*

| University and Institution (Letter is used instead of real name to protect privacy) | Research Methods | Key Participants | Number (N) | Subjects |
|---|---|---|---|---|
| • University A (public)<br>• University B<br>• University C<br>• University D<br>• Institute A (public)<br>• Institute B | Online Semi-structured interview | Lecturers who implement HTLE (snowball sample) | **20** (M= 16, F= 4) | • Research Methodology<br>• Survey Research<br>• Introduction to Linguistics<br>• Comparative Public Policy<br>• Critical Thinking<br>• Professional Writing<br>• Quantitative Research<br>• Contemporary Politics Thoughts<br>• English for Writing Skill<br>• Leadership Skills. |
| | An online questionnaire (closed-ended and open-ended) | students of the lecturers who implement HTLE | **140** students (106 fully completed, 34 partially completed) | |

| | | | | |
|---|---|---|---|---|
| | | | | • Teaching English as a Foreign Language<br>• Introduction to Theory of Public Policy<br>• Media and Politics<br>• Academic Writing<br>• Business Negotiation<br>• People Skills<br>• Ethics<br>• Biochemistry<br>• English Terminology<br>• Academic Skill Development<br>• Core English<br>• Introduction to Political Science<br>• Digital Literacy<br>• Academic English |

### 3.3 Data Collection Instruments [8]

This research study used a semi-structured interview with lecturers and a questionnaire with their students. The semi-structured interview was constructed based on a literature review. It contained essential sections, such as lecturer information, course information (before and during Covid-19), and the effects of implementing hybrid teaching and learning (HTL). The lecturer information section allows us to understand the lecturer's experience, teaching practices, and knowledge and skills of using ICT. The course information section lets us understand the nature of the course learning and instruction before Covid-19 and during Covid-19 by employing and modifying the HY-SUP questionnaire to identify the types of learning environment. The last section of this semi-structured interview gives us insight into the conditions, challenges, support, and effects of implementing HTLE. The interview took us from 40 minutes to 1h:20 minutes depending on the speed of individual participant, preparedness by completing some questions in advance, stable internet connection, and personal disturbed by the participant's family. Please see Appendix 1 for a semi-structured interview.

For questionnaires to use with students, we developed it based on literature review and translated it from the HY-SUP questionnaire to identify the types of a learning environment.

[8] This part was extracted to publish in the book chapter "Impacts of COVID-19 Pandemic's Distance Learning"

There are important sections, such as basic information, individual learner's characteristics, challenges and effects of hybrid teaching and learning (HTL), and type of learning environment before and during Covid-19 (modified from HY-SUP questionnaire, self-positioning tools). The introductory information section tells us about personal conditions, attitudes towards technology, and the internet connection which links them to hybrid learning. The individual learners' characteristics explain how individual characteristics play essential roles in succeeding in class and distance learning. The challenges and effects of the HTLE section enable us to interpret present conditions of implementing HTLE. The last section of this questionnaire describes the types of HTLE before and during Covid-19. For further and detailed information, please read Appendix 2.

### 3.4 Procedure and Timeframe [9]

We used online semi-structured interviews and online questionnaires to collect data. This section will elaborate on the starting and ending date of data collection. We also described special procedures, such as instructions for the participants, presentation of informed consent, time and interview procedures, and administration methods of the questionnaire. We decided to do online semi-structured interviews and questionnaires instead of face-to-face interviews in the classroom because of the Covid-19 pandemic during data collection. First, there was no flight operation from Switzerland to Cambodia in June 2020, and people practiced social distance. Second, even though the number of people infected with Covid-19 was not high compared to the region and in the world, people were not willing to accept face-to-face interviews during that time. Third, all education systems in Cambodia had been physically closed and moved to online or distance learning instead of visual classroom learning since May 2020. Lastly, it was convenient for snowball sampling, enabling a fast approach, and could be completed in a timely manner with fewer administration tasks.

Data was collected online from 4 universities and 2 institutes in Phnom Penh, for 3 months from *June to August 2020*, which is officially a holiday for most educational institutions in Cambodia. There were two main reasons to collect data during this period. First, most lecturers are less busy because during term time many of them moonlight at other universities. (Moonlighting refers to working an extra job to earn money outside official working hours.) Second, since many students in Cambodia study at two universities simultaneously, or attend extra language classes in the evenings, during this period they have

[9] This part was extracted to publish in the book chapter "Impacts of COVID-19 Pandemic's Distance Learning"

more free time. There were two simple procedures to get participants involved in this research study.

### *3.4.1 Procedure of Semi-structured Interview*

First, we used our network in the university, such as the dean, head of the department, and lecturer himself. We were preparing informed consent forms for the rector and lecturer; however, due to a sudden Covid-19 pandemic, the university required lecturers to offer online and distance teaching by using various tools and platforms. Therefore, we decided to send a request to deans and lecturers directly. Through personal networks in those universities and institutes, we received names of recommended lecturers by the head of department and snowball sampling. After we negotiated with lecturers and got their agreement to participate in the research, we sent them outlines of the interview questions we would be asking so they could prepare some answers in advance. This was done through Facebook, Telegram, or email based on their preference. Before starting the interview, we asked their permission to record their voice for data transcription. We also informed them about anonymity and confidentiality to keep their identities anonymous by using a letter to represent their university. The interviews took between 40 minutes and 1h 20mn based on personal knowledge, experiences, and characteristics.

During the interview, some accidental problems caused disturbance to the interview process. First, the time zone of Switzerland and Cambodia are six hours apart. For example, if we arranged to interview at 10 AM in Phnom Penh, using Cambodia time, it was at 4 AM in Switzerland. Second, the internet caused trouble with our interview process on some days, which led to cancellations and changed dates. Third, interviewees sometimes texted to change the date to another day due to personal reasons, such as childcare or family health problems. Finally, some interviews took longer than expected, and had to be paused since the interviewee's device had to be used by another family member, for example, to take an online examination.

After immediately finishing each interview, we requested lecturers to forward online questionnaires to their students through LimeSurvey. We also transcribed each audio record into words, merged small themes, and coded them. For example, we used (*Ua.L1*) to present *university A* lecturer 1, and *(Ua.L2)* presents *university A* lecturer 2. We also used *(Ia.L)* to represent *Institute A* and *L for the lecturer.*

### *3.4.2 Procedure of Closed and Open-ended Questionnaire*

As mentioned above, we kindly asked lecturers to forward an online questionnaire that was designed in LimeSurvey to their students. We also mentioned consent forms on the cover page in the questionnaire, so the students could volunteer to participate in the online survey or could withdraw from the survey at any time. The online survey took from 7 minutes to 10 minutes to complete. However, we only received answers from 9 lecturers' students. This led us to two assumptions. First, lecturers who promised to forward an online questionnaire to their students either forgot or intentionally forgot to forward it. Second, it is possibly related to the class level, language barrier, and cultural disinvolvement in research from students.

## 3.5 Analysis[10]

This research study is exploratory research. It consists of mixed study methods, quantitative (questionnaire), and qualitative (semi-structured interview). As stated in the previous section, two main research questions were each followed by sub-questions. This section will elaborate on the data analysis method for each question because different questions require different analyses. The first main research question and its sub-questions, "*According to them, in which conditions are Cambodian Higher Education early adopters implementing hybrid teaching and learning environment? Are these conditions different according to the type of environment developed according to lecturers? Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes? How was this innovation process supported according to them?*", require applying a categorical analysis using MAXQDA software along with a systemic model of the university innovation process (see figure 2). The Self-positioning tool available online, which consists of 14 descriptive hybrid activities, allows us to identify the type of hybrid learning environment, such as the Scene, the Screen, the Rural Gite, the Crew, the Metro, and the Ecosystem.

A systemic model of university innovation processes adapted from (Depover & Strebelle, 1997; Strebelle et al., 2003) and integrated with Ely (1999) was employed to decipher conditions and the innovation process of implementing HTLE in Cambodian higher education. Therefore, we merged small themes and codes based on content analysis to represent participants' views and experiences using MAXQDA 2020 qualitative software.

[10] This part was extracted to publish in the book chapter "Impacts of COVID-19 Pandemic's Distance Learning"

This qualitative approach allowed us to interpret present conditions, challenges, and support of HTLE from Macro-system, Meso-system to Micro-system.

The second main research question and its sub-questions, "*What are the effects of hybrid teaching and learning environment on students' 21st-century skills according to perceptions of lecturers and students? How could we understand those effects? Are those effects different according to the type of environment developed?*", were analysed through the systemic perspective of circular causality (Charlier et al., 2015, p. 382). This analysis allowed us to understand the effects of digital learning environments on individuals' learning by looking for four characteristics: *individual student characteristics*, *characteristics of the digital learning environment*, *characteristics of the interactions due to the interactions between students and the environment*, and *the learning outcomes*. We also used a self-positioning tool to analyse the types of hybrid learning environments. We again used MAXQDA qualitative software to help create themes and codes for open-ended questions.

The analysis has been realized iteratively and discussed with a PHD supervisor. We also had the opportunity to present and discuss our first results in research conferences such as EARLI-JURE in August 2021, the Second Biennial Conference of Comparative Education Society of Cambodia "Envisioning Education 2030: New Models of Education" in October 2021, and the 2nd CAMBODIAN ELT Conference (virtual): Improving the English Language Teaching in Cambodia in December 2020.

# CHAPTER 4: CASE ANALYSIS

This chapter provides a case-by-case analysis on implementing conditions of hybrid teaching and learning environment in Cambodian higher education. We used the theoretical framework, a systemic model of the university innovation process (page 17), to structure the presentation of the data. This model allowed us to understand the conditions for implementing innovation, support, and process. This analysis follows the alphabetical order of universities and institutes as the following (Table 7). We use letters (A, B, C, ...) to protect the identity and reputation of the institutions instead of using a real name.

**Table 7**

*Overview of Case Analysis*

| Higher Education Institutions (HEIs) | Type of HEI | Participants |
|---|---|---|
| University A | Public | 2 |
| University B | Private | 5 |
| University C | Private | 7 |
| University D | Private | 1 |
| Institute A | Public | 4 |
| Institute B | Private | 1 |
| Total | | N= 20 |

This chapter also depicts the result based on the point of view of 20 lecturers who have been implementing hybrid teaching and learning environment in Cambodian higher education. These findings describe the perceptions of lecturers from four universities and two institutes based on the interview. The interviews have been transcribed carefully from Khmer (Cambodian language) into English and maintained original meaning and interpretation.

## 4.1 Cases for University A (Macro and Meso Level)

This section provides a case analysis of lecturers implementing hybrid teaching and learning in University A. Two lecturers, coded as (Ua.L4) and (Ua.L9), participated in the study. This meant University A for lecturers number 4 and 9.

This university is a public university famous for training students to become teachers. It also has a close relationship with MOEYS; however, most of the funding is generated from students' tuition fees, parking, renting restaurants, and partnership with the private sector (NGOs, International Organizations). According to the university website, this university has

been a leading national university in Cambodia throughout a series of transformations. This university has been trying its best to improve its human resources, for example, enhancing capacity building and professional development. Additionally, it tries to improve and build more infrastructure, improve teaching and learning facilities, and enhance safety and security. It also develops curricula that are outcome-based, demand-driven, ICT-based, and promote social responsibility, creativity, innovation, and entrepreneurship. These elements link to meso-level in the model, including equipment, professional development, and relational climate and resources.

### *4.1.1 Micro-level: Lecturer Number 4 (Ua.L4)*

We interviewed this lecturer on June 08th, 2020. He had a Ph.D. degree. He looks around 40 years old and has been teaching in higher education from 2004 until the present (2020). He taught many courses such as Language Assessment, Quantitative Research, and Qualitative Research, to name a few. Most of the courses he taught were Research Methodology and Language Assessment in TESOL for Graduate Writing. He can speak and write in English effectively. He described himself as self-confident in using technological tools, and he liked integrating technology into his courses. He had sufficient time to prepare online and offline activities for his course. He also identified himself as a person open to adopting innovation and had enough freedom to innovate teaching practices in his course even though he did not receive incentives or rewards for innovation practices. This reflected that he has a strong commitment to driving a positive change along with the university strategic plan, which is an essential focal point between micro and meso-level.

#### *Innovation Process*

He rated himself as strongly agreeing to be more open to adopting innovation. During the **adoption phase**, he was willing to implement HTLE by using different tools to teach and engage his students. He had no problem using such tools to teach and engage students because he could read English instructions and accomplish self-discovery of the tool. Based on the interview, he described himself as a person open to adopting innovation, and he described his teaching practice evolvement in the following:

> In the Cambodian teaching context, we primarily focus on teaching methods applied in the visual classroom. We do not integrate much technology in the classroom. The

> purpose of using technology is to communicate and engage with students. In 2004, the teaching practice was very traditional; we did not even have LCD (liquid-crystal display) projectors. Additionally, laptops were not widely used at that time. Nowadays, we see dramatic changes in classroom teaching, such as using LCD, integrating technology, and using learning platforms to engage students. In the current situation during Covid-19, we do not use a hybrid environment, only distance teaching and online learning because the institution and government do not allow students to come to university. Therefore, we apply distance and online learning 100% by using other learning platforms to engage students, for example, Google Classroom, Schoology, and Zoom meetings. We also make videos, recordings and use Zoom meetings as a platform for discussion and lecturing. If we did not use technology for teaching, it would be impossible. Whether you want to use it or not, you must learn how to use it in this current situation. I can say that teaching practice has evolved from time to time, and it depends on the situation, circumstances, and advancement of technology. (Ua.L4)

During **the implementation phase**, he expressed that he has enough freedom to innovate teaching practices in the course, has freedom of choice in teaching and learning methods, and likes integrating technology into his course. The result of the self-positioning tool analysis indicated that he sometimes provided students with learning and methodological support during the transitional teaching practice shift. He also often used various tools to engage students in the learning process. Last but not least, he marked himself as self-confident in using technological tools in the course. When asking him to choose the courses, he implemented HTLE; he selected "Survey Method in Educational Research" before and during Covid-19. These courses are designed for master's degree students. His teaching activities during Covid-19 included individual discussion, group discussion, individual presentation, group presentation, peer-checking, and reflection papers. He described the activities in the following:

> Students do their short presentations about their progress through Zoom meetings. Students receive my comment and constructive feedback on their questionnaire when constructing the questionnaire. After that, they can bring their questionnaire to get feedback from their peers (peer checking). At the end of the course, we have a reflection paper to reflect students' perspectives to see what they can do and apply in

> real work. This course has no exam because I want to see students' outcomes of creating a proposal and designing a questionnaire. We also have a group discussion through Zoom meetings for teaching activities because we can separate students to work in online groups. They make online discussions to check progress and help each other. After that, I give them additional comments and feedback. (Ua.L4)

Since he has been practicing using technology to engage, enhance and assist his teaching for a long time, he seems to be classified into stabilization of practices and amplification of practices. However, according to the interview, he recommended that we need leader support (facility, finance), technical support team (training both lecturers and students), internet access, and an online learning policy to effectively implement online and offline courses.

***How was this innovation process supported?***

According to a systemic model of the university innovation process (Depover & Strebelle, 1997), the process of innovation, which includes the adoption phase, implementation phase, and routinization phase, needs such kind of support from meso-system and macro-system such as financial support, training to cascade new knowledge and skills, and a technical service team. However, this lecturer received little support from his teaching university. He said that:

> The university called for a meeting with lecturers to inform them that we must go online, but there were no technical or training support lecturers to implement online teaching. The university did not have the budget to provide training, whereas some universities confronted bankruptcy during Covid-19. Additionally, lecturers needed to download and use unlicensed online applications. The university did not have any licensed tools to provide to lecturers. However, the university had to consider buying an online application package so that all teaching staff could use a licensed application. The university bought Microsoft Team for lecturers to use; however, some lecturers are not familiar with using it yet {laughs}. (Ua.L4)

***In which conditions did he implement hybrid teaching and learning environment?***

His teaching profile describes him as self-confident and likes integrating technological tools in his course. He presents himself as more open to adopting innovation and has enough

freedom to innovate teaching practices. He also has sufficient time to prepare online and offline activities for the students; however, he does not receive any incentives or rewards for innovation practices from the university. He also encountered some challenges when implementing HTLE during the COVID-19 pandemic. He describes his challenges in the following:

> Some students are more passive and demotivated than when face-to-face learning. Maybe they do not like or get used to technology for learning. I require student's attendance; otherwise, few students will be online. Online activities make me even busier than in a visual classroom. For example, in the visual classroom, you go to teach and finish; it finishes. However, in online learning, students keep asking questions almost every hour. Additionally, lecturers are busy when students submit their assignments and have almost no time to comment and reply. (Ua.L4)

***Could we observe changes in the type of environment related to the new situation created by the COVID 19 crisis? How can we understand these changes?***

Based on the Self-positioning Tool of HY-SUP, the result indicated that the course "Survey Method in Educational Research" before and during Covid-19 is a Type 5 (the Metro). There are additional remarks even though it is the same Type 5 before and during Covid-19. Before Covid-19, he had regular face-to-face teaching and used technology to engage students, such as a Telegram group to drop documents and lessons. He said that "I never use Videoconference, document, screen sharing, or chatting (verbal communication by video call). However, I usually use Facebook chat and Telegram for commutation and sharing documents" (Ua.L4). Conversely, during Covid-19, he used Videoconference to distance teach and modifies assessment methods to adapt to the situation. He elaborated in the following:

> Before Covid-19, we wanted students to work in a group to design a survey. However, during Covid-19, students work individually to design surveys because students in a master's class are hectic. It was also a suggestion from students to work individually because they do not have sufficient time to meet each other. Students get enough freedom to do their work individually with my consultation along the way. (Ua.L4)

Another critical remark is students' attendance and participation. During Covid-19, students seem to pay less attention while studying online, probably due to their environmental distractions. He highlighted that "some students are passive and demotivated than when face to face learning. Maybe they do not like or get used to technology for learning. I require student's attendance; otherwise, there will be few students online".

***EXTRANTS***

Implementing HTLE in his course promotes more learning engagement, communication, and discussion with students, teachers, and students through social media channels (Facebook group, Telegram). He also stated, "I can see that online activity helps students become well-organized, especially when students submit homework and assignments online. I can clearly see who submits and who does not". In his opinion, students who participated in HTLE can develop their 21$^{st}$-century skills in the following table.

**Table 8**

*Perceived Effects of 21st Century Skills for Ua.L4*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | √ | |
| B. Access and evaluate information | | | √ | |
| C. Collaboration with others | | | √ | |
| D. Think creatively | | | √ | |
| E. Apply technology effectively | | | √ | |
| F. Be self-directed learners | | | √ | |
| G. Work effectively in diverse teams | | | √ | |

***Summary***

This lecturer (Ua.L4) can implement HTLE under conditions of his teaching profile and characteristics. They are self-confident in using technology, integrating technological tools in the course, open-minded to adopting innovation, have enough freedom to innovate teaching practices, and have sufficient time to prepare handouts and activities for students. He can also use English to read the instructions for teaching and learning tools even though he does not receive an incentive for his innovation practices. These conditions have slight differences according to the type of environment developed (type 5 before Covid-19 and type 5 during Covid-19) based on the degree of using tools to engage students from asynchronous to

synchronous, and level of time to scaffolding students learning. He also received little support from the university during Covid-19. We can observe changes in the type of environment related to the new situation created by the Covid-19 crisis; for example, the transition from face to face to distance and online teaching, modifying assessment methods, teaching pedagogy to adapt to the situation and students' participation.

### *4.1.2 Micro-level: Lecturer Number 9 (Ua.L9)*

We interviewed this lecturer on June 18th, 2020. We spent 1h. 12mn to interview him. He was around 36 years old. He has been teaching in higher education for around 6-7 years. He taught some courses, such as General English, Soft-skills, Research Methodology, Teaching Methodology, and Education for Sustainable Development. He described his teaching practices in the following:

> When I was a novice lecturer, I usually wanted students to know a lot of information, so I used content-heavy material to teach students. However, I realized that I could not teach students as much content as I wished them to know. Therefore, I started to select, minimize and deepen the teaching content. I also changed from content-based teaching to PBL (Problem Based Learning), such as doing projects and self-reflection. This teaching method changed the role of the teacher to become a facilitator and coordinator.

Talking about his teaching profile, he illustrated himself as self-confident to use technological tools in his course. He also expressed that he likes integrating technology into his course and is open to adopting innovation. He elaborated that he has enough freedom to innovate his teaching practices on his course and has sufficient time to prepare online and offline activities. However, he raised that he did not receive incentives or rewards for innovation practices. In this way, we can reflect that he is willing to drive positive change along with the university strategic plan, which is an essential focal point between micro and meso-level.

#### *Innovation Process*

This lecturer was willing to change his teaching method positively by implementing HTLE in his course. He stated, "I use it because it introduces new ways of teaching and learning, but requires lots of preparation, support, and tools to use" and he expanded its use

during the Covid-19 crisis. He also described himself as self-confident in using technological tools in his course; for example, he uses Telegram to communicate with students. He further explained that:

> I have a team to create online videos and then upload them to YouTube. I also use Google Meet to discuss with students. Because the class has a lot of participants (around 100), they can drop their questions through the chat platform. Then, the support team will organize those questions in one file and answer them one by one, either by asynchronous or synchronous communication. (Ua.L9)

When asking him to describe the courses in which he implemented hybrid teaching, he chose the "Research Methodology" course before Covid-19 and the "Digital Literacy for Leadership Teacher Upgrading Program" during Covid-19. The Research Methodology course was designed for master's degree students. The Digital Literacy for Leadership Teacher Upgrading Program was for Bachelor students, particularly in-service high-school teachers, to upgrade their teaching pedagogy. He described his teaching activities during Covid-19 in his class "Digital Literacy for Leadership Teacher Upgrading Program" in the following:

> The course is a unique course created to respond to the Covid-19 crisis and help schools operate as usual using technology. The course aims to help teachers to be able to use Google Meet, Google Classroom, Google Docs., Google Calendar and Google Slide. However, before starting the course, I need to teach them to create an email account and change their name on Telegram. For students' assessments, I use Google Classroom. I create learning tasks to communicate on Google Classroom, such as uploading documents, comments, and feedback. However, I found some problems as some of them do not have computers at home, so it is hard for them. (Ua.L9)

According to his teaching experience of implementing HTLE, it became normal for him to work entirely online even though he did not experience applying synchronous teaching before Covid-19, for example, video conference. During Covid-19, he described that he encountered some challenges when implementing HTLE in the following:

- I need a lot of preparation (material) on the LMS, which requires technological competency to prepare an online lesson. I also need to learn to build technological capacity for myself to produce qualified online materials for students.
- I need sufficient facilities to make online teaching go well, such as computers, cameras, earphones, and stable internet.
- There are other problems such as noise, and students feel headaches
- There is less interaction than face-to-face classrooms if we do not know strategies and tools to engage students. While doing online lecturing, students need to drop their questions to the chat, then I answer them later.
- Online teaching is more exhausting than face-to-face learning.
- I am afraid of privacy due to sensitive topics when unintentionally talking online. (Ua.L9)

***How was this innovation process supported?***

According to the interview, he stated that “I received some financial support from the management team to grant five computers to my department (department of education) for a team to support teaching and learning online". He has a team to create online videos and then upload them to YouTube. He highlighted that “I also use Google Meet to discuss with students. Because the class has a lot of participants (around 100), they can drop their questions through the chat platform when they need answers. Then, the support team will organize those questions in one file and answer them one by one, either by asynchronous or synchronous communication”. He also provided some recommendations to implement the qualified online and offline course:

- Build online learning and training capacity for teaching staff, support team, and admin.
- University needs to have their learning platform system
- Provide necessary tools for lecturers, for example, camera, computer, etc. In short, we need active support from the institution.
- There is a need to increase the teaching rate for integrating teaching online for lecturers because teaching online is far more exhausting than face-to-face in the class.

- Concerning privacy, do not use content that the lecturer taught to serve other purposes. The case happened when one lecturer explained an online lesson. Then other people recorded the video to serve other purposes such as politics, culture, and religion, which is a sensitive issue. As a result, that lecturer was ordered to write a public letter of apology. (Ua.L9)

***In which conditions did he implement hybrid teaching and learning environment?***

Based on the interview, he used technology to engage, enhance, and introduce new teaching and learning methods into his course. He implemented HTLE based on his teaching characteristics, such as being self-confident in using technological tools, likes integrating technology into teaching, being more open to adopting innovation, having enough freedom to innovate teaching practices, and having enough time to prepare online/offline activities. Other conditions linked to his education level, English language ability to comprehend and use the tool, and pre-existing knowledge of students' profiles. For example, in his course "Digital Literacy" for Leadership Teacher Upgrading Program for high school, he needed to guide and support students using technology for communication and learning.

***Could we observe changes in the type of environment related to the new situation created by the COVID 19 crisis? How can we understand these changes?***

According to a Self-positioning tool analysis, both courses “Research Methodology” and “Digital Literacy for Leadership Teacher Upgrading Program” were in type 6 (the Ecosystem). This type 6 is student-centred, which employs many technological and pedagogical possibilities offered by hybrid environments, including present/distance articulation, mediatization, mediation, and openness toward learning (Deschryver & Charlier, 2012). Even though the two courses were of the same type, the teaching mode and assessments differed significantly. For example, face-to-face teaching and learning took place regularly in the class before Covid-19 with some applications to engage students' learning, such as Telegram and Facebook groups. However, this teaching and learning mode was temporarily switched to online and distance learning during Covid-19.

***EXTRANTS***

Implementing HTLE in his course helps him engage with students' learning activities outside classroom hours. This HTLE makes feasible for him to share documents, ideas, and

communication with students and produce hidden positive effects in his students to become learning contributors. He described this in the following statements:

> I use Telegram to communicate with students. There are two main activities for them (one before and another after the class). Generally, I assign students to do a presentation. The presenter needs to send his PowerPoint to the students. Then those students prepare some questions to ask during the presentation. After finishing a presentation, I ask them to self-reflect and give peer feedback. The purpose is to help students produce rational ideas and logical explanations while I take the role of facilitator and contributor. (Ua.L9)

According to his idea, he believes that applying HTLE will help students develop their 21st-century skills in the following table.

**Table 9**

*Perceived Effects of 21st Century Skills for Ua.L9*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | | √ |
| B. Access and evaluate information | | | √ | |
| C. Collaboration with others | | | | √ |
| D. Think creatively | | | | √ |
| E. Apply technology effectively | | | √ | |
| F. Be self-directed learners | | | | √ |
| G. Work effectively in diverse teams | | | | √ |

***Summary***

This lecturer implemented HTLE in his course by getting support from a teaching and learning team group in his department to assist his teaching during the Covid-19. He implemented HTLE based on the conditions, *such as being self-confident to use technological tools, likes integrating technology into teaching, being open to adopting innovation, getting enough freedom to innovate teaching practices, and having enough time to prepare online/offline activities. Other conditions related to his educational level, English language ability to comprehend and use the tool, and pre-existing knowledge of his students' profile*. These conditions are not different according to the type of environment developed;

however, he needs to adapt teaching methods and learning material based on students' ability, knowledge, and skills from class to class. For example, he spent an amount of time guiding and instructing his class 'Digital Literacy for Leadership Teacher Upgrading Program', course during Covid-19 to learn to use technology. This included creating an email, changing the name on Telegram, and how to use Google Meet and Google Classroom because this group of learners is provincial high-school teachers whose English language proficiency is not good enough to read and understand the tool, plus computer illiteracy. We can observe that the type of environment is the same, but the degree of teaching activities, teaching method, learning support, and students' attention to lecturing are different. For example, teaching activities and methods changed from face-to-face to entirely online or distance teaching and learning. Students also needed more learning support during distance learning since they had no such learning experience, and lecturers were even busier than visual classroom learning. More importantly, lecturers and students might have a less emotional attachment and get disturbed by family members while studying online.

### *4.1.3 Conclusion of University A*

This university is open to innovate teaching-learning and is willing to enhance the professional development of teaching staff. This openness and willingness help lecturers to be able to exercise their freedom and innovate their teaching methods to improve students' learning outcomes even though those lecturers do not receive incentives or rewards for their innovation practices. This can be reflected through both lecturers who took the interview that they are driven and committed to positive change in their teaching practices to improve students' hard-skills and soft skills.

Two lecturers from this university expressed that they implement HTLE based on their individual teaching characteristics, such as *being self-confident to use technological tools, like integrating technology into teaching, more open to adopting innovation, having enough freedom to innovate teaching practices, having enough time to prepare online/offline activities*. Other conditions linked to their *level of education*, ability to use the *English language to comprehend tool*s, and *pre-existing knowledge of the students' profile*. Additionally, another condition was related to their extrinsic motivation, such as the Covid-19 situation, and intrinsic motivations, such as engaging, enhancing, and introducing new teaching and learning methods into the class. We could also conclude that the course already developed before the Covid-19 crisis helped them be ready to adapt quickly to their teaching

practice during the Covid-19: more use of technical instruments, take care of their students, and adapt assessment methods.

### 4.2 Cases for University B (*Macro and Meso Level*)

This section elaborates a case analysis on lecturers implementing HTLE in University B. This university is a private university that specializes in health sciences programs. This university depends heavily on students' tuition fees to sustain its functions. It also generates funding through the university's parking lot, restaurant, and dentist clinic. Five lecturers participated in the study. They were coded as (Ub.L1) (Ub.L8) (Ub.L10) (Ub.L13) and (Ub.L18).

This university also received a full accreditation certificate from the Accreditation Committee of Cambodia (ACC) for five years, valid from 2019—2023. Additionally, this university has tried its best to encourage lecturers to innovate and improve the quality of teaching and learning through annual professional development, which includes a wide rank of topics such as teaching methods, assessment, online engagement, educational psychology, etc. This university remarks that it has its learning management system developed from MOODLE. It encourages lecturers to try and implement their teaching on the learning management system and test on Google Classroom.

Since this university specializes in health sciences, most lecturers have clinics or private businesses. Therefore, it is tough to gather all of them to join professional development sessions organized by the university on teaching pedagogy, assessment, and designed learning outcomes. The university also provides a small incentive (money) to encourage them to participate in professional development to improve the quality of their teaching and learning organized by the university. These incentive payments have become the norm for most workshops or professional development training organized by ministries or NGOs (Non-Governmental Organizations). However, most of them choose to stay at their clinic or private business at home to earn more money than the university provides during professional development. In some cases, however, they can take part in one day workshops, or partially attend three-day workshops.

#### *4.2.1 Micro-level: Lecturer Number 1 (Ub.L1)*

We interviewed this lecturer on June 05$^{th}$, 2020. We spent 31mn interviewing her because she had filled in some information in advance. She was around 26 years old. She has

taught English courses for Foundation Year, English Academic Year 2, and Professional English Year 3. She described her teaching practices in the following:

> I started teaching at ICS International School. At that time, I taught elementary students whose ages were around 10-13 years old. The teaching was very easy because the school provided the coursebook, and I usually used the whiteboard. After that, I moved to teach at CIA First International School. It was the first time I started using technology to teach students, mostly "Google Classroom". Then I started teaching at PUC (Pannasastra University of Cambodia), but I mostly used a whiteboard. Now, I am teaching at University B (coded name) where I have started using an E-learning Moodle platform to engage students. For example, students can access their self-study. It is also easy for me to give them homework and extra material through Moodle. I can say that technology helps me to engage my students easily. (Ub.L1)

Talking about her teaching profile, she illustrated herself as self-confident to use technological tools in her course. She also expressed that she likes integrating technology into her course and is open to adopting innovation. She elaborated that she has enough freedom to innovate her teaching practices in her course and has sufficient time to prepare online and offline activities. This reflected that she has a strong willingness to drive positive change and upgrade herself to improve the quality of teaching and learning along with university requirements which is an essential focal point between micro and meso-level.

### *Innovation Process*

As mentioned earlier, she was willing to adopt innovation into her teaching classes. The university also allowed her to expand her knowledge through an annual professional development workshop on the quality of teaching and learning. She described what motivated her to integrate online-offline activities into her course in the following:

> The university proposed that all lecturers use Moodle to engage students by sharing documents, discussions, and other activities. There are lots of online resources which can help students improve 4 macro skills, such as reading, writing, speaking, and listening, besides learning from the books. That external learning expands their

> creativity. What motivates me the most is that students can access online material for their external learning, which helps them improve their skills quickly. (Ub.L1)

Generally, she was assigned to teach various English courses such as Foundation Year, Academic English Year 2, and Professional English Year 3. The courses aim to improve student's English proficiency through 4 macro skills (reading, speaking, writing, and listening) by enhancing their vocabulary, grammatical structure, and communication in English with confidence and promoting problem-solving skills. She applied different assessments and teaching activities to help students learn, such as homework, quizzes, projects, group work, poster presentations, mid-term exams, and final exams.

The HY-SUP analysis results for her courses were type 5 (the Subway) before Covid-19 and type 6 (the Ecosystem) during Covid-19. She also highlighted that before Covid-19, she rarely used Videoconference or shared screen, but she used Telegram and Facebook groups for communication. However, during Covid-19, she used Videoconference to offer distance teaching. The characteristics of type 5 focused on supporting, guiding, and openness towards students. For type 6, it employed many technological and pedagogical possibilities offered by hybrid environments, including present/distance articulation, mediatization, mediation, and openness (Deschryver & Charlier, 2012). According to the HY-SUP project, these two types are perceived by teachers and learners as more favourable to students' learning-centred approach. This lecturer adapts and gets familiar with synchronous teaching and learning environments quickly regarding stabilizing practices.

***How was this innovation process supported?***

According to the interview, she received support from her department and peer support. She stated that “In our department, there are two coordinators (one for foundation, another for year 2 &3) to help us (peer group discussion). We also have Google Drive for each department to share slides, teaching and learning materials, so all of these give us easy access and motivate us to work hard". She also offered some recommendations to implement the qualified online and offline course in the following:

> I think a good internet connection is essential because my students in provinces or rural areas have a terrible internet connection, making it hard to access and use Google Classroom. So, if we have a good internet connection, it will be easy for students to access online courses. Additionally, because the Covid-19 situation

developed so fast, the students were confused by going online overnight. So, I think we should be more prepared to implement online courses in the future. (Ub.L1)

***In which conditions did she implement hybrid teaching and learning environment?***

The interview result indicated that she implemented HTLE based on her teaching profiles. They are *self-confident in using technological tools, likes integrating technology into teaching, more open to adopting innovation, having enough freedom to innovate teaching practices, and having enough time preparing online/offline activities*. Additionally, she is aware of the usefulness of technology to engage students' learning, such as sharing documents, discussions, and other activities. As a result, students can access online material for their external learning to improve their hard skills and soft skills. Another condition of implementing HTLE links to the *university requirement*. The university encourages lecturers to implement their teaching on a learning management system (Moodle), test on Google Classroom, and annual professional development (Meso-support). In my assumption, the *nature of the course* itself makes it easier to implement HTLE due to English language proficiency for both lecturer and students to understand the tools and communicate with each other.

***Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?***

Based on Self-positioning Tool data analysis, the outcome showed that the courses were type 5 before Covid-19 and upgraded to type 6 during Covid-19. This change created new teaching and learning experience from face-to-face with some use of technology to entirely online and distance teaching. She highlighted that "It takes time to prepare learning material comparing to face to face learning. However, the more I teach, the more I get familiar with the problems".

***EXTRANTS***

Implementing HTLE in her course gave her *a new role as an expert learner* and *more teaching engagement* by sharing slides, teaching, and learning materials with peers and students. In her view, HTLE also positively affects students' 21$^{st}$-century skills in the following table.

**Table 10**

*Perceived Effects of 21st Century Skills for Ub.L1*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | √ | |
| B. Access and evaluate information | | | √ | |
| C. Collaboration with others | | | √ | |
| D. Think creatively | | | √ | |
| E. Apply technology effectively | | | √ | |
| F. Be self-directed learners | | | √ | |
| G. Work effectively in diverse teams | | | √ | |

***Summary***

This lecturer implemented HTLE in her courses by fully getting support from the university, department, and peer teaching in her group. She implemented HTLE based on her teaching profiles. Other conditions related to *university requirement* to encourage all lecturers to implement their teaching on learning management system (Moodle), test on Google Classroom with annual professional development (Meso-support). She also gets support from professional development and collaboration with her colleagues. Another condition, in my assumption, is that the *nature of the course* itself makes it easier to implement HTLE due to English language proficiency for both lecturer and students to understand the tools and communicate with each other. These conditions are slightly different according to the type of environment developed on *time-consuming to prepare online learning material for students*. For example, during Covid-19, she stated that "It takes time to prepare learning material compared to face-to-face learning".

### *4.2.2 Micro-level: Lecturer Number 8 (Ub.L8)*

We interviewed this lecturer on June 18th, 2020, and we spent 40 minutes interviewing her. She was around 26 years old. She did not teach during the Covid-19 crisis due to her busy-ness working as a coordinator of her department. She started teaching in higher education in 2019 with two courses: Critical Thinking and Academic Skill Development. She described her teaching practices in the following:

> At the beginning of my teaching career, I focused much more on theory than actual practice and tried to finish the lesson without caring about students' learning outcomes. However, I started changing my concept of teaching from one semester to another semester, so I saw a better result, plus students' rapport with the teacher. Regarding the teaching methodology, I tried to search for new teaching methods and increased practical students' learning activities, such as group work, group discussion, mini-projects, research, and assignments, to provide more engagement in learning. (Ub.L8)

Talking about her teaching profiles, she illustrated herself as self-confident in using technological tools in her course. She also expressed that she likes integrating technology into her course and is open to adopting innovation. She elaborated that she has enough freedom to innovate her teaching practices in her course and has sufficient time to prepare online and offline activities even though she does not receive incentives or rewards for her innovation practices. This reflected that she commits to driving positive change and upgrade herself to improve the quality of teaching and learning along with university requirements which is an essential focal point between micro and meso-level.

***Innovation Process***

As described above, she was willing and committed to adopting innovation into her teaching classes. She, motivated to integrate online-offline activities, elaborated, "students can learn faster than before compared to learning without using technology, for example getting course content faster, more engagement outside the classroom which improves rapport between teacher and students and improves the quality of teaching " (Ub.L8). She further explained that the university also required and encouraged lecturers and students to use it; for example, the lecturer can upload video records for absent students to watch. She also prepared herself to take an opportunity to enhance knowledge through an annual professional development workshop on quality of teaching and learning, which the university organized to support teaching staff. She described one of the courses, 'Academic Skills Development', which she taught Bachelor students before the Covid-19 crisis in the following:

> Academic Skills Development is a foundation course with three weeks of learning. This course aims to promote soft skills to help students study in higher education.

> This course focuses on personal development in communication, presentation, problem-solving, decision-making, teamwork, and research. These are fundamental skills for students to go to year 2. (Ub.L8)

She also used ongoing assessments, such as an individual reports, summaries, group discussion, group presentations, mid-term tests, and projects with no exam to assess students' learning. She used various teaching activities, such as slide presentations, flipcharts, group discussions, note-cards, and individual diaries.

According to the Self-positioning Tool of HY-SUP data analysis on her course 'Academic Skills Development', the result indicated that her course was type 5 'the Metro'. The characteristics of type 5 focuses on supporting, guiding, and openness towards students (Deschryver & Charlier, 2012). These characteristics parallel her statement that "student can call me through Facebook (FB) call or FB chat" expressed her active support, guidance, and openness towards students outside classroom hours.

She seemed to be in an "Amplification of practices" (the new practices are regularly employed and integrated into daily university activities with no need for external help from the pedagogical team). However, she encountered some challenges, such as a system error (sometimes we can't submit it or lose students' scores), a need for a stable and fast internet connection, a learning device (smartphone, computer) for students, and students sometimes forgetting their password to log in. She further added that "It is challenging for people who hate technology. They need more commitment and time to adapt to technology".

***How was this innovation process supported?***

Based on the interview, she expressed her concern that “I saw some lecturers find it hard if they are poor at using technological tools”. For example, some lecturers are not familiar with technology, so they find it more difficult when the university completely changes to use online learning tools such as Google Classroom. However, the university provided training and a manual for lecturers to read, guide, and support innovation. She stated that “we have a training and user manual for lecturers to read and support. If the lecturers could not understand and need more support, they can go to the IT technical support team”.

***In which conditions did she implement hybrid teaching and learning environment?***

She implemented HTLE based on her teaching profiles, such as *being self-confident in using technological tools, likes integrating technology into teaching, being more open to adopting innovation, having enough freedom to innovate teaching practices, and having enough time to prepare online/offline activities*. However, she did not receive incentives or rewards *(letter of appreciation, increase-teaching rate*) for innovation practices. Another condition of implementing HTLE in her course links to university requirements. The university encourages lecturers to try and implement their teaching on a learning management system (Moodle), test on Google Classroom, and annual professional development on teaching pedagogy (Meso-support).

***EXTRANTS***

Implementing HTLE in her course helped her become more engaged with students and course organizers. In her view, students who participate in HTLE will improve and develop their 21st-century skills in the following table.

**Table 11**

*Perceived Effects of 21st Century Skills for Ub.L8*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | | √ |
| B. Access and evaluate information | | | | √ |
| C. Collaboration with others | | | | √ |
| D. Think creatively | | | √ | |
| E. Apply technology effectively | | | √ | |
| F. Be self-directed learners | | | | √ |
| G. Work effectively in diverse teams | | | √ | |

***Summary***

This lecturer implemented HTLE in her course fully supported by the university, department, and IT technical support team. She implemented HTLE based on her profiles, such as being *self-confident to use technological tools, likes integrating technology into teaching, open to adopting innovation, getting enough freedom to innovate teaching practices, and having enough time preparing online/offline activities. However, she did not*

*get incentives (letter of appreciation, increase-teaching rate) for innovation practices*. Another condition related to *the university requirement* encourages all lecturers to implement their teaching on a learning management system (Moodle), test on Google Classroom with annual professional development (Meso-support).

### *4.2.3 Micro-level: Lecturer Number 10 (Ub.L10)*

We interviewed this lecturer on June 18th, 2020, and we spent 1h:03 minutes interviewing her. She was around 26 years old. She started teaching in higher education in late 2018 with a Critical Thinking course. This course is designed for foundation year students, compulsory for all freshmen. She mentioned that "the course aims to improve students' critical thinking skill in the Cambodian context, form a strong argument and thinking structure". Students debate forming a structured argument that focuses on real society, such as capital punishment, same-sex marriage, abortion, and general topics for students' assessment. Next, students also practice discussing newspaper and summary events in society before class starts. She further explained her teaching activities and students' assessment during Covid-19 "I focus on debate and newspaper discussion because it is difficult to arrange and time-consuming for students to gather together. I use lecturing, but I try to engage students, keep up with them, and ask them questions". When asking her about her teaching practice evolvement, she described her teaching practices in the following:

> Being a career teacher is not easy. I need to think a lot to find ways to explain complex theory to students in simple words. There are two main challenges in the course (1) the language proficiency of the students (we use English as a medium instruction), and (2) concept beyond word. Additionally, the Critical Thinking textbook is not in the Cambodian context; most examples are from the USA and the UK. It takes time for me to link the external context to the Cambodian context. I am also cautious to use simple enough words or phrases to avoid students' confusion. For my teaching methodology, I try to make class more interactive between student and student, teacher and students. By doing this, I try to apply *low power distance* (try to be equal power) between teacher and student to build rapport. This low power distance allows students to feel close with me, and they are willing to accept what I guide, explain, and teach them. The knowledge that they receive is more meaningful than forcing them to accept the idea. When the gap between teacher and students is

> high (high power distance), students might not dare to ask questions or express their ideas openly. Therefore, I try to minimize the gap by encouraging students to ask questions, discuss, and interact. (Ub.L10)

Talking about her teaching profile, she illustrated herself as self-confident in using technological tools in her course. She also expressed that she likes integrating technology into her course and is open to adopting innovation. She mentioned that she has sufficient time to prepare online and offline activities for her course. However, she does not have enough freedom to innovate her teaching practices nor receive incentives and rewards (letter of appreciation, increase-teaching rate) for her innovation practices. She mentioned that "I think I have less freedom because whenever I have something new, I need to submit it to the management team". In our view, she probably used the words "less freedom" because she teaches the same subject as other lecturers, so everything needs to be parallel. Even so, she has a strong willingness to drive positive change.

***Innovation Process***

As indicated above, she was willing to adopt innovation into her teaching classes. The university also allowed her to enhance professional knowledge through an annual professional development workshop on the quality of teaching and learning. She elaborated what motivates her to integrate online-offline activities into her course in the following:

> I think I am young enough to adopt new technology if looking at my age factor. Technology can help me complete my tasks quickly and save time. For example, I do not need to print a document for my students. I upload it to the platform. So, they can go and download it by themselves. Students also have the flexibility to learn. I am also a curious person, so I want to innovate how I work and communicate with students more conveniently and quickly than before. (Ub.L10)

Self-positioning tool analysis indicated that her courses were type 6 (the Ecosystem) before and during Covid-19. The characteristics of type 6 employs many technological and pedagogical possibilities offered by a hybrid environment, such as present/distance articulation, mediatization, mediation, and openness (Deschryver & Charlier, 2012). During implementing HTLE, she highlighted some problems that she encountered, such as language proficiency and abstract concepts. She stated that "there are two main challenges in the

course (1) the language proficiency of the students (we use English as a medium instruction), and (2) concept beyond words (abstract idea or concept)". She also stressed other challenges in the following:

- Students do not concentrate well on the information that I show them. This may be because they are not familiar with the technology and tools initially, but later, they are OK. For example, I created a Facebook group to upload documents and discussions, but some students said they did not receive the information. So, they wanted me to inform them directly.
- Teaching online is more exhausting than teaching in the classroom
- Internet connection (Ub.L10)

***How was this innovation process supported?***

According to the interview, she received support from her department and peer support. She stated, "I usually have a small discussion with a coordinator of the critical thinking course relating to innovative methods because the course needs to be parallel with others too". She also offered some recommendations to implement the qualified online and offline course in the following:

> To implement online and offline courses going well, I think lecturers need to (A) *be aware of using technology* because there are two things we need to consider (1) the content we are teaching and (2) the use of the platform to teach. For instance, some old teaching staff (older people) find it hard to work with technology on the platform.
> (B) both lecturers and students need to find a good place with *a good internet connection* to avoid disturbance by low internet service and noise. (Ub.L10)

***In which conditions did she implement hybrid teaching and learning environment?***

She implemented HTLE based on her teaching profile, such as *being self-confident in using technological tools, likes integrating technology into teaching, being more open to adopting innovation, and having enough time preparing online/offline activities*. However, she does not have enough freedom to innovate teaching practices in her course nor receive incentives and rewards (letter of appreciation, increase-teaching rate) for innovation

practices. Another condition of implementing HTLE links to *university requirement*s. The university encourages lecturers to try and implement their teaching on a learning management system (Moodle), test on Google Classroom, and attend annual professional development (Meso-support). These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching.

***Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?***

Based on the Self-positioning Tool of HY-SUP data analysis, the outcome showed that the courses were type 6 before and during Covid-19. Even though the type of environment is the same, the new teaching and learning experiences were different, for example, from face to face with some technology to entirely online and distance teaching. We can understand these changes through her workload when online and distance teaching. She highlighted that "teaching online is more exhausting than teaching in the classroom".

***EXTRANTS***

Implementing HTLE in her courses helps her become a facilitator, increase teaching engagement, and adds a new role as an expert learner. Based on the interview, she believed that HTLE would help students improve their 21st-century skills in the following table.

**Table 12**

*Perceived Effects of 21st Century Skills for Ub.L10*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | √ | |
| B. Access and evaluate information | | | √ | |
| C. Collaboration with others | | | √ | |
| D. Think creatively | | | √ | |
| E. Apply technology effectively | | | √ | |
| F. Be self-directed learners | | | √ | |
| G. Work effectively in diverse teams | | | √ | |

***Summary***

This lecturer implemented HTLE in her courses with full support from the university and department. She implemented HTLE based on her teaching profile. Other conditions

were relevant to *university requirement*s to encourage all lecturers to implement their teaching on learning management system (Moodle), and test on Google Classroom with annual professional development (Meso-support).

### *4.2.4 Micro-level: Lecturer Number 13 (Ub.L13)*

We interviewed this lecturer on June 27th, 2020, and we spent 51 minutes interviewing her. She was around 28 years old. She has taught in higher education for around 3 years with courses such as Biology, Biochemistry, and Physical Chemistry. She is working as a full-time teacher and a coordinator for a general science course.

When asking her to choose the course in which she integrated technology into her teaching before Covid-19, she said she taught a Biochemistry course for a bachelor's student. This course involves the study of the molecular composition of living cells, the organization of biological molecules within the cell, and the structure and function of these biological molecules. She assessed students' learning by Quizzes, Assignments, Midterm, and Final Exams (group presentation and written exam). She also used various teaching activities such as direct instruction, group discussion, flipped classroom, practice the experiment in a laboratory, and Moodle. However, during the Covid-19 crisis, she taught Medical Terminology. This course is for Foundation Year students to learn and understand medical terminology. Medical terminology is the study of the principles of medical word building to help the student develop the extensive medical vocabulary used in health care occupations. Students receive a thorough grounding in basic medical terminology by studying root words, prefixes, and suffixes. She assessed students' learning by Quizzes, Assignments, Midterm, and Final Exams. She applied various teaching activities such as direct online instruction, group discussion, flipped classroom (send documents to students in advance and let them have discussion in the class), practicing vocabulary term exercise, and online learning platform tasks.

When asked about teaching practice evolvement, she described that "there are remarkable changes in my teaching practice because in the beginning there was not much involvement to use or integrate technology into teaching—mostly traditional teaching style with a few videos to stimulate teaching (Ub.L13)". If talking about her teaching profile, she illustrated herself as self-confident to use technological tools in her course. She also expressed that she likes integrating technology into her course and is open to adopting innovation. She mentioned that she has sufficient time to prepare online and offline activities

for her course and has enough freedom to innovate her teaching practices in her course. This innovation links to the university innovation process. She stated that "the university had started introducing E-learning platform before Covid-19 happened. It was much involved in technology, and hybrid method".

***Innovation Process***

As mentioned earlier, she was willing to adopt innovation into her teaching classes. The university also allowed her to enhance professional knowledge through an annual professional development workshop on the quality of teaching and learning. She elaborated what motivates her to integrate online-offline activities into her course in the following:

> I integrate online-offline activities because I think students can submit, do, and access learning material at any time and everywhere they want with an internet connection. It is easy for me to engage students outside classroom time activities and access their homework and assignments. The following reason is the university requirement to use it and my intrinsic motivation. (Ub.L13)

The result of the Self-positioning tool analysis of her two courses indicated that the two courses were type 6 (the Ecosystem) before and during Covid-19. The characteristics of type 6 employed many technological and pedagogical possibilities offered by the hybrid environment, such as present/distance articulation, mediatization, mediation, and openness toward learning (Deschryver & Charlier, 2012). During implementing HTLE, she highlighted some problems that she encountered, such as herself, internet connection, natural phenomena, and students' interaction with each other in the following:

- **Myself**: First, it is a new burden because I need to prepare online lessons and spend time learning to use technological tools. Second, it is an abrupt change from face to face to entirely online which makes it difficult for me to adapt to it even though I like technology. It is time challenging (time management) because I need to discover how to use the tool and share information with other lecturers. Some learning tools are utterly new to me, so I need to learn from the Teaching and Learning Department and IT support team. Now, I enjoy using these tools.

- **Internet connection**: I do not have a problem with internet connection; however, I hear other lecturers complain about it because they might choose companies with slow internet service. Students having a problem with an internet connection should find a good internet connection in their province or come back to stay in Phnom Penh as usual.
- **Natural phenomena**: in the monsoon season, there is heavy rain which brings harsh lighting[11], so I decide to cancel an online class.
- **Students' interaction with each other**: I receive feedback from students that they want to meet each other in class to talk and play with each other. They can see teacher's handwriting on the board, giving them feel release from stress and boredom. Even though I can share my screen during online learning, students said they feel more emotionally attached to physical contact. (Ub.L13)

***How was this innovation process supported?***

According to the interview, she received full support from the university. She stated that "I receive much support from the Institution, especially from the department of teaching and learning, and the IT office department while I was implementing HTLE". She also offers some recommendations to implement the qualified online and offline course in the following:

- The teacher needs to pay a lot of attention to students by looking at students' presence online while the teacher is on a live-stream session, needs to create more interactions with students as in the classroom by asking them questions. Do not wait for them to volunteer to answer the question; call their name to ensure that they are paying attention to the class. We can create students' involvement in online study by doing this.
- I usually ask students to turn on their cameras and create more interaction with them to make them care and avoid boredom.
- The institution needs to support teachers, including technical support, methodological support, and training on new tools. (Ub.L13)

[11]. *Cambodia lighting during the rainy season has killed people and animals annually*

***In which conditions did she implement hybrid teaching and learning environment?***

She implemented HTLE based on her teaching profile, such as *being self-confident to use technological tools, likes integrating technology into teaching, being more open to adopting innovation, having enough time to prepare online/offline activities, and having enough freedom to innovate teaching practices*. However, she did not receive incentives and rewards (letter of appreciation, increase-teaching rate) for innovation practices. Another condition of implementing HTLE links to university requirements. The university encourages lecturers to try and implement their teaching on a learning management system (Moodle), test on Google Classroom, and annual professional development (Meso-support). These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. However, we noticed the time constraint on learning design because she stated, "I need to prepare an online lesson and spend time learning to use technological tools too".

***Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?***

Based on the Self-positioning Tool of HY-SUP data analysis, the outcome showed that the two courses were type 6 before and during Covid-19. Even though the type of environment is the same, the new teaching and learning experiences were different, for example, from face to face with some use of technology to entirely online and distance teaching. We can observe these changes through her workload when online and distance teaching. She thoroughly described the challenge factors such as herself, internet connection, natural phenomena, and students' interaction with each other.

***EXTRANTS***

Implementing HTLE in her courses helps her become a *facilitator*, improves *teaching engagement*, and take on a *new role as an expert learner*. For example, she can manage and engage students' learning at any time and anywhere with an internet connection. She stated, "It is easy for me to engage students outside classroom time activities and access students' homework and assignments". According to the interview, she highlighted students would improve their 21$^{st}$-century skills if they participated in HTLE class in the following table.

**Table 13**

*Perceived Effects of 21st Century Skills for Ub.L13*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | √ | |
| B. Access and evaluate information | | | √ | |
| C. Collaboration with others | | | √ | |
| D. Think creatively | | | | √ |
| E. Apply technology effectively | | | | √ |
| F. Be self-directed learners | | | √ | |
| G. Work effectively in diverse teams | | √ | | |

***Summary***

This lecturer implemented HTLE in her courses fully supported by the university, particularly the teaching and learning department and the IT department. She implemented HTLE based on her teaching profile. Other conditions were related to *the university requirement* to encourage all lecturers to implement their teaching on a learning management system (Moodle), and test on Google Classroom with annual professional development (Meso-support). These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. However, we noticed time constraints on learning design when shifting from hybrid to distance teaching.

### *4.2.5 Micro-level: Lecturer Number 18 (Ub.L18)*

We interviewed this lecturer on July 03rd, 2020, and we spent 47 minutes interviewing him. He was around 28 years old. He has been teaching in higher education since December 2019 in Khmer History and Culture Research Methodology. This course is designed for Bachelor students. It aims to introduce the history and evolution of Cambodia's health care, which links to the process of science, including setting a topic and hypothesis, locating appropriate and valid literature, developing questionnaires, writing research proceedings/papers, giving presentations, and referencing. This subject will foster the development of critical thinking, scientific perspective, and conducting science with integrity and ethics. At the end of the course, the students conduct a systematic review, prepare research proceedings/papers, and improve presentation skills and critical thinking skills. The

teaching activities of this course include direct instruction, group discussion, and Moodle. Assessment methods consist of various tasks such as quizzes, assignments, mid-term exams, and project presentations.

When asked about his teaching practice evolution, he described his teaching practices "When I was a novice lecturer, I used slides to do a presentation. Later on, I found out that students could not keep up with the lesson. Then, I added a case study to help students learn and get more understanding (Ub.L18)". Talking about his teaching profile, he illustrated himself as self-confident to use technological tools in his course. He also expressed that he likes integrating technology into his course and is open to adopting innovation. He mentioned that he has sufficient time to prepare online and offline activities for his course and has enough freedom to innovate his teaching practices. He also stated that "for me, I am a full-time teacher, so salary is annually increased".

### *Innovation Process*

As mentioned earlier, he was committing to adopting innovation into his teaching classes. The university also provided him an opportunity to enhance professional knowledge through an annual professional development workshop on the quality of teaching and learning. He elaborated what motivates him to integrate online-offline activities into his course "I want students to learn and experience online, offline activities, so they can prepare themselves to study abroad and for the workplace. However, honestly speaking, they are just foundation year students, so I cannot provide much online for them" (Ub.L18). This leads us to reflect on the profile of students, which consists of students' pre-existing knowledge of using ICT, and the level of independent learning in our model.

Self-positioning tool analysis of his two courses indicated that the course before Covid-19 was type 5 (the Metro) and during Covid-19 was type 6 (the Ecosystem). The characteristics of type 5 focused on supporting, guiding, and openness towards students, while the characteristics of type 6 employed a large number of technological and pedagogical possibilities offered by the hybrid environment, which includes the present/distance articulation, mediatization, mediation, and openness toward learning (Deschryver & Charlier, 2012). During implementing HTLE during Covid-19, he highlighted some problems that he encountered, such as internet connection, the Cambodian culture of doing housework when they are at home, and spending more time to support students in the following:

> First, the internet connection is the main problem. Sometimes the internet disconnects for the whole morning even though I live in Phnom Penh City, and sometimes electricity cuts off. Another problem is the culture; students sometimes get interrupted by their parents asking them to do housework when they are at home. As a result, students cannot fully concentrate on their studies as in class. Finally, students need to work in a group, so I need to spend more time supporting them. (Ub.L18)

In severe cases, he mentioned that "some students decided to suspend their studies for a while due to their parents' financial problem paying tuition fees" during the Covid-19 crisis. This leads us to shed light on financial problems that create a barrier to academic success.

***How was this innovation process supported?***

According to the interview, he received full support from the university. He stated that "of course, there is some support from the institution to use Moodle as a learning platform, training on how to use Google Classroom, Google Doc., email, conference classroom, and training online activity improvement. He also offered recommendations to implement qualified online and offline courses that students need to commit to studying because online learning strongly requires self-learning. Students need to read many more resources than before". These recommendations parallel our research framework on students' profiles, indicating a level of independent learning.

***In which conditions did he implement hybrid teaching and learning environment?***

He implemented HTLE based on his teaching profile, such as *being self-confident to use technological tools, likes integrating technology into teaching, being more open to adopting innovation, having enough time to prepare online/offline activities, and having enough freedom to innovate teaching practices*. Another condition links to his teaching career because he is employed as a full-time lecturer. Therefore, his salary is annually increased. It is an indirect incentive for him. The other condition of implementing HTLE is associated with *university requirement*s. The university encourages lecturers to try and implement their teaching on a learning management system (Moodle), test on Google Classroom, and provides annual professional development (Meso-support). These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately

distance and online teaching. However, he stated that "teaching activities for online learning include pre-recording video for each lesson and encouraging online discussion".

***Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?***

Based on the Self-positioning Tool of HY-SUP data analysis, the outcome showed that the course before Covid-19 was type 5 (the Metro) and during Covid-19 was type 6 (the Ecosystem). We can see that the new teaching and learning experiences are different, for example, from face-to-face with some use of technology to entirely online and distance teaching. We can observe these changes through his online and distance teaching workload as he spends more time supporting students.

***EXTRANTS***

Implementing HTLE in his courses helps him become *a course designer and organizer* because he needs to prepare a pre-recorded video for each lesson for students. *Additionally, he plays a new role as an expert learner* because the university provides him an opportunity to attend an annual workshop on using tools for online teaching and learning. HTLE also positively affects students' 21st-century skills based on his opinion in the following table.

**Table 14**

*Perceived Effects of 21st Century Skills for Ub.L18*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| H. Problem-solving by solving different kinds of non-familiar problems. | | | | √ |
| I. Access and evaluate information | | | | √ |
| J. Collaboration with others | | | | √ |
| K. Think creatively | | | √ | |
| L. Apply technology effectively | | | | √ |
| M. Be self-directed learners | | | √ | |
| N. Work effectively in diverse teams | | | √ | |

***Summary***

This lecturer implemented HTLE in his courses with full support from the university to provide teaching and learning tools training. He implemented HTLE based on his teaching profile. Other conditions related to his *full-time teaching employment* and the *university*

*requirement* to encourage all lecturers to implement their teaching on learning management system (Moodle), and test on Google Classroom with annual professional development (Meso-support). These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. However, we noticed time constraints such as pre-recording video lessons and supporting students when shifting from hybrid teaching to distance teaching.

### *4.2.6 Conclusion of University B*

This university commits to encouraging and supporting lecturers to innovate and improve the quality of teaching and learning through annual professional development, for example, teaching methods, assessment, online engagement, and educational psychology, to name a few. The university also provides a small incentive (money) to encourage them to participate in professional development to improve the quality of their teaching and learning organized by the university. This university has its learning management system, which is developed from MOODLE, and IT support department to help lecturers implement their teaching on the learning management system and test on Google Classroom. This links to the framework on meso-support from the management team.

The interview with 5 lecturers in this university indicated that they implemented HTLE based on their teaching profiles. These characteristics are being *self-confident to use technological tools, liking integrating technology into teaching, being more open to adopting innovation, having enough freedom to innovate teaching practices, and having enough time preparing online/offline activities*. This also reflected that they have the same interest as the university to improve the quality of teaching and learning, which is the focal point of micro and macro-level for innovation. Another condition links to the university requirement to integrate face to face teaching with ICT. Besides, the condition might be related to *English language to use tool and understand instruction*. Last, they implemented HTLE based on their *intrinsic motivation*. For example, *to prepare students for the workplace and study abroad, engage students' learning, expand students' creativity, provide extra and access learning material to students, and save time and cost on printing material*. So, we reflected that these conditions indirectly help students during the Covid-19 crisis.

### 4.3 Cases for University C (*Macro and Meso Level*)

This section provides a case analysis of lecturers who implemented hybrid teaching and learning in University C. This university is private. It depends heavily on students' tuition fees to sustain its functions. There are seven lecturers who participated in the study. They were coded as (Uc.L2), (Uc.L6), (Uc.L7), (Uc.L12), (Uc.L14), (Uc.L19), (Uc.L20).

#### *4.3.1 Micro-level: Lecturer Number 2 (Uc.L2)*

We interviewed this lecturer on June 06th, 2020, and we spent 38 minutes interviewing him. He was around 30 years old. He has been teaching in higher education for around 5 years with 'Research Methodology' and 'Social Psychology'. These courses are designed for Bachelor students. During the interview, he chose the 'Research Methodology' course to describe his teaching experience before and during Covid-19. He described his course objectives in the following:

> The objectives of the research methodology course are (1) to help students engage in evidence-based thinking and think critically, (2) build practical skills in doing a research project. I want them not only to understand their own project but also to contribute their ideas and understand their classmates' projects. Before Covid-19, I still used project-based learning, so students could work in a group to discuss, share, and exchange ideas with each other within family groups and expert groups. However, during Covid-19, they did not have much interaction. It means they only understand their own project because they interact less with other groups, such as sharing ideas or discussing online.

When asking him about his teaching practice evolvement, he described his teaching practices from theory to practice in the following paragraph:

> At the beginning of my teaching, I primarily focused on lectures, theories, and concepts. I observed that this method was ineffective for learners, so I changed it to project-based learning. For example, I assign project work for them to do independently, but I regularly mentor them on their projects. However, applying project learning also has pros and cons, especially during the summer term because it is very short. Therefore, I do not stick to the course outline. For example, there are

> many lecture sessions, theories, and concepts in the course outline, but students find it hard to apply them in reality. Therefore, I switched to project learning, as students learn better by doing their projects. (Uc.L2)

Moving to his teaching profile, he illustrated himself as self-confident to use technological tools in his course. He also expressed that he likes integrating technology into his course, is open to adopting innovation, and has enough freedom to innovate his teaching practices. However, he highlighted that he does not have sufficient time to prepare online and offline activities nor receive incentives or rewards (letter of appreciation, increase-teaching rate) for his course.

***Innovation Process***

As mentioned earlier, he was glad to adopt innovation into his teaching classes. He elaborated what motivates him to integrate online-offline activities into his course thus:

> Integrating online and offline activities is important for students because it can help them prepare to work in an international environment and makes it easy to study. We can use it to engage students, and they can reach us easily when they have questions. Last but not least, it can improve their self-study if they know and use it in the right way. (Uc.L2)

The result of the Self-positioning tool analysis of his two courses indicated that the 'Research Methodology' course before Covid-19 and during Covid-19 was type 6 (the Ecosystem). During implementing HTLE, he highlighted some problems that he encountered before and during Covid-19 in the following:

> **Before Covid-19:** I think it depends on the subject we teach. If the subject is not practical, then is not difficult. However, if the subject requires practical activities, it requires more practical activities for students to make them understand. Therefore, the time duration of the course is significant. Next, the course syllabus design is inappropriate. For example, some students should have studied the basic level first before moving to another level. Therefore, it is tough to balance the teaching of mixed levels together. Additionally, language proficiency is a matter. For example, some students study using the Khmer language as an instruction medium. In

> contrast, others study using English as their instruction medium, so it is really hard to adjust when they are put together into one class. More importantly, it is challenging to mentor or guide mixed students with different majors into a course because they come from different backgrounds that are not our field of expertise.
>
> **During Covid-19**: there are some challenges such as it is time-consuming, students' lack of knowledge of the online tool, internet connection, and physical resources (some students do not have a computer, and poor internet connection in some provinces or rural areas) which cause a problem for communication. (Uc.L2)

Based on his opinion above, we can reflect that it is difficult for him to effectively implement HTLE in his class due to the language barrier of his students and learning experiences to use ICT and technology to assist learning. Additionally, the level of students' knowledge is an obstacle for him because a mixed level of learners makes it challenging for him to apply technology. Therefore, learners need more support and guidance when applying HTLE in their classes.

***How was this innovation process supported?***

According to the interview, he received no support from the university before Covid-19. He stated that "before Covid-19, there is no support from the Institution. However, during Covid-19, the institution encouraged lecturers to use Google Classroom and Zoom". He also offered some recommendations to implement the qualified online and offline course in the following:

> (1) the university should revise the course curriculum to fit students' levels. For example, students must complete the basic level first before moving to the advanced level. (2) Teaching methodology (hybrid teaching and learning) should be continued and supported by the institution even after Covid-19 is finished. This is related to institutional policy to provide an open learning environment for lecturers to blend their teaching methods in a physical class with distance learning. (3) Internet connection should be expanded across the university to ensure that students can use it to search online documents. If the internet connection is not good or there is no internet access, students will be unable to apply technology. (4) Stakeholder

involvements such as institutions, lecturers, students, and parents should promote online and offline learning. (Uc.L2)

***In which conditions did he implement hybrid teaching and learning environment?***

He implemented HTLE based on his teaching profile, such as *being self-confident to use technological tools, likes integrating technology into teaching, being more open to adopting innovation, and having enough freedom to innovate teaching practices. However, he did not have enough time to prepare online/offline activities nor receive incentives or rewards (letter of appreciation, increase-teaching rate) for innovation practices*. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching.

***Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?***

Based on the Self-positioning Tool of HY-SUP data analysis, the outcome indicated that the 'Research Methodology' course before Covid-19 and during Covid-19 was type 6 (the Ecosystem). We can see that the new teaching and learning experiences were different, for example, from face-to-face with some use of technology to entirely online and distance teaching. This teaching method change created a gap in online interaction with lecturer and students, students and students. For example, students are less interactive during online learning, such as sharing ideas or discussing.

***EXTRANTS***

Implementing HTLE in his courses helps him engage with his students through online tools. HTLE also positively affects students' 21$^{st}$-century skills based on his opinion in the following table.

**Table 15**

*Perceived Effects of 21st Century Skills for Uc.L2*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | | √ |
| B. Access and evaluate information | | | | √ |
| C. Collaboration with others | | | | √ |
| D. Think creatively | | | | √ |
| E. Apply technology effectively | | | | √ |
| F. Be self-directed learners | | | | √ |
| G. Work effectively in diverse teams | | | | √ |

***Summary***

This lecturer implemented HTLE in his courses despite getting no support from the university. He implemented HTLE based on his teaching profile. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. However, we noticed that students' interaction is less active when learning is shifted from hybrid teaching to distance teaching.

### *4.3.2 Micro-level: Lecturer Number 06 (Uc.L6)*

We interviewed this lecturer on June 10th, 2020, and we spent 41 minutes interviewing him. He was around 37 years old. He has been teaching in higher education since 2012. Most of the subjects he taught were 'Teaching Methodology' and 'Linguistics'. These courses are designed for Bachelor students. During the interview, he chose the 'English Grammar' course before Covid-19 and "Linguistics" course during Covid-19 to describe his teaching experience. Describing his teaching activities of the 'English Grammar' course, he used various activities, such as lecturing, pair discussion, group discussion, individual work, and presentations. He also continued to elaborate that for the "Linguistics" course during Covid-19, students have to attend online class, do a presentation, and do a written assignment of around 1500 words individually. He further explained in the following:

> I also set up some learning activities and documents on Google Classroom to read, do, and discuss. Additionally, we have an online discussion about teaching activities too. For the teaching activities, we changed from face-to-face to online. Therefore, if

> students do not get used to self-reading and self-learning, they will have problems with their studies. Of course, in class they can ask questions, and the lecturer walks around and checks the students' understanding quickly. (Uc.L6)

When asking him about his teaching practice evolvement, he described his teaching practices from face to face to hybrid teaching in the following paragraph:

> Technology plays a crucial role in contributing to the quality of teaching and learning; therefore, we could not use only traditional methods like face-to-face teaching as before. We can use Schoology as a platform to engage students and design learning activities too. (Uc.L6)

Moving to his teaching profile, he illustrated himself as self-confident to use technological tools in his course. He also expressed that he likes integrating technology into his course, opens to adopting innovation, has enough freedom to innovate his teaching practices, and has sufficient time to prepare online and offline activities. However, he does not receive incentives or rewards (letter of appreciation, increase-teaching rate) for innovating his course.

***Innovation Process***

He was delighted to adopt innovation into his teaching classes, as indicated earlier. He elaborated what motivates him to integrate online, offline activities into his course: "Online activities help students expand their learning experience outside the classroom. When students are absent, they can still get learning materials, information about the class, and lessons online".

The result of the Self-positioning tool analysis of his two courses indicated that the 'English Grammar' course before Covid-19 was a mix of type 5 (the Metro) and type 6 (the Ecosystem). In contrast, the 'Linguistics' course during Covid-19 was type 6 (the Ecosystem). The characteristics of type 5 are focused on supporting, guiding, and openness towards students, while the characteristics of type 6 employed a large number of technological and pedagogical possibilities offered by a hybrid environment which includes the present/distance articulation, mediatization, mediation, and openness toward learning (Deschryver & Charlier, 2012). During implementing HTLE, he highlighted some problems that he encountered before and during Covid-19, including teacher's knowledge of technology, low internet

connection, students' learning habit, students' learning facility (computer), and that it is hard to monitor students' learning in the following:

> There are some challenges. The first challenge is the teacher's knowledge of technology or ICT skills to find tools to support teaching. For example, Zoom can only be used for 40 minutes without a license, which is not very pleasant. However, other teachers have the knowledge and skill to use it more than 40mn. Next, a low internet connection makes the conversation difficult because students find it hard to ask questions and get answers compared to classroom learning. Furthermore, the online class requires students to read documents uploaded in advance, but most are not used to reading yet. More importantly, some students do not have computers to use, so they use their smartphones, which makes it hard for them to study because they cannot see the screen clearly when the lecturer shares his screen with them. Finally, some students put their voice or video off, making it hard for lecturers to see what they are doing, where they are, and whether they are listening or not. These are the problems for online learning in Cambodia. (Uc.L6)

According to the problems he raised above, we can well reflect that technological knowledge and pedagogical knowledge identified by Koehler and Mishra (2009) played an essential role in online teaching and learning. Learning and teaching facilities such as computers and fast internet speed helped make online teaching and learning more convenient in communication and clarification. To help online learning and teaching more effectively and efficiently, the university needs to provide continued professional development in technological pedagogical knowledge to teaching staff and learning facilities to support both lecturers and students.

***How was this innovation process supported?***

According to the interview, he stated that “there is an emotional support (verbal support) from the institution, but no technical support". He also offers some recommendations to implement qualified online and offline courses based on two factors (institution and Individual) in the following:

> **Institution:** I think the university should buy a licensed tool and create an official learning platform for lecturers and students. Additionally, the university should

provide training workshops to help the lecturers use the tool effectively. The university should also have a support team to help lecturers when lecturers have a problem with technical tools.

**Individual:** lecturers themselves need to strengthen and develop their technical skills, such as installing programs and designing online learning activities. This links to institutional responsibility to invite inside/outside experts to provide a short lecture on using and designing online learning activities. (Uc.L6)

***In which conditions did he implement hybrid teaching and learning environment?***

The interview result indicated that he implemented HTLE based on his teaching profile. These profiles included *being self-confident to use technological tools, likes integrating technology into teaching, being more open to adopting innovation, having enough freedom to innovate teaching practices, and having enough time preparing online/offline activities. However, he did not receive incentives or rewards (letter of appreciation, increase-teaching rate)*. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching.

***Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?***

Based on the Self-positioning Tool of HY-SUP data analysis, the outcome indicated that the 'English Grammar' course before Covid-19 was a mix of type 5 (the Metro) and type 6 (the Ecosystem), while the 'Linguistics' course during Covid-19 was type 6 (the Ecosystem). We can see that the new teaching and learning experience differed between 'before Covid-19' and 'during Covid-19', for example, from face to face with some use of technology to entirely online and distance teaching. This change of teaching method creates a teaching gap of technological pedagogical knowledge because lecturers are required to be able to use technological tools and techno-pedagogy to help students learn effectively. In our opinion, this techno-pedagogy may help lecturers to create an interactive learning environment and monitor students' learning progress.

***EXTRANTS***

In his opinion, implementing HTLE in his courses helps his students enhance their learning experiences outside the classroom and lead to independent learners. HTLE also positively affects students' 21st-century skills based on his opinion in the following table.

**Table 16**

*Perceived Effects of 21st Century Skills for Uc.L6*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | √ | |
| B. Access and evaluate information | | | √ | |
| C. Collaboration with others | | | √ | |
| D. Think creatively | | | √ | |
| E. Apply technology effectively | | | √ | |
| F. Be self-directed learners | | | √ | |
| G. Work effectively in diverse teams | | | √ | |

***Summary***

This lecturer implemented HTLE in his courses by getting emotional support, for example, positive reinforcement and encouragement from his university, but no technical support. He implemented HTLE based on his teaching profile. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. However, online learning and distance teaching require technological pedagogical knowledge, students' pre-existing knowledge of ICT and technology, and sufficient learning facility (computers, fast internet speed) to make learning effective. This abrupt change creates questions and doubts on equality of teaching and learning since both lecturers and students have little experience and knowledge of technological tools and pedagogical knowledge.

### *4.3.3 Micro-level: Lecturer Number 07 (Uc.L7)*

We interviewed this lecturer on June 16th, 2020, and we spent 34 minutes interviewing him. He was around 37 years old. He has been teaching in higher education since 2008. He has been teaching in the College of Education, the College of Art and Humanity, and Social Science. He obtained his Master of Education and Ph.D. in Political Science. During the

interview, he chose the 'Media and Politics' course before Covid-19 and the 'Comparative Public Policy' course during Covid-19 to elaborate on his teaching experience. Both courses are designed for Bachelor students. In 'Media and Politics', he assessed students using various assessments, such as mid-term and final exams, presentations active participation, and assignments. He described his teaching activities of using presentation practice and performance in the following:

> For example, one newspaper was assumed to be a part of the toppling Suharto's regime in 1997 in Indonesia. Then, we look at the role of newspapers, what they did, and their background. After that, we analyse the newspaper by looking for other sources that talk about that newspaper and draw a conclusion. To evaluate media stance, we need to look at the source of funding, board of management, and whether the editorial team are biased in the political spectrum. That is the teaching activities. We usually use PowerPoint presentations and provide websites for students to read. (Uc.L7)

He used Google Classroom to share documents and interact with students. He also elaborated on students' assessment methods and teaching activities in the 'Comparative Public Policy' course during Covid-19. He stated the following:

> It is busier than teaching in the classroom; for example, we need to have homework every day. We need to prepare either a slide presentation or video for students, post it into Google Classroom, and quiz students. We also use Zoom and Google Meet. We take 2 hours for online discussion. Then we have 1 hour to switch to read documents and do a quiz on Google Classroom. Nevertheless, I felt less motivated to prepare documents, lessons, and quizzes for students after salary delays. (Uc.L7)

When asking him about his teaching practice evolvement, he described that "this is not much different regarding the theory of teaching and learning because I am in the field of education. However, during Covid-19, we changed from classroom teaching to online teaching by using different kinds of technological tools".

Moving to his teaching profile, he illustrated himself as self-confident to use technological tools in his course. He also expressed that he likes integrating technology into his course, is open to adopting innovation, and has enough freedom to innovate his teaching

practices. However, he did not have sufficient time to prepare online and offline activities or receive incentives or rewards (letter of appreciation, increase-teaching rate) for his course.

***Innovation Process***

As mentioned earlier, he was excited to adopt innovation into his teaching classes. He described what motivates him to integrate online, offline activities into his course: "it is easy to facilitate learning because we can put documents online, so students can find supporting documents and do exercises".

The result of the Self-positioning tool analysis of his two courses indicated that the 'Media and Politics' course before Covid-19 was type 5 (the Metro) while the 'Comparative Public Policy' course during Covid-19 was type 6 (the Ecosystem). During implementing HTLE, he highlighted some problems that he encountered during Covid-19, such as monitoring students' learning, learning facility (computer, internet, electricity), and learning interaction. He stated in the following lists:

- "Sometimes students log in, turn off the camera and sound, then we cannot control them because we do not know what they are doing.
- Students are not ready to adopt online learning because most do not have laptops or PCs. Of course, they have only smartphones, but smartphones are not as good as PCs.
- Internet is slow in their areas
- Electricity fails
- Less interaction between students and students in the group
- Difficult to arrange group work and control their learning" (Uc.L7)

According to the problems which he raised above, we can clearly reflect that pedagogical knowledge identified by Koehler and Mishra (2009) played an essential role in online teaching and learning, while learning and teaching facilities such as computer, electricity, and fast internet speed helps make teaching and learning online more convenient in terms of communication and clarification. To make online learning and teaching more effective and efficient, the university needs to provide continued professional development of technological pedagogical knowledge to teaching staff and learning facilities to support lecturers and students. This links to the teacher's, students', and university profiles (Depover & Strebelle, 1997).

***How was this innovation process supported?***

According to the interview, "there is no training support from the institution". He also offers two recommendations to implement qualified online and offline courses based on the following:

- We need to have online learning with face-to-face learning because students are not ready to become independent learners.
- The institution needs to consider quality and support, such as technical support and financial support. (Uc.L7)

***In which conditions did he implement hybrid teaching and learning environment?***

The interview result indicated that he implemented HTLE based on his teaching profile. They included *being self-confident to use technological tools, likes integrating technology into teaching, being more open to adopting innovation, and having enough freedom to innovate teaching practices. However, he did not have enough time to prepare online/offline activities or receive incentives or rewards (letter of appreciation, increase-teaching rate) for innovation practices*. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. This abrupt change from face-to-face to online learning creates questions on the quality of teaching and learning, such as pedagogical knowledge, learning facilities, and teaching and learning support.

***Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?***

Based on the Self-positioning Tool of HY-SUP data analysis, the outcome indicated that the 'Media and Politics' course before Covid-19 was type 5 (the Metro) while the “Comparative Public Policy” course during Covid-19 was type 6 (the Ecosystem). We can see that the new teaching and learning experience differed between 'before Covid-19’ and ‘during Covid-19', for example, from face to face with some use of technology to completely online and distance teaching. The change of teaching method indirectly generates a teaching gap of technological pedagogical knowledge because lecturers are required to use technological tools and techno-pedagogy to help students learn effectively. In our opinion, this techno-pedagogy may help lecturers to create an interactive learning environment and monitor students' learning progress. Additionally, this abrupt change creates a learning barrier

for students who are poor at technology. The lecturer stated that "we need to have online learning with face-to-face learning because students are not ready to study independently".

***EXTRANTS***

In his view, implementing HTLE helps him become a learning facilitator because he can easily share learning resources and create more learning engagement with students. HTLE also positively affects students' 21st-century skills, such as the ability to access and evaluate information, collaboration, and apply technology, according to the interview with him. Therefore, students can enhance their learning experiences outside the classroom and become independent learners.

***Summary***

To sum up, this lecturer implemented HTLE in his courses with no training support from the institution. He implemented HTLE based on his teaching profile. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. However, online learning and distance teaching require even more technological pedagogical knowledge, students' pre-existing knowledge of ICT and technology, and sufficient learning facility (computers, fast internet speed) to make learning effective. This abrupt change creates questions and doubts on the quality of teaching and learning since both lecturers and students have little experience and knowledge of technological tools and pedagogical knowledge.

### *4.3.4 Micro-level: Lecturer Number 12 (Uc.L12)*

We interviewed this lecturer on June 27th, 2020, and we spent 52 minutes interviewing him. He was around 37 years old. He has been teaching in higher education since 2011 with some courses, such as Political History, Political Science, International Relations, and Public Policy. During the interview, he chose the 'Introduction to Political Science' course before Covid-19 and the 'Contemporary Political Thought' course during Covid-19 to elaborate on his teaching experience. The 'Introduction to Political Science' course is designed for Bachelor students while the "Contemporary Political Thought" is for postgraduate students.

In "Introduction to Political Science", he assessed students using various assessments, such as students' attendance, assignments, class activities, and mid-term and final exams. He said he used lecturing-based (PowerPoint slide), group discussion, and presentation for his

teaching activities. He also elaborated on students' assessment methods and teaching activities in the "Contemporary Political Thought" course during Covid-19 that he used online lecturing and discussion with students. He further explained that he assessed students' learning using mid-term tests, final tests, assignments, chapter summaries, presentations, and attendance. When asking him about his teaching practice evolvement, he described his teaching practices in the following:

> In the past, I used only textbooks to teach in the classroom. However, I used extra reading for students later, such as journal articles and other relevant books required by the institution mentioned in the course syllabus. Nevertheless, nowadays, the university requires me to teach online by using Zoom and Google Meet. He says, "It also makes it easy to share documents and journals to coordinate students' learning" (Uc.L12).

Moving to his teaching profile, he illustrated himself as self-confident to use technological tools in his course. He also expressed that he likes integrating technology into his course, is open to adopting innovation, has enough freedom to innovate his teaching practices, and has sufficient time to prepare online and offline activities. However, he did not receive incentives or rewards (letter of appreciation, increase-teaching rate) for his course.

***Innovation Process***

As mentioned earlier, he was willing to adopt innovation into his teaching classes. He described what motivates him to integrate online-offline activities into his course before Covid-19 in the following paragraph:

> Integrating online-offline activities can help slow or absent students to catch up on the lesson. Moreover, they can ask questions through group discussions or chat directly to ask for some advice. It also makes it easy to share documents and journals to coordinate students' learning. (Uc.L12)

The result of the Self-positioning tool analysis of his two courses indicated that the 'Introduction to Political Science' course before Covid-19 was type 5 (the Metro), while the 'Contemporary Political Thought' course during Covid-19 was type 6 (the Ecosystem). During implementing HTLE, he highlighted some problems that he encountered during

Covid-19, such as students' participation, internet, and computers. He stated in the following lists:

- "Students do not fully participate in learning because they go to their home in the province with low internet connection.
- *Internet and computer*: Some students do not have computers and no good internet at home. Therefore, they use their smartphone to learn; however, it is not as easy to watch and learn as with a computer.
- During distance lecturing, only half of the students participate (attendance), while other students are absent. However, after finishing lecturing, those absent students chat to ask me questions, so I have to take time to explain again". (Uc.L12)

According to the problems mentioned above, we conclude that these problems link to home learning facilities such as computers and stable internet connections. This home learning facility is vital for both lecturers and students to attend hybrid classes.

***How was this innovation process supported?***

Based on the interview, he stated that "there is some short training on how to use the tool to teach during Covid-19 offered by the institution". He also offered two recommendations to implement qualified online and offline courses. He underlined that "for my recommendation for future education, we should apply HTLE to complement each other. If we have a learning platform, we can use that platform to fill in the gap caused by an end to face-to-face teaching".

***In which conditions did he implement hybrid teaching and learning environment?***

The interview result indicated that he implemented HTLE based on his teaching profile. These consisted of *being self-confident to use technological tools, likes integrating technology into teaching, more open to adopting innovation, having enough freedom to innovate teaching practices, having enough time to prepare online/offline activities. However, he did not receive incentives or rewards (letter of appreciation, increase-teaching rate)*. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching.

***Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?***

The outcome self-positioning tool data analysis indicated that the 'Introduction to Political Science' course before Covid-19 was type 5 (the Metro), while the 'Contemporary Political Thought' course during Covid-19 was type 6 (the Ecosystem). We observed different teaching methods 'before Covid-19' and 'during Covid-19', for example, from face to face with some use of technology to entirely online and distance teaching. This change of teaching method produces a teaching gap of technological pedagogical knowledge because lecturers are required to be able to use new technological tools and techno-pedagogy to help students learn effectively. In our opinion, this techno-pedagogy may help lecturers to build an interactive learning environment and monitor students' learning progress. Additionally, this abrupt change creates a learning barrier for students who are poor at technology and lack a home learning facility for hybrid learning.

***EXTRANTS***

In his view, implementing HTLE helps him become a learning facilitator because he can easily share learning resources and create more learning engagement with students. HTLE also has a positive effect on students' 21st-century skills in the following table:

**Table 17**

*Perceived Effects of 21st Century Skills for Uc.L12*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | √ | |
| B. Access and evaluate information | | | √ | |
| C. Collaboration with others | | | √ | |
| D. Think creatively | | | √ | |
| E. Apply technology effectively | | | √ | |
| F. Be self-directed learners | | | | √ |
| G. Work effectively in diverse teams | | | √ | |

***Summary***

This lecturer implemented HTLE in his courses with the support of short training on using the tool to teach during Covid-19. He implemented HTLE based on his teaching profile. Implementing conditions are not different according to the type of environment

developed when shifting from hybrid to ultimately distance and online teaching. However, online learning and distance teaching require technological pedagogical knowledge, students' pre-existing knowledge of ICT and technology, and sufficient learning facility (computers, fast internet speed) to make learning effective. In addition, a home learning facility is essential for both lecturers and students to attend online and distance education.

#### *4.3.5 Micro-level: Lecturer Number 14 (Uc.L14)*

We interviewed this lecturer on June 29th, 2020, and we spent 49 minutes interviewing him. He was 36 years old. He started teaching in higher education in 2011 with some courses related to the English language, such as writing skills, reading skills, listening skills and speaking skills, literature study, English for business, and research writing. His teaching practice has evolved since the beginning of his career; he said:

> There have been some changes since I started teaching. Firstly, I used to try to find some things new to teach, but later, I stop trying to find new teaching activities because I think I got used to those activities. On the other hand, I completely switched from face-to-face to online teaching due to Covid-19. It is a new challenge for me and other lecturers to adapt to a new teaching environment related to teaching tools that I have never used, such as Zoom, Microsoft Team, Google Meet. In the past, I used technology too, but not Videocall. I used only Telegram, Chat, and Facebook groups, and other inside classroom activities to help administration work. (Uc.L14)

During the interview, he chose the "Reading 206" course to describe his teaching experience before and during Covid-19. This course is designed for Bachelor students to improve academic writing and reading techniques. Students are assessed on class attendance, activities, other assignments, and mid-term and final examinations. There are some normal teaching activities, such as PowerPoint slides, group discussion, individual presentation, homework, and assignments. However, during Covid-19, he modified his teaching activities and assessments to adapt to the Covid-19 crisis. He described his teaching activities and assessments in the following:

> For students' assessment during Covid-19, I use online quizzes, homework, assignments, reflection papers, and videos. For teaching activities, I use Zoom. However, I do not provide various teaching activities like in the classroom. It meant that we just sat at the same place and watched each other. The next point is that the voice is unclear due to the internet connection. This causes a problem for students who live in provinces. For group work, students can discuss after the class session finishes. Actually, in Zoom, we can break it down into class discussions, but it is a bit difficult for students and me because they are new to technology and are not good at it yet. (Uc.L14)

Moving to his teaching profile, he illustrated himself as self-confident to use technological tools in his course. He also expressed that he likes integrating technology into his course, is open to adopting innovation, and has enough freedom to innovate his teaching practices. However, he did not have sufficient time to prepare online and offline activities nor receive incentives or rewards (letter of appreciation, increase-teaching rate) for his course. He stated that “I do not have enough time because I work full-time in another place. Therefore, I do not have sufficient time to prepare online activities for students. I only have one hour to read the document before I start teaching”.

***Innovation Process***

Apart from his willingness to adopt innovation into his teaching classes, he described what motivates him to integrate online-offline activities into his course before Covid-19 in the following paragraph:

> I think Cambodian students' knowledge of online learning is low. Compared to other developed countries, they started using online learning long ago and now use it better. Looking at our curriculum, we are not accustomed to existing technology yet. That is why I want young teachers and students to get used to technology by using online teaching activities to gain new experience, enrich knowledge, get fast information, and do research on the internet. So, I encourage other people to use technology to facilitate teaching and learning. (Uc.L14)

The result of the Self-positioning tool analysis of his two courses indicated that his "Reading 206" course before Covid-19 and during Covid-19 were type 6 (the Ecosystem).

While implementing HTLE, he highlighted some problems he encountered during Covid-19, such as the subject itself, extra resources, assessments, internet connection, outsiders joining the class, and confusion. He stated the following:

> There are some challenges that I encountered. First, the subject itself is difficult to use technology with, for instance, asking students to read and tell the answers. Second, it is difficult to find other resources with this level (grammar and writing are no problem, but reading is difficult). For students' assessment, I used Google Classroom as a platform for students to submit homework, assignments, and doing quizzes online. As a result, I am not sure if they had exchanged or copied answers with each other. Some students ask to be late, have no phone credit, and have no internet access. Another problem is that some students add their friends who are not studying in my class to online learning because they know the password. Some students missed class two or three times before they found out everyone had an online learning class, while others were confused or registered in the wrong class.

***How was this innovation process supported?***

According to the interview, he stated that "If lecturers have a question regarding the use of the tool, the institution will find a solution to help. The institution also helps recommend new applications to lecturers to use, but there is no training provided". He also offered recommendations to implement the qualified online and offline course in the following:

> Online learning activities should be introduced to young people before entering university life to learn about technology and research on the internet. As a result, it makes it easier when they come to university life. In my observation, I think they are not fully involved in online learning due to their habits. Institutions and teaching staff have not yet prepared a good curriculum and teaching methods to respond to online teaching and learning. Therefore, I think Covid-19 is a silver lining to improve institutions, lecturers, and students' use of technology in the education sector.

***In which conditions did he implement hybrid teaching and learning environment?***

The result of the interview indicated that he implemented HTLE based on his teaching profile, such as *being self-confident to use technological tools, likes integrating technology*

*into teaching, more open to adopting innovation, and having enough freedom to innovate teaching practices, though he did have enough time to prepare online/offline activities nor receive incentives or rewards (letter of appreciation, increase-teaching rate)* for innovation practices. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching.

***Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?***

The outcome of self-positioning tool data analysis indicated that the "Reading 206" course before Covid-19 and during Covid-19 were type 6 (the Ecosystem). We observed the use of teaching methods "before Covid-19" and "during Covid-19," for example, from face-to-face with some use of technology to entirely online and distance teaching. This change of teaching method creates a teaching gap of technological pedagogical knowledge because lecturers are required to be able to use new technological tools and techno-pedagogy to help students learn effectively. This reflects what he mentioned of challenges of online learning to deal with online assessment and monitoring. In our opinion, this techno-pedagogy may help lecturers to create an interactive learning environment and monitor students' learning progress. Additionally, this abrupt change creates a learning barrier for students who are poor at technology and lack a home learning facility for hybrid learning.

***EXTRANTS***

In his opinion, implementing HTLE helps him become more engaged with students by sharing fast information with students. HTLE also has a positive effect on students' 21st-century skills in the following table:

**Table 18**

*Perceived Effects of 21st Century Skills for Uc.L14*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | √ | |
| B. Access and evaluate information | | | | √ |
| C. Collaboration with others | | | | √ |
| D. Think creatively | | | | √ |
| E. Apply technology effectively | | | | √ |
| F. Be self-directed learners | | | | √ |
| G. Work effectively in diverse teams | | | √ | |

***Summary***

This lecturer implemented HTLE in his courses with technical support from his institution but no training support during Covid-19. He implemented HTLE based on his teaching profile. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. However, we reflected that online learning and distance teaching require technological pedagogical knowledge, students' pre-existing knowledge of ICT and technology, and sufficient learning facilities (computers, fast internet speed) to make learning effective. In addition, a home learning facility is vital for both lecturers and students to attend online and distance education.

### *4.3.6 Micro-level: Lecturer Number 19 (Uc.L19)*

We interviewed this lecturer on July 15th, 2020, and we spent 1hour and 13 minutes interviewing him. He was 42 years old. He stated, "I have been teaching in higher education since 2011 with some courses, such as philosophy, sociology, psychology, anthropology, organizational behaviour, and leadership. For the past few years, I have only taught leadership and psychology". He also mentioned his teaching practice in the following:

> When I started my career, I searched and read many documents. My teaching methods were insufficient because I swiftly switched from teaching English as a foreign language to a content subject. So, I asked the students to do take part in many discussions, read documents, and do presentations. One or two years later, I completely understood the content lessons and became flexible in my teaching. I started looking at context and stopped taking the whole book's content and reflecting on real society and the Cambodia context. Before Covid-19, I offered students an opportunity to do a self-recorded video presentation. If they are absent on the day, they do a presentation in the class. Then, they send that video to me. That is my flexibility. I observed that students are happy because some are busy at the workplace or have a mission in the province but still have a chance to get scores. I also update slide presentations and recommend some textbooks to read as it makes it easy to teach if students get more information from other sources. (Uc.L19)

During the discussion, he chose the 'Leadership' course to describe his teaching experience before and during Covid-19. This course is designed for Bachelor students to gain theoretical and conceptual knowledge of leadership, so students can apply those theories and concepts into their daily lives and the community of the workplace. He applied various teaching activities in his class, such as PowerPoint slides, reading, videos, a reflection of understanding, group discussions and presentations, individual presentations, homework and assignments, and writing on the whiteboard. He also used different assessment methods in his class, for example, students' attendance, assignment and activities, and mid-term and final exams. However, he modified these assessment and teaching methods during Covid-19. He mentioned that "students are required to do a special assignment to replace the mid-term exam, and a presentation to replace the final exam. Teaching activities include lecturing through Zoom, video recordings, and uploading videos into Google Classroom, group assignments, individual assignments, and group discussions".

Moving to his teaching profile, he rated himself as self-confident to use technological tools in his course. He also expressed that he likes integrating technology into his course, is open to adopting innovation, has enough freedom to innovate his teaching practices, has sufficient time to prepare online and offline activities, though he did not receive incentives or rewards (letter of appreciation, increase-teaching rate) for his course.

### *Innovation Process*

In addition to his willingness to adopt innovation into his teaching classes, he described what motivates him to integrate online-offline activities into his course before Covid-19. He stated, "I integrated online, offline activities into my course because I wanted to fulfil the course objective that students have completed assignments and engage the students' learning process". According to the Self-positioning tool analysis of his two courses, the result indicated that the "Leadership" course before Covid-19 was type 5 (the Metro) and during Covid-19 was type 6 (the Ecosystem). During implementing HTLE, he highlighted some problems that he encountered during Covid-19, such as internet connection, monitoring students' learning, outsiders, and the institution itself in the following:

> There are some challenges that I encountered. First, the internet connection is very slow, making it difficult for online lecturing. This internet connection causes problems for not only lecturers but also students. So, it is not very pleasant sometimes. Another challenge is that some students get accepted to Zoom, but they

> do not turn on their cameras, so I do not know what they are doing. Another problem is that an anonymous person or outsider joins the group without notice because students can pass a link to other people deliberately or unintentionally. (Uc.L19)

***How was this innovation process supported?***

According to the interview, he stated that "there was some support from the institution to train lecturers to use Zoom, cut videos, and encourage lecturers who need WIFI, material for recording videos, and lecturers can put in a request to use a room to record video. However, most lecturers use home WIFI, so the university does not support this". He also offered recommendations to implement the qualified online and offline course in the following:

> I require students to turn on their cameras to see their activities and get to know each other. By doing this, we can create a good rapport between lecturer and students, students and students. By turning on the camera, the lecturer can track students' activity when it is time to study because some students might be somewhere else and with others. Another point is that the lecturer needs to do pre-record videos and send them to students, so we need to be strict with them during the discussion when it comes to working online. We need to look at the lecturer's health, living standards, competency, and time availability. If lecturers have good health and living standards, they might have good preparation and a high commitment to teaching. (Uc.L19)

***In which conditions did he implement hybrid teaching and learning environment?***

The result of the interview indicated that he implemented HTLE based on teaching profile, such as *being self-confident to use technological tools, likes integrating technology into teaching, more open to adopting innovation, having enough freedom to innovate teaching practices, and having enough time to prepare online/offline activities, though he did not receive incentives or rewards (letter of appreciation, increase-teaching rate) for innovation practices*. Other conditions include the lecturer's health, living standard, competency, and time available. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching.

***Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?***

The outcome of self-positioning tool data analysis indicated that the “Leadership” course before Covid-19 was type 5 (the Metro) and during Covid-19 was type 6 (the Ecosystem). We observed the use of teaching activities and students' assessment "before Covid-19" and "during Covid-19" from face-to-face with some use of technology to entirely online and distance teaching. For example, during Covid-19, he used Zoom, video recordings, and Google Classroom to support his teaching activities while students were required to do a particular assignment to replace the mid-term exam and a presentation to replace the final exam. This change of teaching method creates a teaching gap of technological pedagogical knowledge because lecturers are required to be able to use technological tools and techno-pedagogy to help students learn effectively. This reflects the challenges of online learning to deal with online monitoring of students' learning. In our opinion, this techno-pedagogy may help lecturers to create an interactive learning environment and monitor students' learning progress. For example, ask students to turn on their cameras and monitor for their online discussions. Additionally, this abrupt change creates a learning barrier for students who are poor at technology and lack a home learning facility for hybrid learning.

***EXTRANTS***

In his view, implementing HTLE helps him become more engaged in students' learning progress. HTLE also has a positive effect on students' 21st-century skills in the following table:

**Table 19**

*Perceived Effects of 21st Century Skills for Uc.L19*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | √ | |
| B. Access and evaluate information | | | √ | |
| C. Collaboration with others | | | √ | |
| D. Think creatively | | | √ | |
| E. Apply technology effectively | | | | √ |
| F. Be self-directed learners | | | √ | |
| G. Work effectively in diverse teams | | | √ | |

***Summary***

This lecturer implemented HTLE in his courses with support from his institution, such as training on how to use Zoom, cut videos, and by providing space, and teaching facilities at the university during Covid-19. He implemented HTLE based on his teaching profiles. Other conditions include the lecturer's health, living standard, competency, and time available. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. However, we reflected from this interview that online learning and distance teaching require technological pedagogical knowledge and sufficient learning facility (computers, fast internet speed) to make learning effective. In addition, a home learning facility is essential for both lecturers and students to attend online and distance education.

### *4.3.7 Micro-level: Lecturer Number 20 (Uc.L20)*

We interviewed this lecturer on July 17th, 2020, and we spent 45 minutes interviewing him. He was 47 years old. He stated, "I started teaching in higher education in 2003, so it has been around 17 years now. I teach some subjects such as Political Science, International Relations, ASEAN's Politics, and History so on and so forth". He also mentioned his teaching practice in the following:

> I see some changes from both sides of students and me. First, students start to understand their roles and duty as learners due to the competitive job market and applying for scholarships to study abroad. There is also an increase in teaching awareness of using the student-centred approach to promote active and interactive learning. I often used the teacher-centred approach in early 2003, but later, I changed to a student-centred approach to allow students to share ideas, write what they want to write, ask questions they want to ask, and have a discussion. I set the task for them to do research at home; they come to class to discuss and share ideas. I also increased my reading to improve my knowledge capacity and skills for myself and my students in the class. Before Covid-19, I used slide presentations, textbooks, extra learning material, and homework for students to do in the library. However, during Covid-19, there was an abrupt change for me. I mainly use two tools to communicate with students. The first one is Skype which is directly used for

> teaching and learning, while the second one is Telegram for indirect communication. The Telegram group is very effective because students can ask questions related to tasks. Students themselves also increase their ability to do research and search for information on the internet at home and in the library too. (Uc.L20)

During the discussion, he chose the 'Introduction to Theories of Public Policy course before Covid-19 and 'Media and Politics' course during Covid-19 to describe his teaching experience. Both courses are designed for Bachelor students. The "Introduction to Theories of Public Policy" course introduces students to the major concept, methods, and policy models in political and social science. He used various teaching activities, such as PowerPoint presentations, group discussion, reports, homework, and assignments. He also assessed students' learning through group presentations, group/individual assignments, class activities, and exams. On the other hand, he explained that the "Media and Politics" course aims to examine the different perspectives on the influences and effects of media on politics. It also analyzes mass media roles and media effects on the political system. He stated about his teaching activities and students' assessment during Covid-19 in the following:

> For teaching activities, I use online applications such as Google Classroom, Skype, and Telegram to communicate with students during Covid-19. However, before Covid-19, I also used Telegram to communicate and engage students, but not Skype. I ask students to assess my teaching twice a semester, one after mid-term and the other before the final. I assess students' knowledge and skills through regular homework, mid-term, and final exams (video presentation). I can see students improve; they did not know how to do a video presentation in the past, but now they know how to do it well. Some students practice and record their video three times before sending it to me to ensure good quality. (Uc.L20)

Moving to his teaching profile, he marked himself as self-confident to use technological tools in his course. He also highlighted that he likes integrating technology into his course, is open to adopting innovation, has enough freedom to innovate his teaching practices (panel discussion, art walking gallery method), has sufficient time to prepare online and offline activities, though he did not receive incentives or rewards (increase-teaching rate) for his course.

***Innovation Process***

Besides his commitment to adopting innovation into his teaching classes, he described what motivated him to integrate online, offline activities before Covid-19 by saying that Covid-19 encourages us to use online learning and distance teaching such as Google Classroom, Skype, and Telegram groups. We use Telegram and Facebook groups to communicate, discuss, and share information. To make it clear, before Covid-19, we also used it, but not online conference calls. According to the Self-positioning tool analysis of his two courses, the result indicated that the 'Introduction to Theories of Public Policy' and 'Media and Politics' were type 6 (the Ecosystem) of HTLE. During implementing HTLE, he highlighted some problems that he encountered during Covid-19, such as being time-consuming, a lack of class attendance, family disturbances, internet connection, environmental factors (during monsoon), and stress management in the following:

> There are some challenges. First, it is more time-consuming than before. For example, we spend three hours online streaming with students and extra hours supporting students through group chat and learning design. Second, some students' attendants are not present because, during Covid-19, they go to their homes in the countryside. This affects the lecturer too because I need to explain the lesson to them again. Students also get some disturbances from their families while studying from home. Additionally, a stable internet connection is critical for students to study from home. Surprisingly, this season is a monsoon, so students are afraid of studying online due to ferocious lightning (Nature factor). Another observation is that the students become stressed because of too much online learning. They are active at the beginning of the first week, but they are inactive later. Probably they received too much homework from other lecturers too. To sum up, the challenges are that it is time-consuming, internet connection, and stress with too much online. I need to prepare the lesson for students to read in advance because it is different from visual teaching in the class; it takes much time. (Uc.L20)

***How was this innovation process supported?***

According to the interview, he stated that "University C helps us to explain how to create Google Classroom to use for distance learning; furthermore, we use live stream by Skype call to help students as well. Additionally, the university provides technical support,

short training course for lecturers who need technical support such as recording videos, cut and pasting videos". This lecturer received training support from the university, while other lecturers said they did not get support based on several assumptions. First, he might have kept checking university information and notification on the Telegram group. Second, he might have asked the university if there were any training and teaching professional development opportunities for teaching staff. He also offered recommendations to implement the qualified online and offline courses in the following:

> The lecturer must commit to following the course syllabus when applying online-offline learning. The institution needs to strengthen the lecturer's capacity to use technology, especially for those lecturers who are poor at technology. Lecturers who need technical support and a quiet place should go to university if they get disturbed by their family members. I think we should not give too much homework to students because I can see they get pressured, stressed to death, and have increased blood pressure. We need to strengthen students' ability to use technology too. Additionally, personal phones and computers for study are not updated or have such technology for personal use. This links to the individual economy. (Uc.L20)

***In which conditions did he implement hybrid teaching and learning environment?***

The result of the interview indicated that he implemented HTLE based on his teaching profile, such as *being self-confident to use technological tools, likes integrating technology into teaching, more open to adopting innovation, having enough freedom to innovate teaching practices, and having enough time to prepare online/offline activities, though he did not receive incentives or rewards (letter of appreciation, increase-teaching rate) for innovation practices*. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. He also received technical support for his teaching activities from the university. He highlighted that he used technological tools such as Telegram and Facebook groups to communicate, discuss, and share information with students, which led to the engagement of students' learning.

***Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?***

The outcome of Self-positioning tool data analysis indicated the two courses were type 6 (the Ecosystem). We observed the use of teaching activities and students' assessment

"before Covid-19" and "during Covid-19" from face-to-face with some use of technology to entirely online and distance teaching. For example, during Covid-19, he used Google Classroom, Skype, and Telegram groups to support his teaching activities while students were required to do regular homework and video presentations. This change of teaching method creates a new burden for him; for example, it is time-consuming because he needed to prepare the lesson for students to read in advance. It was different from face-to-face teaching in the class; it took longer than before.

***EXTRANTS***

In his view, implementing HTLE helped him take on a new role as a facilitator and increased teaching engagement. HTLE also positively affects students' 21st-century skills, such as problem-solving, accessing and evaluating information, thinking creatively, applying technology, becoming self-directed learners, and working in diverse teams. However, I think that HTLE could not positively affect collaboration skills. He stated, "I do not think it improves student collaboration because students do not meet each other and most of the tasks are individual assignments" (Uc.L20).

**Table 20**

*Perceived Effects of 21st Century Skills for Uc.L20*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | √ | |
| B. Access and evaluate information | | | √ | |
| C. Collaboration with others | | √ | | |
| D. Think creatively | | | √ | |
| E. Apply technology effectively | | | √ | |
| F. Be self-directed learners | | | √ | |
| G. Work effectively in diverse teams | | | √ | |

***Summary***

This lecturer implemented HTLE in his courses with support from his institution, such as using Google Classroom and technical support. He implemented HTLE based on his teaching profile. These led him to engage students' learning because he used technological tools to communicate, discuss, and share information. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately

distance and online teaching. However, we reflected from this interview that online learning and distance teaching require sufficient learning facilities (computer, fast internet speed), minimum learning tasks, and lecturer and students' competency to use ICT.

### *4.3.8 Conclusion of University C*

According to the interview with 7 lecturers in this university, we can see that most of the lecturers implement HTLE based on their individual teaching characteristics, such as *being self-confident to use technological tools, like integrating technology into teaching, more open to adopting innovation, and have enough freedom to innovate teaching practices, though some of them do not have enough time to prepare online/offline activities nor receive an incentive (increase teaching rate or letter of appreciation).* Other conditions associated with their *intrinsic motivations, for example, to help students work in an international environment, to increase engagement with students, to expand their learning experience outside the classroom, to promote self-study, to facilitate teaching and learn (sharing documents and journals), to coordinate students' learning, to help slow learners and absent students to catch up lessons, to help students and young teachers get used to technology by using online teaching activities to gain new experience, enrich knowledge, get fast information and research on the internet, and to engage students' learning process*es. One lecturer received training support from the university, while other lecturers said they did not get support. First, he probably kept checking university information and notifications on the Telegram group. Second, he might have asked the university if there were any training and teaching professional development opportunities for teaching staff.

## 4.4 Cases for University D *(Macro and Meso Level)*

This section provides a case analysis on a lecturer implementing HTLE in a private university D. Only one lecturer was participating in the study due to a network connection. This lecturer was coded as (Ud.L11).

### *4.4.1 Micro-level: Lecturer Number 11 (Ud.L11)*

We interviewed this lecturer on June 21$^{st}$, 2020, and we spent 46 minutes interviewing him. He was 40 years old. He stated that "I started teaching in higher education in 2012 with some English courses such as Writing, Grammar, Reading, and Speaking". He also mentioned that "there is not much change in teaching practices. I usually allow students to do

more practice and activities than theory. I try to find and search for other approaches to help students get more understanding, such as communicative approach and self-reflection activity".

During the discussion, he chose the 'Professional Writing' course before Covid-19 and during Covid-19 to describe his teaching experience. This course is designed for Bachelor students to enhance their professional writing skills in their current or future professions in business and administration. He applies various teaching activities, for example, lectures, reports, class discussions and activities, fieldwork, individual work, library and internet research, and presentations. He also uses different types of assessments to evaluate students' learning. These assessments consist of ongoing assessment 70% (students' attendance, progress tests, presentations, assignments, homework, mid-term test), and final exam 30%.

Moving to his teaching profile, he presented himself as self-confident to use technological tools in his course. He also highlighted that he likes integrating technology into his course, is open to adopting innovation, has enough freedom to innovate his teaching practices, has sufficient time to prepare online and offline activities, though he did not receive incentives or rewards (increase-teaching rate) for his course. He further specified that “During Covid-19, the university has a financial problem that affected teachers' salary. This problem led teachers to feel demotivated due to an irregular salary". This problem links to our framework in the Meso-system—financial support.

***Innovation Process***

Apart from his commitment to adopting innovation into his teaching classes, he highlighted that " technical support and financial support " motivated him to integrate online-offline activities into his course. In this sense, he wanted to emphasize that "If there is no financial and technical support, teachers are demotivate". According to the Self-positioning tool analysis of his two courses, the result indicated that the 'Professional Writing' course before Covid-19 and during Covid-19 was type 6 (the Ecosystem). During implementing HTLE, he highlighted some problems that he encountered during Covid-19, such as internet connection, extrinsic motivation of lecturer and students, and system errors. He stated the following:

- Online teaching is not the same as face-to-face teaching in the class because the internet connection in Cambodia is not good or gets disconnected.

- Participation of the students was only 50%. Additionally, students and teachers have financial problems, which causes them to feel less motivated to teach and study.
- School LMS is not perfectly good. Sometimes errors related to students' attendance, set times, and correct assignments cannot be marked and commented on. Students also cannot submit their assignments due to the errors in the system. (Ud.L11)

***How was this innovation process supported?***

According to the interview, he mentioned that “There is a class orientation related technology provided by an institution such as how to check students' attendance, upload documents, use Zoom, and set assignment for students". He also offered recommendations to implement qualified online and offline courses such as good internet connection, technical support to explain or guide teachers and students to use tools, and financial support (proper, on time, and regular teachers' salary).

***In which conditions did he implement hybrid teaching and learning environment?***

The result of the interview showed that he implemented HTLE based on his characteristics, such as *being self-confident to use technological tools, likes integrating technology into teaching, more open to adopting innovation, having enough freedom to innovate teaching practices, having enough time to prepare online/offline activities, though he did not receive incentives or rewards (letter of appreciation, increase-teaching rate) for innovation practices*. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. However, he stated that "students and teachers have financial problems, which causes them to feel less motivated to teach and study".

***Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?***

We observed the use of teaching activities and students' assessment "before Covid-19" and "during Covid-19" from face-to-face with some use of technology to completely online and distance teaching. The self-positioning tool data analysis indicated the two courses were type 6 (the Ecosystem). For example, he highlighted his teaching activities and assessments during Covid-19 in the following:

The teaching activities during Covid-19 focused on online activities, and sometimes I did a video recording of a lecture with instructions to do exercises. Then, students can download, watch and do it. Most activities included individual work and teamwork. They contacted each other through Zoom with two or three people to write a memo, report, and proposal to submit to me. This course does not have an exam because I received feedback and suggestions from students to do the tasks every week. (Ud.L11)

***EXTRANTS***

In his view, HTLE has a positive effect on students' 21st-century skills in the following table:

**Table 21**

*Perceived Effects of 21st Century Skills for Ud.L11*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | √ | |
| B. Access and evaluate information | | | √ | |
| C. Collaboration with others | | | √ | |
| D. Think creatively | | | √ | |
| E. Apply technology effectively | | | | √ |
| F. Be self-directed learners | | | √ | |
| G. Work effectively in diverse teams | | | √ | |

***Summary***

This lecturer implemented HTLE in his courses with support from his institution, such as checking students' attendance, uploading documents, using Zoom, and setting assignments for students. He implemented HTLE based on his teaching profile. The implementing conditions were not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. However, we reflected from this interview that good internet connection, technical support, and financial support are significant dimensions for HTLE.

## 4.5 Cases for Institute A (Macro and Meso Level)

This institute provides various language teaching programs such as English, French, Chinese, Korean, Thai, Japanese, and International Studies. Four lecturers were participating in the interviews, coded as (Ia.L3), (Ia.L5), (Ia.L15), and (Ia.L17). This institute is semi-private and government; however, most funding depends on students' fees, renting restaurants, and parking lots. This institute is famous for training students to become language teachers.

### *4.5.1 Micro-level: Lecturer Number 3 (Ia.L3)*

We interviewed this lecturer on June 07th, 2020, and we spent 34 minutes interviewing him. He was 33 years old. He stated, "I have been teaching in higher education for around 8 years. I have taught some courses, such as Writing Skill, Grammar, Core English, Reading Skill, Global Studies, and Bridging Courses". He also mentioned his teaching practice in the following:

> When I started teaching in higher education, (1) I did a lot of preparation and searched relevant documents to answer students' questions because I was a novice. In later years, I did not do as much preparation as before. However, it did not mean the quality of the teaching became low. I meant I was less pressured because I had taught the same subjects many times; I felt more relaxed than before. (2) Regarding the teaching methods, I knew them more than before through teaching experience, joining Cam-TESOL, and training workshop in university. (3) Another thing is technology, because I can send documents and videos to students in advance through Facebook and Telegram for extra learning resources because some courses are abstract; that is why we need such visual support. (Ia.L3)

During the discussion, he chose the 'Core English' course before Covid-19 and during Covid-19 to describe his teaching experience. This course is designed for Bachelor students to improve students' 4 macro skills reading, writing, speaking, listening, especially grammar and vocabulary. He used various assessments such as ongoing assessments (quiz, homework, presentation, assignment, progress test) and final assessment (final exam) to evaluate students' learning. He also applied different teaching activities, for example, classroom lecture, group presentation, individual presentation, pair-work, whole-class discussion,

debate, writing report, and a speaking test. However, the teaching activities move from face-to-face to online discussion during Covid-19.

***Innovation Process***

Aside from his enthusiasm to embrace innovation in his teaching classes, he underlined what motivated him to integrate online-offline activities into his course before Covid-19 by stating "the most important is richness of resources to engage students. For example, I can send more learning resources to students than just using a textbook. It saves time and the environment because I do not have to print or use hard copy". According to the Self-positioning tool analysis of his two courses, the result indicated that the 'Core English' course before Covid-19 was type 5 (the Metro) and during Covid-19 was type 6 (the Ecosystem). He highlighted some problems during Covid-19, such as unfamiliar tools, system errors, interruptions, and monitoring students' learning. He stated the following:

> There are some challenges when implementing HTLE such as (1) students, and I, need time to be familiar with new tools, (2) It is a waste of time when it is stuck or there are errors while we are using it, (3) Interruption because of not using licensed tool. For example, Zoom allows only 40 minutes without a license for free. Later, I used the Crack file, (4) I cannot control and check students because I do not see all their faces on the screen. (Ia.L3)

***How was this innovation process supported?***

According to the interview, he addressed that; “Of course, the university gave an introduction to using technology to engage students, I asked colleagues who used to work or implement online activities, and I did self-discovery through YouTube videos". He also offered some recommendations to implement qualified online-offline course, namely "To implement online and offline activities with a good result, we need to consider (1) understanding of the technological tools which we are using, (2) set time management, (3) check students’ attendance, (4) and send documents to students to read in advance”.

***In which conditions did he implement hybrid teaching and learning environment?***

The result of the interview showed that he implemented HTLE based on his teaching profile, such as *being self-confident to use technological tools, likes integrating technology into teaching, more open to adopting innovation, having enough freedom to innovate*

*teaching practices, having enough time to prepare online/offline activities, though he did not receive incentives or rewards (letter of appreciation, increase-teaching rate) for innovation practices*. He stated that "There is no reward for innovation practices". These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. *Another condition is a requirement of the university and ministry to use online and distance teaching and learning during* Covid-19.

***Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?***

We observed the use of teaching activities and students' assessment "before Covid-19 " and "during Covid-19" from face-to-face with some use of technology to entirely online and distance teaching. The Self-positioning tool data analysis indicated that before Covid-19 was type 5 (the Metro), the course during Covid-19 was 6 (the Ecosystem). He explained that he provided enough freedom to students to innovate their creativity. He stated the following:

> That is great freedom of choice for students to choose tools to produce their work. When I set assignments or homework for them, I care about the results. Students can use any tools they think they can use to produce work and answer the task. For example, when students design presentations, they can use letters, PowerPoint, or maps. (Ia.L3)

***EXTRANTS***

In his opinion, HTLE offers him an opportunity to do more engagement with students and has a positive effect on students' 21st-century skills in the following table:

**Table 22**

*Perceived Effects of 21st Century Skills for Ia.L3*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | √ | |
| B. Access and evaluate information | | | | √ |
| C. Collaboration with others | | | | √ |
| D. Think creatively | | | √ | |
| E. Apply technology effectively | | | | √ |
| F. Be self-directed learners | | | √ | |
| G. Work effectively in diverse teams | | | √ | |

***Summary***

This lecturer implemented HTLE in his courses with little support from his institution, for example introducing technological tools. He implemented HTLE based on his teaching profile. The implementing conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. However, we reflected from this interview that providing technical training support is significant for innovative teaching and learning. The training support can be done when introducing new teaching and learning tools. However, monitoring and support should be done continually. *Another condition is the requirement by the university and ministry of education to use online learning and distance teaching during Covid-19*.

### *4.5.2 Micro-level: Lecturer Number 5 (Ia.L5)*

We interviewed this lecturer on June 08th, 2020, and we spent 46 minutes interviewing him. He was 32 years old. He stated that "I started teaching in higher education in 2010, but there were some gap years when I went to study abroad. I have taught some courses such as Writing, Global Studies, and Applied Linguistics". He also mentioned his teaching practice in the following:

> There have been some remarkable changes in my teaching practice from the beginning until now. First, I was keen to train students (Year 1 and 2) to become independent learners, but this method did not work well because they had just graduated from high school and had got used to the spoon-feeding method. They did not learn much because they did not feel happy to learn on their own. In later years, I became flexible to help students based on real class situations. Some groups of students and classes require guidance and support, while others require less guidance and support because of their level of knowledge. (Ia.L5)

During the discussion, he chose the 'Research Methodology' course before and during Covid-19 to describe his teaching experience. He described various assessments to measure students' processes, such as quizzes, homework, tests, writing reports, and consultations. He also applied different teaching activities, for example, lecturing, group discussion on assignments, and consultations. However, the teaching activities moved from face-to-face to online during Covid-19.

***Innovation Process***

Besides his eagerness to apply innovation into his teaching classes, he underlined what motivated him to integrate online, offline activities into his course before Covid-19 "(1) I want students to become independent, (2) I want students to get used to technology when they graduate". According to the Self-positioning tool analysis of his two courses, the result indicated that the 'Research Methodology' course before and during Covid-19 were type 6 (the Ecosystem). During implementing HTLE, he highlighted some problems that he encountered during Covid-19 in the following:

- **Material factors** (internet for both lecturer and students sometimes works, sometimes does not work; used own material (computer, smart-phone), so it is a problem for students especially students from provinces)
- **Teaching methodology factors** apply to technology, for example, you know how to use technological tools, but how to transfer them into knowledge is another question. This is similar to the analogy as you know how to use SPSS but converting numbers into words is another thing.
- **Time-consuming** to design online tests or quizzes. (Ia.L5)

***How was this innovation process supported?***

According to the interview, he said that “there is almost no support from the institution. Generally, I discover study by myself or ask my peer teaching group. For application, I usually use free application versions". He also offered some recommendations to implement the qualified online and offline course in the following:

> To implement online and offline courses effectively, (1) we need good cooperation and support from the institution and other stakeholder involvement. I see lecturers having to take on another role’ lecturing and dealing with IT too. Therefore, we need an IT team to help solve the problem whenever technical issues happen. (2) we need to consider the transition period to implement online activities because both lecturers and students need time to adapt to understand and acquire a tool to use, not an abrupt change. (Ia.L5)

***In which conditions did he implement hybrid teaching and learning environment?***

He implemented HTLE based on his teaching profile, such as being *self-confident to use technological tools, likes integrating technology into teaching, being more open to adopting innovation, and having enough freedom to innovate teaching practices. However, he did not have enough time to prepare online/offline activities nor receive incentives or rewards for innovation practices*. He highlighted that "there is no incentive or reward for innovation practices, but there is a letter of appreciation of teaching, which is evaluated by students". These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching.

***Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?***

We observed the use of teaching activities and students' assessment "before Covid-19" and "during Covid-19" from face-to-face with some use of technology to entirely online and distance teaching. The Self-positioning tool data analysis indicated that before and during Covid-19 were type 6 (the Ecosystem). He further explained his activities that used tools before Covid-19: "I never used Videoconference, documents, and screen sharing, or chatting (verbal communication by video call). However, I often used Facebook chat and Telegram for commutation and to share documents".

***EXTRANTS***

In his opinion, HTLE makes him become more engageable with students and has a positive effect on students' 21st-century skills in the following table:

**Table 23**

*Perceived Effects of 21st Century Skills for Ia.L5*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | | √ |
| B. Access and evaluate information | | | | √ |
| C. Collaboration with others | | | | √ |
| D. Think creatively | | | | √ |
| E. Apply technology effectively | | | | √ |
| F. Be self-directed learners | | | | √ |
| G. Work effectively in diverse teams | | | | √ |

***Summary***

This lecturer implemented HTLE in his courses with little support from his institution. He implemented HTLE based on his teaching profile. The implementing conditions were not different according to the type of environment developed when shifting from hybrid to completely distance and online teaching. However, he mentioned how time-consuming it was to design online tests or quizzes during Covid-19.

Overall, we reflected from this interview that learning facilities such as stable internet connection, computers, smart-phone, and techno-pedagogy play a significant role in helping innovation. In addition, the institution also needs to have a strategic plan and policy to provide annual professional development on teaching pedagogy and assessments, especially techno-pedagogy training to teaching staff.

### *4.5.3 Micro-level: Lecturer Number 15 (Ia.L15)*

We interviewed this lecturer on June 30th, 2020, and we spent 26 minutes interviewing him. He was 30 years old. He stated, "I started teaching in higher education in 2014 with some courses, Core English, Academic Writing, Advance English, Communication Skills, Critical Thinking, and Ethics". He also mentioned his teaching practice in the following:

> First, it is a teaching methodology. When I first started teaching, I used lots of teacher talking time. However, after I received feedback from students, I reduced teacher talking time and increased students talking time by giving some activities for them, such as discussion and reflection. One more thing, it is related to the academic activity; I linked it to real-world activity. For example, I asked students to write journal activities with free topics; however, it was not related to real-world tasks. Then, I used a newspaper article to stimulate their thoughts to play a role as a narrator, editor, or real scene to make students learn more from the real world. (Ia.L15)

During the discussion, he chose the 'People Skills' course before Covid-19 and the 'Ethics' course during Covid-19 to describe his teaching experience. Both courses are designed for Bachelor students. For 'People Skills', he described it in the following:

> This course is for year 4 students to focus on people skills such as communication, negotiation, and human psychology. The critical activities for teaching include lectures, watching a sample video and analysis, case studies, role-playing in class, written assignments, and exams. For students' assessment, I assess activities, for example, role play, presentation, written assignment, and exam. (Ia.L15)

He also explained the 'Ethics' course that helps students understand ethics theories, a case study from an outside context with links to the Cambodian context and bringing theory to reflect in the workplace. He stated that "teaching activities include lecture, video, case study, reflection paper for each chapter, peer evaluation on reflection, and personal portfolio. Students' assessment consists of a quiz, test, chapter reflection, and mini-reflection by picking up one theory from an author and then writing about it in two pages".

***Innovation Process***

He stressed what motivated him to integrate online-offline activities into his course before Covid-19 as "first, it is a Higher Education opportunity because most students want to pursue their master's degree abroad. Therefore, I need to train them to communicate online and use hybrid online resources. Second, it is the job market because students need to understand how to work online". The Self-positioning tool analysis of his two courses indicated that the 'People Skills' course was type 5 (the Metro), and the 'Ethics' course was type 6 (the Ecosystem). During implementing HTLE, he highlighted some problems that he encountered during Covid-19, such as learner's motivation, interruptions, and assessment. He stated that "I encountered some challenges such as learners' motivation because we do not have face to face (online), though we see each other on screen, a phase of the study was interrupted for a few weeks during Covid-19 and changes in students' assessments".

***How was this innovation process supported?***

According to the interview, he said that “there is no training support from the institution. However, the institution encourages, and lists recommended tools and platforms for lecturers to download and use". He also proposed some recommendations to implement the qualified online and offline course in the following:

> I have some recommendations. First, learning outcomes must be modified to align with online learning components because some learning outcomes are set and

aligned with exams and content mastery, but not methods. Therefore, learning outcome needs to reflect on methods too. Second, change assessment activities to encourage online learning. For example, if the assessment depends on an exam or MCQ, it does not strongly encourage online learning. We need to change to reflection, mini-research, and read articles requiring internet search. (Ia.L15)

***In which conditions did he implement hybrid teaching and learning environment?***

The interview result showed that he implemented HTLE based on his teaching profile, such as *being self-confident to use technological tools, likes integrating technology into teaching, being more open to adopting innovation, having enough freedom to innovate teaching practices, and receiving incentives or rewards for his innovation practices*. *However, he did not have enough time to prepare for online/offline activities.* Another condition is a requirement of the university and ministry to use online and distance teaching and learning during Covid-19. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching.

***Could we observe changes in the type of environment related to the new situation created by the Covid 19 crisis? How can we understand these changes?***

The result of Self-positioning tool data analysis indicated the course before Covid-19 was type 5 (the Metro) and during Covid-19 was type 6 (the Ecosystem). In this case, we observed the changes in *teaching activities*, *learning outcome*, and *students' assessment* 'before Covid-19 and during Covid-19' from face to face with some use of technology to entirely online and distance teaching.

***EXTRANTS***

In his view, HTLE has a positive effect on students' 21$^{st}$-century skills in the following table:

**Table 24**

*Perceived Effects of 21st Century Skills for Ia.L15*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | | √ |
| B. Access and evaluate information | | | | √ |
| C. Collaboration with others | | | | √ |
| D. Think creatively | | | √ | |
| E. Apply technology effectively | | | √ | |
| F. Be self-directed learners | | | | √ |
| G. Work effectively in diverse teams | | | √ | |

***Summary***

This lecturer implemented HTLE in his courses with no training support from his institution. He implemented HTLE based on his teaching profile. The implementing conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. He also provided some recommendations to implement HTLE, that learning outcomes and assessment activities must be modified to align with online learning components to reflect learning. *Another condition is the requirement by the institution and Ministry of Education to use online learning and distance teaching during Covid-19*. Overall, we reflected from this interview that this lecturer is still making progress and is aware of the importance of innovating to improve his quality of teaching and learning even though he has not received training support from his institution.

### *4.5.4 Micro-level: Lecturer Number 17 (Ia.L17)*

We interviewed this lecturer on July 01st, 2020, and we spent 40 minutes interviewing him. He was 39 years old. He stated, "I have been teaching in higher education since 2015. So far, I have taught various subjects such as Grammar for Bridging Course, Core English, Writing, and Foundation of Education for year-4 student". He also mentioned his teaching practice in the following:

> When I first started teaching, I felt very enthusiastic and focused on teaching the students activities in class. I applied the student-centred approach because I taught adult learners who were undergraduate students. However, I did not interact and

> communicate with the students after class. I also noticed that I used different teaching methods with different classes. For example, if I taught grammar, it seems deductive-oriented because, being a grammar teacher, I needed to do a lot of explanation and let the students practice exercises. However, when I taught year 2, 3, or 4 students, I assigned them tasks. I mean I gave them work to do; they have to discuss in a group or pairs, and they need to share or demonstrate work to the whole class. My role is a facilitator; I observe their work and give them feedback. However, I have done my job in class, not outside. (Ia.L17)

During the discussion, he chose the 'Research Method' course before Covid-19 and during Covid-19 to describe his teaching experience. Both courses are designed for Bachelor students. He described this course to equip Third Year students at the Department of English with a sound understanding of the fundamental research concepts in quantitative and qualitative research, which is vital for undertaking a rigorous, empirical research study in their areas of interest. His teaching approach is social constructivist. The teaching activities include lecturing, discussions, practices, and consultations. Assessment methods consist of a research proposal, presentation of the research proposal, progress test, quizzes, homework, a reading log, reflections, summaries, class participation, and exams. However, during Covid-19, he stated the following:

> Now we are encouraged to teach online by the Department of English using Google Classroom and Zoom to help students learn from home. Students tend to be more interactive because they have sufficient time to communicate with us, leave comments, or respond to a task. The students can also go for other resources before they post their work. I mean, they have done their research and reviewed it before sharing their work with me. I observe that the quiet students in class become active online. However, we missed the classroom interaction, especially the work arrangement like pairs or groups. Online learning is functional, but I do not think we make the best use of it. Most of the time, we lecture online. I meant the students listen to us and then take notes to ask questions during a lecture or the whole class discussion. However, it is more convenient and supportive when we teach online now because the students do not have to leave home, spend time getting stuck in the traffic. Moreover, the students can go over the lecture repeatedly. They can watch it because we record it every session to help them learn. (Ia.L17)

***Innovation Process***

During Covid-19 crisis, he used online and distance teaching to give instruction by using Google Classroom and Zoom. According to the Self-positioning tool analysis, the result indicated that the courses before and during Covid-19 were type 6 (the Ecosystem). During implementing HTLE, he highlighted some problems that he encountered during Covid-19 such as time-consuming, participation, and internet connection in the following:

> There are some challenges, such as "time" because we need to spend time checking, reading, and commenting on students' online assignments almost every day after teaching. In the classroom, we had a discussion and used verbal comments, then we were finished. Next, the number of online learning students is only 60% to 70%, not fully participate. The third problem is the internet connection. If there is a slow or low internet connection, it causes students to be interrupted and makes it challenging to share documents.

***How was this innovation process supported?***

He elaborated that he received support from his colleagues based on the interview. He stated the following:

> In my institution, there is no IT support team to help. Generally, faculty members who have some knowledge about IT share their personal experience of using a platform with students. For example, when I have a question, they help and share ideas such as installing and using Zoom, recording video, and copying links to students to join a meeting. Additionally, in Google Classroom, they share ideas on organizing the class, creating class codes for students, and creating homework and assignments. The institution also provides and organizes informal training on using tools by peers who have experience using tools. (Ia.L17)

He also proposed some recommendations to implement the qualified online and offline course in the following:

> First, we need to have a good internet connection. Second, do not offer too many classes to lecturers to teach, so lecturers have sufficient time with students to prepare lessons, give feedback, and comment. Third, lecturers should join online learning courses or training to enrich their teaching knowledge. Fourth, there should be some

> distance learning sessions in the future, recognized and acknowledged by MoEYS. Interestingly, the lecturer plays a pivotal role as a facilitator while students need to create a reading habit and self-regulated learning because online learning requires self-directed learning. Students must have a stance to become autonomous learners; however, it might be difficult because it is related to self-motivation. Another important thing is that online learning resources need to be ready and available for students to download, such as textbooks, journal articles, and text, because online learning requires reading. Therefore, universities need to have online data-base resources or be linked with partner universities to be ready for lecturers and students to use and do research. Finally, we should provide orientation on how to use tools or training sessions for students to use them for online learning. (Ia.L17)

***In which conditions did he implement hybrid teaching and learning environment?***

The interview result showed that he implemented HTLE based on his characteristics, such as *integrating technology into teaching, being more open to adopting innovation, and having enough freedom to innovate teaching practices. However, he did not feel confident using technological tools, did not have enough time to prepare online/offline activities or receive incentives or rewards for his innovation practices*. He had a good teaching experience and focused more on students' learning and teachers' development. These conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. *Another condition is a requirement of the institution and ministry to use online and distance teaching and learning during Covid-19*. He also received teaching support from colleagues.

***Could we observe changes in the type of environment related to the new situation created by the Covid19 crisis? How can we understand these changes?***

The Self-positioning tool data analysis indicated the two courses were type 6 (the Ecosystem). However, we observed the changes in *teaching activities* and *students' participation* "before Covid-19" and "during Covid-19" from face-to-face with some use of technology to entirely online and distance teaching. The lecturer felt it was more time-consuming to design tasks through distance teaching, and students participated less than during face-to-face learning.

***EXTRANTS***

In his view, HTLE has a positive effect on students' 21st-century skills in the following table:

**Table 25**

*Perceived Effects of 21st Century Skills for Ia.L17*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | | √ |
| B. Access and evaluate information | | | √ | |
| C. Collaboration with others | | | √ | |
| D. Think creatively | | | √ | |
| E. Apply technology effectively | | | | √ |
| F. Be self-directed learners | | | √ | |
| G. Work effectively in diverse teams | | | √ | |

***Summary***

This lecturer implemented HTLE in his courses with support from his colleagues and institution, such as organizing informal training on using tools. He implemented HTLE based on his teaching profile. The implementing conditions are not different according to the type of environment developed when shifting from hybrid to ultimately distance and online teaching. However, he mentioned that designing learning tasks for students is time-consuming and the low participation of students during Covid-19. *Another condition is the requirement by the institution and Ministry of Education to use online learning and distance teaching during Covid-19*. In my reflection, innovation needs support from institutions and other relevant stakeholders such as lecturers, IT support teams, and students' commitment to sustaining its quality. There should be annual training, professional development or workshops on innovative teaching methods, rethinking assessments and using technology to engage learning. So, lecturers and students can take this opportunity to improve their current knowledge and skills.

### *4.5.5 Conclusion of Institute A*

Based on interviews with 4 lecturers in this institute, we observed that most of the lecturers implement HTLE based on their teaching profiles, such as *being self-confident to use technological tools, like integrating technology into teaching, more open to adopting innovation, having enough freedom to innovate teaching practices, though some lecturers do*

*not have enough time to prepare online/offline activities nor receive an incentive (increase teaching rate, letter of appreciation) for their innovative teaching. Another condition is the requirement of the institution and ministry to use online and distance teaching and learning during Covid-19*. Other conditions related to their *intrinsic motivations* toward learners*, such as to engage students and share learning resources with students rather than just using a textbook, to save time and the environment (don't have to print or use hard copy), to train students to become independent, to inform students to get used to technology when they graduate, to be well aware of the job market and higher education opportunities for students to study abroad*.

### 4.6 Cases for Institute B (Macro and Meso Level)

This institute is a private one that is more focused on the business field. This institute offers business administration and professional training services in the field of finance and banking. However, there is little information that can be found and available on this institute.

#### *4.6.1 Micro-level: Lecturer Number 16 (Ib.L16)*

We interviewed this lecturer on July 01st, 2020, and we spent 34 minutes interviewing him. He was 32 years old. He stated, "I have been teaching in higher education since 2012. I taught some courses such as Business Negotiation, Academic Writing, and some Soft-skills and Politics". He also mentioned his teaching practice in the following:

> I changed the teaching approach from teacher-centred to student-centred, using project-based learning so that students can learn more than before rather than spoon-feeding them. By doing so, students can improve their communication skills, critical thinking, collaboration, teamwork, etc. Additionally, during Covid-19, some lecturers need to apply online teaching. (Ib.L16)

During the discussion, he chose the 'Academic Writing' course before Covid-19 and the 'Business Negotiation' course during Covid-19 to describe his teaching experience. Both courses are designed for bachelor students. He described the 'Academic Writing' course as helping students develop their abilities to express their ideas in paragraph and essay writing. He used slide presentations, lectures, peer-assessment, class discussion, and Think-Pair-Share for teaching activities. His description of the "Business Negotiation" course is "this course is

designed to introduce students various aspects of business negotiation skills and apply various techniques of negotiation skills to the real business. I do it online for teaching activities and students' assessment, for example, Google Classroom".

***Innovation Process***

During Covid-19, he used Google Classroom to assess students' activities. According to the Self-positioning tool analysis, the result indicated that the courses before and during Covid-19 were type 6 (the Ecosystem). During implementing HTLE, he highlighted some problems that he encountered during Covid-19 such as technological knowledge, weather, internet connection, monitoring students' learning, study settings, cheating, and time-consuming in the following:

> I encounter some challenges during online offline activities. Students lack the technical knowledge to use tools and adapt to the online learning environment. For example, some students find it hard to register for the course. Sometimes the weather is rainy, so students cannot join the class. Internet connection also causes a problem. I find it hard to follow up with students because they join the course, but I do not know what they are doing, such as housework or something else. Another problem is student private study places; for example, some female students did not turn on the Camera during learning because they were concerned about their female staff in their room. Last but not least, there is a high percentage of cheating during quizzes or exams because I do it on Google Classroom. I also find it hard to correct and it takes time because some students send images (photographs of their work) rather than text files. (Ib.L16)

***How was this innovation process supported?***

During the interview, he stated that "lecturers and students get trained how to use tools and applications for online learning. Some lecturers are too old to catch up with technology. That is why they find it hard to adopt new technology. However, the younger generations can catch up with new technology more effectively". He also proposed some recommendations to implement the qualified online and offline course in the following:

> I think the government should partly include online learning since primary school, so students are ready to adopt this learning environment when they grow up. For

example, I saw the MoEYS (Ministry of Education, Youth and Sport) live teaching on Facebook, but it is ineffective because there is no interaction. Additionally, HEIs should apply online learning by using licensed tools to support teaching. For example, some institutions have been using the Microsoft 365 package, which including many applications, while some have not yet. Next, universities should consider university infrastructure, including advanced technology, the internet, and computer.

***In which conditions did he implement hybrid teaching and learning environment?***

The interview result showed that he implemented HTLE based on his teaching profile, such as being self-confident to use technological tools, *likes integrating technology into teaching, being more open to adopting innovation, and having enough freedom to innovate teaching practices. However, he did not have enough time to prepare online/offline activities nor receive incentives or rewards for his innovation practices*. The implementing conditions are not different according to the type of environment developed when shifting from hybrid to completely distance and online teaching. *Another condition is because of Covid-19, he said*.

***Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?***

The Self-positioning tool data analysis indicated the two courses were type 6 (the Ecosystem). However, we observed *that teaching activities were moved online*. It also required more independent learning for both lecturer and student with technological knowledge and monitoring students' learning activities.

***EXTRANTS***

In his view, HTLE has a positive effect on students' 21$^{st}$-century skills in the following table:

**Table 26**

*Perceived Effects of 21st Century Skills from Ib.L16*

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | | √ |
| B. Access and evaluate information | | | | √ |
| C. Collaboration with others | | | | √ |
| D. Think creatively | | | √ | |
| E. Apply technology effectively | | | √ | |
| F. Be self-directed learners | | | | √ |
| G. Work effectively in diverse teams | | | | √ |

***Summary***

This lecturer implemented HTLE in his courses with support from his institution, such as training on using tools and applications for online learning. He implemented HTLE based on his teaching profile. These conditions are not different according to the type of environment developed when shifting from hybrid to completely distance and online teaching. However, he encountered problems such as technological knowledge, weather conditions during raining season, internet connection, monitoring students' learning, study setting for female students, cheating in exams, and that it is more time-consuming, during Covid-19. *Another condition is the requirement by the institution and Ministry of Education to use online learning and distance teaching during Covid-19*. He also suggested that the institution (meso-system) provide teaching and learning support, such as applications, advanced technology, internet, and computers.

**Conclusion to All Lecturers (N=20)**

Based on the interviews with the four scale measurement (1= strongly disagree, 2= disagree, 3= agree, 4= strongly agree), most lecturers implement HTLE based on their teaching profiles, such as *self-confidence to use technological tools (M= 3.30; Std =0.57), like integrating technology into teaching (M= 3.55; Std= 0.51), being more open to adopting innovation (M= 3.50; Std= 0.51), and having enough freedom to innovate teaching practices (M= 3.20; Std= 0.52). However, they did not have enough time to prepare online/offline activities (M= 2.65; Std= 0.48) nor receive incentives or rewards for his innovation practices (M= 1.90; Std= 0.55)*. Other conditions related to their *English language ability to use tools,*

*health and living standards, and intrinsic and extrinsic motivations*. The next chapter will provide more information about implementing conditions of HTLT.

# CHAPTER 5[12]: CONDITIONS OF IMPLEMENTING HYBRID TEACHING AND LEARNING ENVIRONMENT

This chapter answers the first research questions. These questions are mainly concerned with *implementing hybrid teaching and learning environment and the possible impact of Covid-19 on these conditions*. Thus, our research questions are:

According to them, in which conditions are Cambodian Higher Education early adopters implementing hybrid teaching and learning environment?

A. Are these conditions different according to the type of environment developed according to lecturers?

B. Could we observe changes in the type of environment related to the new situation created by the Covid-19 crisis? How can we understand these changes?

C. How was this innovation process supported according to them?

For these questions, the analysis is based on the interviews with the lecturers. We will first address the first sub-question beginning by characterizing the teaching and learning environment types before and during Covid-19.

## 5.1 Type of Teaching and Learning Environment before Covid-19

By analyzing the type of learning environment through self-positioning tool HY-SUP, the results indicated that 50% of the learning environments were type 5 (the Metro) and 50% type 6 (the Ecosystem) before Covid-19 based on lecturers' descriptions. These two types are clearly focused on learning and learners.

The Metro's teaching and learning characteristics (type 5) highlighted lecturers focus on supporting and guiding students, are open to external resources and actors, and leave some freedom for selecting methods and learning pathways (Deschryver & Charlier, 2012; Charlier & Lambert, 2019). On the other hand, the Ecosystem (type 6) is a "learning configuration characterized by exploitation of a large number of technological and educational opportunities offered by hybrid systems" (Charlier & Lambert, 2019, p. 3). Lecturers use all of the dimensions (see table 27) that classify hybrid teaching and learning types. They include students' active participation (in-class and remotely), frequent and diversified use of technological tools, availability and production of multimedia documents, peer interaction, the openness of the system to external resources and actors, etc. According to table 27,

[12] This part was extracted to publish in the book chapter "Impacts of COVID-19 Pandemic's Distance Learning"

describing the learning environment before Covid-19, lecturers gave high-rate responses to in-site active participation, management, communication and interaction tools, use of external resources, freedom of choice teaching and learning methods, etc. Based on the interview with lecturers, management, communication, and interaction tools are used to engage students' learning outside the university, send homework and assignments, notify about a special event or learning opportunity, and share documents with students. They usually use Facebook groups, Telegram groups, and sometimes Google Classroom to reach their students rather than email accounts. One of the lecturers provided the reasons that he integrates online and offline activities in the following:

> I think integrating "online and offline activities" is vital for students because it can (1) help prepare them to work in an international environment, (2) make it easy to study because we can engage students and students can reach us easily when they have questions, (3) improve their self-study if they know and use it in the right way (Uc.L1).

**Table 27**

*The 14 Descriptive Factors of Hybrid Teaching and Learning Environment*

| ***Before Covid-19*** | Never | Rarely | Sometimes | Often | Number of participants |
|---|---|---|---|---|---|
| 1. In-site active participation | | | 1 | 19 | 20 |
| 2. Distance active participation | | 2 | 8 | 10 | |
| 3. Learning support tools | | 3 | 9 | 8 | |
| 4. Management, communication and interaction tools | | 1 | 4 | 15 | |
| 5. Multimedia resources | | 2 | 5 | 13 | |
| 6. Multimedia works | | 3 | 5 | 12 | |
| 7. Communication and collaboration synchronous tools | 4 | 6 | 4 | 6 | |
| 8. Comment and annotate online documents | 2 | 3 | 5 | 10 | |
| 9. Reflexive and interpersonal goals | | | 11 | 9 | |
| 10. Methodological support | | | 11 | 9 | |
| 11. Metacognitive support | | | 7 | 13 | |
| 12. Support by students | | | 7 | 13 | |
| 13. Freedom of choice teaching and learning methods | 1 | 1 | 14 | 4 | |
| 14. Use of external resources and actors | 1 | | 4 | 15 | |

### 5.2 Type of Teaching and Learning Environment during Covid-19

Before the Covid-19 crisis, some Cambodian lecturers applied HTLE in their courses using different learning tools and platforms. They used Facebook groups, Telegram groups, Google Classroom, Schoology, and Moodle. The use of HTLE had prepared them and their students to deal with the learning environment during the Covid-19 crisis. They learned to adapt learning assessment from Face-to-Face to online learning, for example, online quizzes and asynchronous discussion. With 19 courses offered during Covid-19, the result proved that 18 courses (95%) were type 6 (the Ecosystem) among 19 lecturers' responses based on self-positioning tool analysis. We noticed that the courses in type 5 before Covid-19 evolved towards type 6 during Covid-19.

**Table 28**

*The 14 Descriptive Factors of Hybrid Teaching and Learning Environment*

| ***During Covid-19*** | Never | Rarely | Sometimes | Often | Number of participants |
|---|---|---|---|---|---|
| 1. Synchronous | | | | **19** | 19 |
| 2. Asynchronous | | | | **19** | |
| 3. Learning support tools | 1 | | 7 | 11 | |
| 4. Management, communication and interaction tools | | | 1 | **18** | |
| 5. Multimedia resources | | 1 | 2 | 16 | |
| 6. Multimedia works | | 1 | 3 | 15 | |
| 7. Communication and collaboration synchronous tools | | | | **19** | |
| 8. Comment and annotate online documents | | 1 | 5 | 13 | |
| 9. Reflexive and interpersonal goals | | | 10 | 9 | |
| 10. Methodological support | | 1 | 6 | 12 | |
| 11. Metacognitive support | | | 4 | 15 | |
| 12. Support by students | | | 5 | 14 | |
| 13. Freedom of choice teaching and learning methods | 1 | 1 | 14 | 3 | |
| 14. Use of external resources and actors | | 1 | 5 | 13 | |

As mentioned earlier, the type 6 "the Ecosystem" learning configuration is characterized by exploiting many technological and educational opportunities offered by hybrid systems. Lecturers employ all dimensions identified to characterize hybrid teaching and learning, such as students' active participation (in-class and remotely), frequent and

diversified use of technological tools, availability and production of multimedia documents, peer interaction, and openness of the system to external resources and actors, etc. During Covid-19, 19 lecturers gave a high rate to 14 defining factors of hybrid teaching and learning environment on "often" such as In-site active participation (synchronous), Distance active participation (asynchronous), Communication and collaboration synchronous tools, Management, communication and interaction tools and so on (see table 28).

## 5.3 Condition of Implementing Cambodian Hybrid Teaching and Learning Environment (HTLE)

This section will describe under which conditions Cambodian higher education lecturers implemented HTLE, what kinds of challenges they encountered, and their recommendations. This description follows our theoretical model, "a systemic model of the university innovation process".

### *5.3.1 Lecturers' Motivation to Integrate Online, Offline Activities*

According to (Depover & Strebelle, 1997; Ely, 1999), a systemic model of the school innovation process (Figure. 2), innovation begins with why to innovate. Based on our findings, there are two main reasons (intrinsic and extrinsic motivation) to implement hybrid teaching and learning environments. Regarding intrinsic motivation, some elements push lecturers to implement HTLE.

First, the most crucial reason that lecturers implement HTLE in their course is to share learning resources with their students. This consists of sharing documents, discussion, accessing students' work, and other activities. Students can also reach their lecturers easily when they have questions. When students are absent, they can get learning material, information about the class, and the lesson online. One of the lecturers mentioned that "I can send more learning resources to students than just using the textbook" (Ia.L3). Another lecturer stated that "students can learn faster than before, for example, getting course content faster, more engagement outside the classroom, which improves rapport between teacher and students, and improves the quality of teaching more than before" (Ub.L8).

Second, the reason that lecturers implement HTLE is **to offer external learning resources** to their students. Five lecturers mentioned that online activities help students expand their learning experience outside the classroom, and lecturers can upload video recordings for absent students to watch. It also makes it easy to share documents and journals to coordinate students' learning. One of them expressed that "I integrate online, offline

activities because I think that students can submit, do, access learning material at any time and everywhere they want with an internet connection" (Ub.L13).

Third, lecturers integrate technology into their courses **to prepare students for** the workplace. One of the lecturers underlined, "I want students to learn and experience online, offline activities, so they can prepare themselves to study abroad and in the workplace" (Ub.L18). So, technology plays an essential role in daily human life, research, and the international work environment.

Fourth, lecturers implement HTLE to introduce a **new way of teaching and learning.** They want to innovate the way they work and communicate with students more conveniently and more easily than before, and students also have the flexibility to learn. In reflection, they also wanted to develop students' digital skills. One of the lecturers expressed his opinion in the following:

> What motivates me to integrate online-offline activities into my course is that I think Cambodian students' knowledge of online learning is low. Compared to other developed countries, they started using it long ago and now use it better. Looking at our curriculum, we are not accustomed to existing technology yet. That is why I want young teachers and students **to get used to technology** by using online teaching activities to gain new experience, enrich knowledge, get information faster, and do research on the internet. So, I encourage other people **to use technology to facilitate teaching and learning**. (Uc.L14)

Finally, other lecturers implement HTLE **to save time and materials**, **improve self-study, and help slow learners and absent students to catch up with the lessons**. One of the lecturers provided her reason in the following:

> I think I am young enough to adopt new technology if looking at my age factor. Technology can help me complete my tasks quickly and save time. For example, I do not need to print documents for my students; I just upload it to the platform. Then, they can go and download it by themselves. (Ub.L10)

Two factors induce lecturers to implement HTLE in the course regarding extrinsic motivation. First**, the Covid-19 situation** is a significant factor. One of the lecturers stated, "Covid-19 forces institutions to use online learning through Google Classroom and Zoom" (Ia.L17). Covid-19 pushes us to use online learning and distance teaching by using Google Classroom, Skype, Telegram groups, and other applications.

Another factor is an **institutional requirement.** Three lecturers said that "this is a requirement of the university, so we need to encourage students to use it" (Ub.L8, Ub.L13, Ia.L17). For a summary of motivation to integrate online-offline activities, please see table 29.

**Table 29**

*Motivation to Integrate Online, Offline Activities*

| Intrinsic motivation | Extrinsic motivation |
|---|---|
| - To engage students (9) *<br>- To offer external learning to students (5)<br>- To prepare students for the workplace (5)<br>- To introduce a new way of teaching and learning (4)<br>- To save time and materials (2)<br>- To improve self-study (2)<br>- To help a slow learner and absent student to catch up with lesson (1)<br><br>Note: (9) * it meant there were nine responses. | - Covid-19 (7)<br>- Institutional requirement (3) |

### *5.3.2 Teaching Profile*

The interview result with 20 Cambodian lecturers indicated that they implemented HTLE based on their teaching profiles. These included loving integrating technology into their course (M=3.55), being more open to adopting innovation (M=3.50), being self-confident to use technological tools (M=3.30) and having enough freedom to innovate teaching practices in their course (M=3.20). They adapted and changed their teaching methods based on their students' evaluations at the end of the term. Therefore, the lecturers took their students' feedback to design learning activities and assessments to improve students' learning outcomes in each of the terms.

The result also revealed they had insufficient time to prepare online/offline activities and received no incentive or rewards for their innovation practices (table 30). This finding reflected that they had less time to prepare online and offline activities because most have been teaching at more than one university or have been moonlighting. Therefore, recruiting more full-time teaching staff can help institutions or universities strengthen teaching quality and join professional development.

**Table 30**

*Frequency of Teaching Profile*

| | Strongly disagree | Disagree | Agree | Strongly agree | Total (N) | Mean |
|---|---|---|---|---|---|---|
| A. You are self-confident to use technological tools in your course. | | 1 | 12 | 7 | 20 | **3.30** |
| B. You like integrating technology into your course. | | | 9 | 11 | 20 | **3.55** |
| C. You are more open to adopting innovation. | | | 10 | 10 | 20 | **3.50** |
| D. You have enough freedom to innovate teaching practices in your course. | | 1 | 14 | 5 | 20 | **3.20** |
| E. You have sufficient time to prepare online/offline activities for your course. | | 7 | 13 | | 20 | 2.65 |
| F. You receive incentives or rewards (letter of appreciation, increase-teaching rate…) for innovation practices. | 4 | 14 | 2 | | 20 | 1.90 |

### *5.3.3 Implementing Support*

As mentioned in the theoretical model (Depover & Strebelle, 1997; Ely, 1999), innovation requires support from stakeholder involvement. While implementing HTLE, some lecturers mentioned that they received some support from their institution, while others said they did not receive any support, sometimes in the same institution (see table 31).

**Table 31**

*Getting Support from University/Institution*

| **Getting support** | |
|---|---|
| Institutional support | No support from the institution |
| - Technical support (8)<br>- Give orientation about the tool (5)<br>- Computer (1)<br>- Emotional support (1) | - Peer teaching support (3)<br>- Self-discovery (2) |

Regarding institutional support, they mentioned that their institution provides technical support to help them implement HTLE in their course. Their institution introduced using

technology to engage students and encouraged them to use Google Classroom and Zoom. However, only University B prepared and provided healthy support to lecturers. Five of the lecturers from University B mentioned they received welcome support from technical support and their department. One of the lecturers said, "Of course, there is some support from the Institution to use Moodle as a learning platform, training on how to use Google Classroom, Google Doc., email, conference classroom, and training online activity improvement" (Ub.L18). The other two lecturers mentioned similarly, " I receive a lot of support from the institution, especially from the department of teaching and learning, and the IT office department while I was implementing HTLE" (Ub.L13); "We have training and user manual for teachers to read and support. If the teachers could not understand and needed more support, they can go to IT technical support" (Ub.L8).

Some of the lecturers addressed their institution orientation about implementing HTLE. The orientation includes how to check students' attendance, how to upload documents, how to use Zoom, and how to set assignments for students. There is also some short training on using tools to teach during the Covid-19 offered by the institution. One of the lectures stated, "Yes, lecturers and students get trained to use tools and applications for online learning. Some lecturers are too old to catch up with technology. That is why they find it hard to adopt new technology. However, for the young generations, they can catch up with new technology more effectively" (Ib.L16). Similarly, another lecturer raised that "If lecturers have a question regarding the use of the tool, the institution will find a solution to help. The institution also helps recommend new applications for lecturers to use, but there is no training provided" (Uc.L14). Another lecturer described his response in the following:

> The university called for a meeting with lecturers to inform them that we must go online, but there were no technical or training support lecturers to implement online teaching. The university does not have the budget to provide training, while some universities confronted bankruptcy during Covid-19. Additionally, lecturers need to download and use unlicensed online applications. The university does not have any licensed tools to provide to lecturers. However, the university had to consider buying an online application package so that all teaching staff could use licensed applications. The university bought Microsoft Team for lecturers to use; however, some lecturers are not familiar with using it yet {laughs….}. (Ua.L4)

As a reflection, some lecturers taught at the same university or institute but provided different perspectives regarding supporting innovative teaching and learning. Some lecturers mentioned that they received support, while others stated they did not get support even though they taught at the same university or institute. There might be relevant assumptions to this issue. Firstly, most universities and institutes in Cambodia do not have an email account for lecturers, but they use a Telegram group to inform lecturers. The Telegram group will contain lots of communication, so it is hard to follow up on noteworthy information, unlike email. Secondly, the university itself failed to disseminate information about training or support to lecturers due to its communication channels. Thirdly, it was related to the lecturers' moonlighting (extra career); that is why they did not join the training due to the loss of opportunity cost.

### *5.3.4 Challenges of Implementing Online Activities during Covid-19*

There are two main factors that lecturers encountered while teaching during Covid-19 through their online classes. These are natural factors and individual factors (See table 33). Natural factors happen during the monsoon season because it causes heavy rain and lightning. In Cambodia, lightning kills people and cattle every year especially during raining season. Three lecturers expressed, "There is a heavy rain bringing cruel lightning in the monsoon season, so I decided to cancel the online class (Ub.L13). Sometimes the weather is raining, so students cannot join the class (Ib.L16). Surprisingly, this season is a monsoon, so students are afraid of studying online due to ferocious lightning" (Uc.L20).

Besides natural factors, there are some problems related to individual factors, such as the institution itself, lecturers, students, nature of courses, and home learning facilities. First, institution problems consisted of system errors and challenges for people who hate technology. One of the lecturers stated, " It challenges people who hate technology; they need more commitment and time to adapt to technology" (Ub.L8). Therefore, the institution needs to provide more support and guidance and encourage them to adapt to modern teaching and learning. Another lecturer highlighted that "LMS is not perfectly good, it sometimes causes errors related to students' attendance, set time and correct assignment. It cannot be marked and commented, and students cannot submit their assignment due to an error in the system" (Ud.L11).

**Table 32**

*Challenges When Implementing Online Activities during Covid-19*

| Natural factor | Individual factor |
|---|---|
| • Monsoon season causes heavy rain and lightning (3) | 1. Lecturers<br>- Difficult to monitor students' learning (8)<br>- Knowledge of using tools (4)<br>- More exhausting than the physical classroom (2)<br>- Change student's assessment (1)<br>- Privacy on sensitive online topics (1)<br>- Teaching methodology (1)<br>- Time-consuming (1)<br>+ correcting student's work (1)<br>+ wasting time when tool errors (1)<br>+ responding to students' questions (3)<br>+ learning designed (4)<br>- System error (2)<br>- Technical problems which cause challenges for people who hate technology (1)<br><br>2. Students<br>- Less participation during Covid-19 (7)<br>- Less active (5)<br>- Get disturbed by family (3)<br>- Knowledge of tools (2)<br>- Outsider also joins the class (2)<br>- Suspending study due to financial crisis during Covid-19 (1)<br>- Private room to study (1)<br>- Forget password (1)<br>- Does not get used to self-study (1)<br>- Language proficiency (1)<br>- Get more stressful (1)<br><br>3. Nature of course<br>- Inappropriate course syllabus (1)<br>- Mixed-major of study (1)<br><br>4. Home facility<br>- Low internet (10)<br>- Use a smartphone instead of a computer (3)<br>- Electricity failed (2)<br>- Unstable internet (1) |

Lecturers also encountered problems such as difficulty monitoring students' learning during online teaching and limited knowledge of using tools. Additionally, they felt more exhausted than in a physical classroom, plus other challenges such as changing students' assessments, concerns about privacy on sensitive online topics, teaching methodology, and time-consumed while correcting students' work, wasting time when the tool has errors, responding to students' questions, learning design. The significant challenges of lecturers teaching online are difficulties monitoring students' learning, limited knowledge of using tools, and that it is time-consuming (learning designed and responding to students' questions). Some lecturers underlined that they could not monitor students because they did not see all their students' faces on the screen. Some students put their voice or video off, so it is hard for the lecturer to see what they are doing and where they are, whether they are listening. Additionally, there is a high percentage of cheating during quizzes or exams. One of the lecturers stated, "I used Google Classroom so that students can submit homework, assignments, and do quizzes online. As a result, I am not sure if they had exchanged or copied answers with each other" (Uc.L14). Another lecturer raised that "students do not fully attend because during Covid-19 some students go to their home in the countryside. This affects the lecturer too because I need to spend time to explain to them again" (Uc.L20). Other lecturers also highlighted that their challenges of online teaching activities were related to the nature of the course they taught. These problems included inappropriate course syllabus and mixed majors of study. One of the lecturers expressed that some students should have studied the basic level first before moving to another level. Therefore, it is tough to balance the teaching of mixed levels together. It is also tricky to mentor or guide them because they come from different backgrounds that are not our expert field (Uc.L2).

Some lecturers also highlighted home learning facilities as challenges for students and lecturers. These challenges included low internet connection, smartphone use instead of a computer, electricity failure, and unstable internet connection. The most challenging problem was a low internet connection. A low internet connection makes the conversation go poorly because students find it hard to ask questions and get the answer easily as in the classroom. If there is a slow or low internet connection, it causes students interruption and difficulty sharing documents. One of the lecturers said that "internet connection and physical resources (some students do not have a computer, poor internet connection in some provinces or rural areas) cause a problem for communication" (Uc.L2). Another lecturer provided a further comment that "some students do not have a computer to use and have no good internet at

home. Therefore, they use their smartphone to learn; however, a smartphone is not as easy to watch and learn from as a computer" (Uc.L12).

Students also faced many challenges while studying online during Covid-19. These problems included less participation in the learning activity, being less active, get disturbed by family, limited knowledge of using tools, outsiders also joining the class, suspending study due to the financial crisis, no private room to study, forgetting the password, unfamiliar with self-study, the language proficiency of using tools, and getting more stressed. The biggest challenges that we encountered through interviews with lecturers about their students include less participation during Covid-19, being less active, and getting disturbed by family members. Some students are more passive and demotivated than when face-to-face learning. Maybe they do not like or get used to technology for learning. Other students do not fully participate in learning because they go to their home in the province with a low internet connection. This affects lecturers too because they need to spend time to explain the lesson to students again. One of the lecturers stated that "participation of the students is not full (attendance), 5/10. Additionally, students and teachers both have financial problems which cause them to feel less motivated to teach and study" (Ud.L11). Another lecturer said "I receive feedback from students that they want to meet each other in class, so they can talk and play with each other, they can see teacher's handwriting on the board, which makes them feel less from stressed and bored. Even though I can share my screen online, the students said they feel more emotional attached with physical contact" (Ub.L13). Students also get disturbed by their family members while studying from home. One of the lecturers stated that "It might be the culture or not. However, students sometimes get interrupted by their parents asking them to do housework at home. As a result, students cannot fully concentrate on their study as in class" (Ub.L18).

### *5.3.5 Conclusion*

A hybrid teaching and learning environment play crucial roles in the 21st century of education. However, there are many factors contributing to support its implementation in Cambodian higher education. These conditions are described in the following paragraphs.

The first condition is the teacher's motivation to integrate online and offline activities, consisting of intrinsic and extrinsic motivation. Intrinsic motivation includes *engaging students, offering external learning to students, preparing students for the workplace, introducing a new way of teaching and learning, saving time and materials, improving*

*student self-study,* and *helping slow learners and absent students to catch up*. This evidence proves that these lecturers are focused on learning and learners and aware of the critical role of technology in education; therefore, they want to help their students develop digital skills to ease learning. On the other hand, extrinsic motivation also plays a part in pushing lecturers to introduce hybrid teaching. This includes *Covid-19 and institutional requirement*s.

The second condition is related to the "*lecturers' characteristics*". These teaching characteristics are counted, such as integrating technology into their course, being more open to adopting innovation, and being self-confident to use technological tools and engagement. Additionally, the institution itself needs to provide enough freedom for lecturers to innovate their teaching methods. According to the interviews, the result showed that lecturers have enough freedom to innovate teaching practices in their courses. However, they seem to have insufficient time to prepare online/offline activities and receive no incentive or rewards for their innovation practices. Most of them probably have been teaching at more than one university or moonlighting. Therefore, universities or institutes should recruit full-time teaching staff and provide them adequate time to prepare teaching tasks and research.

It should also be noticed that some lecturers expressed a change of attitude from their early days as lecturers. They said they were more focused on content and teaching; however, feedback from their students or their own analysis led them to change their posture. These were based on the needs of their disciplines or the specifics of their courses. Unfortunately, we do not have the data to analyse this further.

The third condition is linked to the supporting system from their university. The result shows that some universities provide technical support and orientation about using the tools, while others fail to support their teaching staff. Therefore, those teaching faculties get support from their peers or through self-discovery. To my understanding, it is essential to have technical staff, especially an IT department, to support both lecturers and students regarding their teaching and learning. So, at least they know who and where to get help. It is really hard for training workshops or professional development because it is like dragging bamboo against the air. This makes it difficult for a university to gather teaching staff and provide workshop training. First, it is related to budget and funding as most of the funding is from students' tuition fees. Second, it is relevant to opportunity cost versus self-improvement. Most of the lecturers have part-time jobs, or they have to moonlight. So, they will lose their opportunity cost if they decide to join the training.

There were many challenges to take into account when implementing HTLE. These problems are natural factors and individual factors. Natural factors happen during the

monsoon season, which causes heavy rain and lightning. As a result, it disturbed online teaching and learning. Individual factors include lecturers' challenges, students' challenges, the nature of courses (inappropriate course syllabus, mixed-major of study), and home learning facilities. Lecturers faced challenges, for example, difficulty monitoring students' learning during online teaching. They also had limited knowledge of using tools. They added that online teaching is more exhausting than being in a physical classroom. They needed to modify teaching methodology and learning assessment to adjust to online learning. Furthermore, they are concerned about privacy on sensitive online topics. They complain that online teaching is time-consuming when correcting students' work, a waste of time when there are tool errors, and responding to students' questions and time on learning design. They are sometimes faced with system errors and technical problems, which cause challenges for people who hate technology. Additionally, we need to consider home learning facilities or digital resources for lecturers and students. These include a good speed and stable internet connection, personal computer and stable electricity.

Students also encountered challenges during Covid-19, such as low active participation and family disturbance. They also had limited knowledge of using tools and there were outsiders joining the class. Furthermore, they faced suspending study due to the financial crisis, no private room to study, forgot a password, were not familiar with self-study, lacked language proficiency to use tools, and got more stressed than in a physical classroom. Both lecturers and students mentioned problems with their home teaching and learning facilities. These facilities include low internet, using a smartphone instead of a computer, electricity failure, and installing internet connection.

### 5.4 An Enhanced Model of Implementing Hybrid Teaching and Learning Environment

Our analysis allows us to propose a revision of our theoretical model. Indeed, certain conditions appear specific to the Cambodian context and to the Covid-19 crisis. Our revised model (Figure 5) is presented below. We added new information from our findings in the italic.

**Profile of Lecturers**. The lecturer's profile counts, such as *self-confidence to use ICT, integrating ICT into teaching, being open to adopting innovation, getting enough freedom to innovate, and having enough time to innovat*e. The institution itself needs to provide enough freedom for lecturers to innovate their teaching methods. According to the interviews, the result shows that lecturers have enough freedom to innovate teaching practices in their courses. However, they seem to have insufficient time to prepare online/offline activities and

receive no incentive or rewards for their innovation practices. Therefore, universities or institutes should recruit full-time teaching staff and provide them adequate time to prepare teaching tasks and research. Another condition links to lecturers' English language proficiency to understand the instructions for using tools because most teaching tools have been developed using the English language as an instruction. Moreover, the lecturer's health and living standards should be considered. If a lecturer has good health and living standard, he/she is more likely to invest in supporting, guiding, and engaging with students' learning outcomes. Other conditions might be considered, for example, the lecturer's motivation **(intrinsic and extrinsic motivation)** to integrate online and offline activities. Intrinsic motivation includes *engaging students, offering external learning to students, preparing students for the workplace, introducing a new way of teaching and learning, saving time and material, improving student self-study, and helping slow learners and absent students to catch up*. On the other hand, extrinsic motivation includes *Covid-19 and institutional requirement*s.

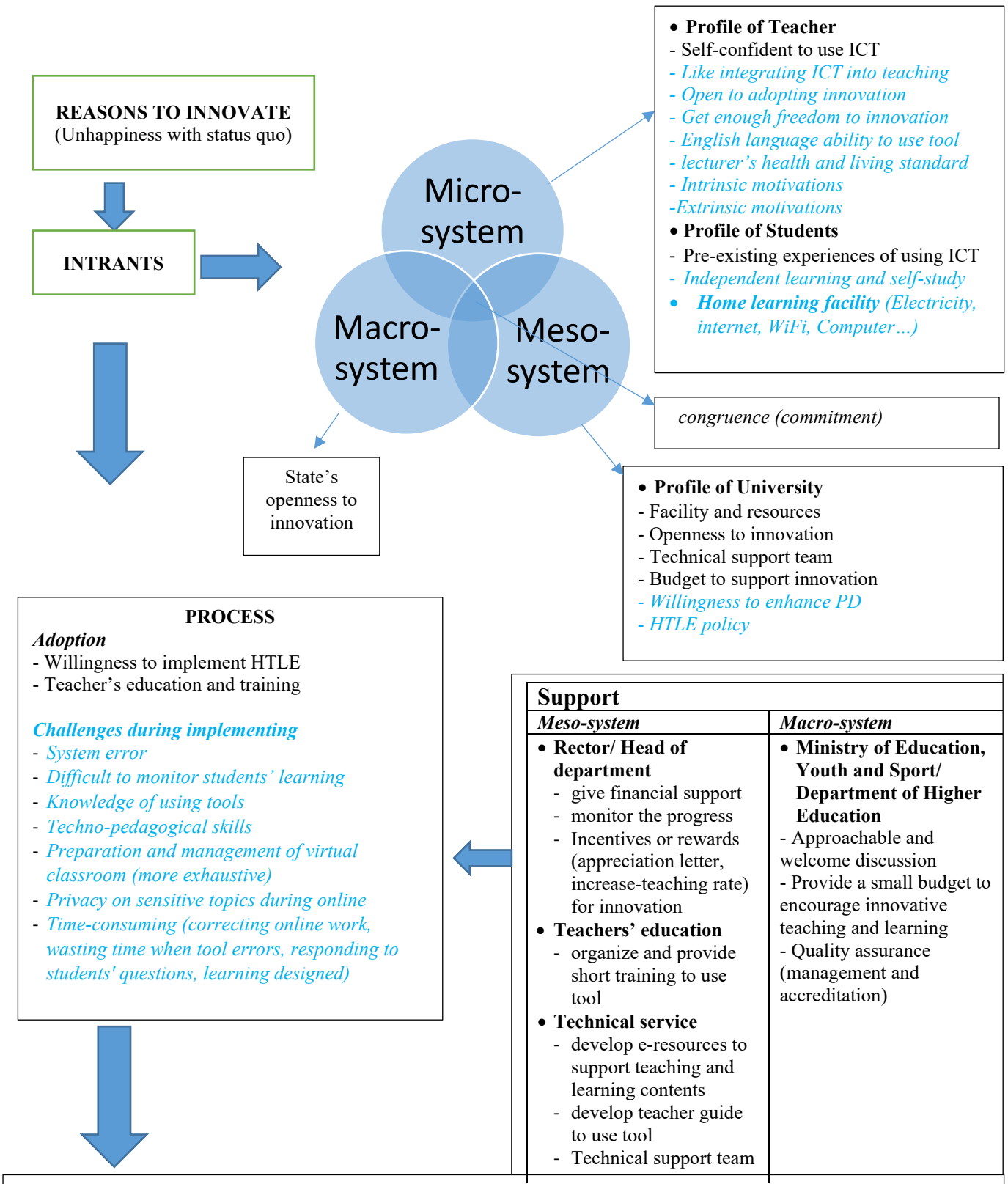
**Profile of Students**. This condition links to *pre-existing experiences or knowledge of students using ICT*. Applying technology into the classroom will become easier if students can understand some primary use of ICT. The other condition is related to students' *independent learning and self-study*. This condition is essential because HTLE requires students to do more research independently.

**Home Learning Facility**. This condition is associated with a stable internet connection, teaching and learning devices (laptops, computers, smartphones), WIFI, and electricity. These conditions are taken into account of both lecturers' and students' home learning facilities.

**Profile of University**. This condition is linked to the supporting system from the university. The result shows that some universities provide technical support and orientation about using tools, while others fail to support their teaching staff. Therefore, those teaching faculties get support from their peers and through self-discovery. In this regard, the implementing conditions of HTLE are closely connected with the university's profile to provide support and training to lecturers struggling with technology to produce high-quality teaching delivery. These conditions concern facility and resources, openness to innovation, technical support team, budget to support innovation, willingness to enhance professional development, and designing a clear hybrid teaching and learning policy for internal use.

**Figure 5**

*An Enhanced Model of Implementing Hybrid Teaching and Learning Environment 2021 (credit author)*



**Challenges during Implementing**. There were many challenges to take into account when implementing HTLE. These problems are natural factors and individual factors. Natural factors happen during the monsoon season, which causes heavy rain and lightning. As a result, it disturbed online teaching and learning. Individual factors include institutional challenges, lecturers' challenges, students' challenges, the nature of courses (inappropriate course syllabus, mixed-major of study), and home learning facilities. Institutional challenges deal with system errors and technical problems that cause challenges for people who hate technology. Lecturers also face challenges, such as difficulty monitoring students' learning during online teaching and having limited knowledge of using tools. Online teaching is more exhausting than a physical classroom, and lecturers need to modify teaching and learning assessments to adapt to the situation. Other challenges include privacy on sensitive online topics, adapting teaching methodology, time-consuming correcting students' work, wasting time when a tool errors, responding to students' questions, and time on learning design.

Students also encountered challenges such as less participation during the Covid-19, being less active, and getting disturbed by the family. They also have limited knowledge of tools. An outsider sometimes joins the class. Other challenges include suspending study due to the financial crisis during Covid-19, no private room to study, forgetting the password, not being used to self-study, lack of language proficiency to use tools, and getting more stressed than in a physical classroom. Both lecturers and students mentioned problems with their home teaching and learning facilities. These facilities include low internet, using a smartphone instead of a computer, electricity-failed, and unstable internet connection.

Among these challenges, we select some considerable challenges to put into our enhanced model framework, such as system error, difficulty to monitor students' learning, knowledge of using tools (students and lecturer), techno-pedagogical skills (how to make interactive online learning and monitoring student's progress), preparation and management of virtual classrooms (more exhausting), privacy on sensitive topics while online, and time-consuming (correcting online work, wasting time when tool errors, responding to students' questions, learning designed). The interview result indicated that lecturers have a challenge with time while implementing HTLE. One of the lecturers (Ib.L16) stated, "I find it hard to correct and take time because some students send a file as an image". Another lecturer (Ia.L3) added about wasting time when the tool errors "It is a waste of time when it is stuck or errors while we are using it, interruption because of using unlicensed tools". Three lecturers (Ua.L4, Ia.L17, Uc.L20) mentioned time-consuming responses to students’ questions. They stated in the following:

- Online activities make lecturers even busier than in a face-to-face classroom. For example, for a face-to-face classroom, you go to teach and finish; it finishes. However, for online learning, students keep asking questions almost every hour. Additionally, lecturers are busy when students submit their assignments and have little time to comment and reply. (Ua.L4)
- There are some challenges, for example, 'time' because we need to check, read, and comment on students' online assignments almost every time and day after teaching. Whereas in class, we just have a discussion and use verbal comments. (Ia.L17)
- It is more time-consuming than before. For example, we spend three hours online streaming with students and extra hours supporting students through group chat and learning design. (Uc.L20)

The other four lecturers (Ub.L1, Ia.L5, Ua.L9, Ub.L13) underlined time challenges on learning design. For example, it takes more time to prepare learning material compared to face-to-face learning. It is time-consuming to design online tests or quizzes. It is also a new burden because lecturers need to prepare online lessons and spend time learning to use technological tools. One of the lecturers stated the following:

> I need a lot of preparation (material) on the LMS, which requires technological competency to prepare an online lesson. I also need to learn to build technological capacity to produce qualified online materials for students. (Ua.L9)

### *5.5 Recommendations*

Based on our analysis, the lecturers (considered early adopters) provided some recommendations to improve HTLE in Cambodian higher education. These concerns institutions, lecturers, students, and transitional periods (see table 33). These recommendations play an essential role for higher education institutions to underpin the implementation of HTLE for all adopters. These recommendations also enable actors to find and describe their own conditions to adopt HTLE to their class.

The institution needs to provide physical and technical support, including good internet connection and technological tools. The institution also needs to consider having HTLE policy and its own LMS. Institutions should not offer too many courses to lecturers, so they have time to prepare lessons and do more research to improve their knowledge and teaching skills. Other things include paying regular salaries on time, increasing teaching rates, and

revising the learning curriculum based on the student's level. Additionally, lecturers themselves need to strengthen and develop technological skills. They need to have a strong commitment to follow the course syllabus, amend assessment and learning outcomes, create more interaction with students, and check students' attendance regularly.

**Table 33**

*Recommendation to Improve Hybrid Teaching and Learning Environment (HTLE)*

| | |
|---|---|
| 1. Institution | - Physical and technical support (9)<br>+ good internet connection (6)<br>+ knowledge of technological tools (3)<br>- Need HTLE policy (5)<br>- Need to have own LMS (2)<br>- Do not offer too many courses to lecturers (1)<br>- Pay regular salary (1)<br>- Increase teaching rate (1)<br>- Revise learning curriculum based on student's level (1) |
| 2. Lecturer | - Strengthen and develop technology skills (5)<br>- Strong commitment to follow course syllabus (1)<br>- Should not give too much homework (1)<br>- Amend assessment and learning outcome (1)<br>- Create more interaction with students (1)<br>- Check student's attendance (1) |
| 3. Student | - Read documents in advance (3)<br>- Individual economy (1)<br>- Strengthen knowledge of technology (1)<br>- Need to turn on the camera (1) |
| 4. Transition period | - A transition period (3)<br>+ step by step implement HTLE (2) |

On the other hand, students need to read documents in advance, strengthen their knowledge of technology and turn on their cameras while online learning. However, it depends on the individual economy of the students. The higher the economy, the higher chance, and resources they can access. Finally, we need to consider the transitional period by offering step by step implementation of HTLE.

Among these recommendations, we attempt to select firm recommendations to institutions and lecturers who wish to improve the quality of teaching and learning when applying HTLE in the enhanced model framework. Institutions should have a technical support team, provide techno-pedagogical training, have a good internet connection, have

HTLE policy, and have their own LMS. On the other hand, lecturers should strengthen and develop their technology skills, commit to following course syllabus, amend assessment and learning outcomes, create more interaction with students, and check students' attendance regularly.

Covid-19 is a blessing in disguise. It alarmed Cambodian educators, policymakers, and MoEYS to re-design teaching and learning approaches and assessments for the 21st century of education. To re-design teaching and learning in post-Covid-19, Cambodian higher education institutions need to have their LMS, have university email accounts for both lecturers and students, adopt a flexible approach to synchronous and asynchronous and promote project-based and group-based learning. Additionally, rectors and educational leaders need to provide capacity building and support for teaching staff, faculty members, and students. For example, the university or institute can help lecturers improve their digital pedagogy and digital literacy of both students and lecturers, develop an e-community where students can seek support, and develop positive attitudes toward hybrid teaching and learning.

# CHAPTER 6: EFFECTS OF HYBRID TEACHING AND LEARNING ENVIRONMENT ON STUDENTS' 21ST-CENTURY SKILLS

This chapter analyses the effects of hybrid teaching and learning environment on students' 21st-century learning skills. These 21st-century learning skills consist of *problem-solving skills, accessing and evaluating information, collaboration, creativity, applying technology, self-directed learning, and working in diverse team*s. The perceived effects expressed by the 20 lecturers we interviewed are described. In addition, case analysis is presented based on the interview we did with the lecturers (n=9) for whom we received their students' responses. This will allow us to compare teachers' responses with those of their students and to understand any differences by taking into account students' perceptions of the HTLE types corresponding to their courses (linked to our second theoretical model, figure 4). We used the SPSS program to measure mean (*m*), standard deviation (*sd*) for a four-point scale (1. Strongly disagree, 2. Disagree, 3. Agree, 4. Strongly agree).

## 6.1 What Are the Effects of Hybrid Teaching and Learning Environment on Students' 21st Century Skills According to Perceptions of Lecturers and Students?

### *From Lecturers' Perspectives*

According to most lecturers' responses (n= 20), HTLE positively affected students' 21st-century learning skills.

**Table 34**

*Frequency Table of the Effects of HTLE on 21st-century Learning Skills*

| | Strongly disagree | Disagree | Agree | Strongly agree | Total |
|---|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | 1 | 10 | 9 | 20 |
| B. Access and evaluate information | | | **12** | **8** | 20 |
| C. Collaboration with others | | 1 | 9 | 10 | 20 |
| D. Think creatively | | 1 | 14 | 5 | 20 |
| E. Apply technology effectively | | | **12** | **8** | 20 |
| F. Be self-directed learners | | 1 | 11 | 8 | 20 |
| G. Work effectively in diverse teams | 1 | 1 | 15 | 3 | 20 |

The table (34) clearly indicated that all lecturers agree that HTLE positively affects accessing and evaluating information and applying technology effectively.

19 out of 20 lecturers positively responded to 21st-century learning skills such as improving problem-solving, improving collaboration with others, thinking creatively, and becoming self-directed learners. Additionally, 18 out of 20 lecturers responded positively to working effectively in diverse teams.

### *From Students' Perspectives*

According to students' responses (n=106), they concurred that HTLE had a positive effect on 21st-century learning skills if we look at the mean (*m*), standard deviation (*sd*), and mode (table 35). Students gave a high rate on applying technology (*m*= 3.22, *sd*= 0.60) and self-directed learning (*m*= 3.10, *sd*= 0.64). However, they seemed to disagree with the effect of HTLE on problem-solving, accessing and evaluating information, collaboration with others, thinking creatively, and working effectively in diverse teams.

**Table 35**

*Students' Response to 21st-century Learning Skills*

| 21st Learning Skills | Mean | Std. Deviation | Mode | N |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | 2.76 | 0.54 | 3 | 106 |
| B. Access and evaluate information | 2.92 | 0.46 | 3 | 106 |
| C. Collaboration with others | 2.75 | 0.69 | 3 | 106 |
| D. Think creatively | 2.96 | 0.55 | 3 | 106 |
| E. Apply technology effectively | **3.22** | **0.60** | 3 | 106 |
| F. Be self-directed learners | **3.10** | **0.64** | 3 | 106 |
| G. Work effectively in diverse teams | 2.69 | 0.63 | 3 | 106 |

*Note*. a scale ranked from 1 to 4 (1. Strongly disagree, 2. Disagree, 3. Agree, 4. Strongly agree)

### Summary

Both lecturers' and students' statistical analysis positively viewed HTLE on 21st-century learning skills, such as applying technology effectively and being self-directed learners. However, their students disagreed with HTLE on improving problem-solving skills, increasing access and evaluating information, improving collaboration skills, developing creative skills, and enhancing working in diverse teams. The following section provides a case analysis comparing the students' responses to the same course to better understand the student's perspective taking into account students' representation of the learning environment.

## 6.2 Perceived Effects According to the Types of HTLE Students' Representations

This section compares the case analysis of the students and their lecturers who participated in the interview. There were 9 lecturers whose students responded through an online survey. Below we analyse the students' answers for each of the lecturers.

### *6.2.1 Uc.L2 and his Student (N=1)*

This lecturer has been teaching in higher education for around 5 years. He teaches a 'Research Methodology' course for Bachelor students. According to self-positioning tool analysis, his course was categorized into type 6 (the Ecosystem) before and during Covid-19. According to his student's response (n= 1), this result was the same type 6 (the Ecosystem). However, they had different perspectives on the effects of HTLE on students' 21st-century learning skills. Both of them expressed that HTLE positively affected problem-solving skills, improved creative ideas, and became self-directed learners. However, his student disagreed that HTLE positively affected students accessing and evaluating information, collaborating with others, applying technology effectively, and working effectively in diverse teams (table 36).

**Table 36**

*The Perspective of Uc.L2 and his Students on 21st-century Learning Skills*

| 21st-century learning skills | **Lecturer** | **Student** | | |
|---|---|---|---|---|
| | Scale | *Scale* | *Std. Deviation* | *N* |
| Problem-solving by solving different kinds of non-familiar problems. | 4 | **3** | 0 | 1 |
| Access and evaluate information | 4 | 2 | 0 | |
| Collaboration with others | 4 | 2 | 0 | |
| Think creatively | 4 | **3** | 0 | |
| Apply technology effectively | 4 | 2 | 0 | |
| Be self-directed learners | 4 | **3** | 0 | |
| Work effectively in diverse teams | 4 | 2 | 0 | |

We conclude and confirm the hypothesis that Type 6, the learning-oriented model, responded by both lecturer and his students' perceived effects on 21st-century learning skills. These effects included problem-solving by solving different kinds of non-familiar problems, thinking creatively, and becoming self-directed learners.

### *6.2.2 Ua.L4 and his Students (N=17)*

This lecturer has been teaching in higher education since 2004. He teaches a "Survey Method in Educational Research" course for a master's degree before and during Covid-19. The self-positioning tool analysis indicated that his course was type 5 (the Metro). However, according to his students' responses (N= 17) in the course “Survey Method in Educational Research”, the learning environment was categorized into type 5 (n=3) and type 6 (n=14). Interestingly, the students recognize that their HTLE is learning-oriented.

Based on table 37, we can see that both lecturer and his students had a similar positive opinion on the effect of HTLE on 21st-century learning skills. His students had a very positive view on creative thinking, applying technology effectively, and becoming self-directed learners. However, the students disagreed that HTLE can improve problem-solving, accessing and evaluating information, collaboration with others, and working effectively in diverse teams.

**Table 37**

*The Perspective of Ua.L4 and his Students on 21st-century Learning Skills*

| | **Lecturer** | **Student** | | |
|---|---|---|---|---|
| 21st-century learning skills | Scale | *Mean* | *Std. Deviation* | *N* |
| Problem-solving by solving different kinds of non-familiar problems. | 3 | 2.82 | 0.39 | 17 |
| Access and evaluate information | 3 | 2.82 | 0.52 | |
| Collaboration with others | 3 | 2.94 | 0.65 | |
| Think creatively | **3** | **3.18** | **0.63** | |
| Apply technology effectively | **3** | **3.29** | **0.68** | |
| Be self-directed learners | **3** | **3.29** | **0.58** | |
| Work effectively in diverse teams | 3 | 2.94 | 0.55 | |

As a result, we conclude and confirm the hypothesis that the similar type of HTLE (Type 5 and 6, learning-oriented) responded by both lecturer and his students' perceived effects on 21st-century learning skills such as creative thinking and applying technology effectively, and becoming self-directed learners.

### *6.2.3 Uc.L6 and his Students (N= 19)*

This lecturer has been teaching in the university since 2012. He teaches TEFL (Teaching English as a Foreign Language) course before Covid-19 and Introduction to Linguistics course during Covid-19. Both courses are designed for bachelor's degrees. According to self-positioning tool analysis, his course was classified into type 6 during Covid-19. This result was consistent with his students' responses (N= 19) in the course "Introduction to Linguistics" with the learning environment type 5 (n= 3) and 6 (n= 16).

Based on table 38, it was indicated that both lecturer and his students agreed HTLE had a positive impact on creative thinking and applying technology effectively. However, the students disagreed that HTLE positively impacts problem-solving, accessing and evaluating information, collaborating with others, being self-directed learners, and working effectively in diverse teams.

**Table 38**

*The Perspective of Uc.L6 and his Students on 21st-century Learning Skills*

| | **Lecturer** | **Student** | | |
|---|---|---|---|---|
| 21st-century learning skills | Scale | *Mean* | *Std. Deviation* | *N* |
| Problem-solving by solving different kinds of non-familiar problems. | 3 | 2.79 | 0.41 | 19 |
| Access and evaluate information | 3 | 2.95 | 0.22 | |
| Collaboration with others | 3 | 2.63 | 0.49 | |
| Think creatively | **3** | **3.00** | 0.47 | |
| Apply technology effectively | **3** | **3.05** | 0.62 | |
| Be self-directed learners | 3 | 2.79 | 0.78 | |
| Work effectively in diverse teams | 3 | 2.53 | 0.51 | |

As a result, we conclude and confirm the hypothesis that the similar type of HTLE (Type 5 and 6, the learning-oriented model) responded by both lecturer and his students' perceived effects on 21st-century learning skills such as creative thinking and applying technology effectively.

### *6.2.4 Uc.L7 and his Students (N= 10)*

This lecturer has been teaching in the university since 2008. He teaches at the college of education, the college of art and humanity, and the college of social science. He teaches Media and Politics course before Covid-19 and Comparative Public Policy course during

Covid-19. Both courses are designed for bachelor's degrees. According to self-positioning tool analysis, his course before Covid-19 "Media and Politics" was classified into type 5 (the Metro), and the course during Covid-19 "Comparative Public Policy" was type 6 (the Ecosystem). This result was consistent with his students' responses (N= 10) in the course of "Comparative Public Policy" with the learning environment type 5 (n= 1) and 6 (n= 9).

According to table 39, both lecturer and his students had different opinions on the effect of HTLE on 21st-century learning skills. However, both of them agreed that HTLE positively affected applying technical skills. They also concurred that HTLE did not positively impact problem-solving skills, creative thinking skills, and working in diverse teams.

**Table 39**

*The Perspective of Uc.L7 and his Students on 21st-century Learning Skills*

| | **Lecturer** | **Student** | | |
|---|---|---|---|---|
| 21st-century learning skills | Scale | *Mean* | *Std. Deviation* | *N* |
| Problem-solving by solving different kinds of non-familiar problems. | **2** | **2.70** | 0.67 | 10 |
| Access and evaluate information | 3 | 2.70 | 0.67 | |
| Collaboration with others | 3 | 2.40 | 0.69 | |
| Think creatively | **2** | **2.70** | 0.82 | |
| Apply technology effectively | **3** | **3.70** | 0.67 | |
| Be self-directed learners | 2 | 3.10 | 0.73 | |
| Work effectively in diverse teams | **1** | **2.60** | 0.69 | |

Although students and lecturers have the same representation of HTLE, they have diverse representations about its effect on the development of 21-century skills. However, the result indicated that similar perceptions of 'apply technology effectively' may be highlighted. The Uc.L7 expressed his opinion that "in the past students did not have an email account, but currently all of them have email accounts and can use them with other learning tools".

### *6.2.5 Ua.L9 and his Students (N= 8)*

This lecturer taught at a higher education level for around 6 to 7 years. He teaches some courses such as General English, Soft-skills, Research Methodology, Teaching Methodology, and Education for Sustainable Development. He taught a Research Methodology course before Covid-19, designed for master's degree students. During Covid-19, he taught a Digital Literacy course designed for the teacher upgrading program for the school director.

According to self-positioning tool analysis, both courses were classified into type 6 (the Ecosystem). This result was consistent with his students' responses (N= 8) in the course of "Research Methodology" with the learning environment type 5 (n= 1) and 6 (n= 7).

According to table 40, we can see that the lecturer has higher expectations than his students toward the effects of students' 21st-century learning skills if they study in the HTLE course. They both agreed that HTLE positively affected accessing and evaluating information, thinking creatively, applying technology effectively, and becoming self-directed learners. However, his students disagreed that HTLE positively affects problem-solving, collaboration with others, and working effectively in diverse teams.

**Table 40**

*The Perspective of Ua.L9 and his Students on 21st-century Learning Skills*

| | **Lecturer** | **Student** | | |
|---|---|---|---|---|
| 21st-century learning skills | Scale | *Mean* | *Std. Deviation* | *N* |
| Problem-solving by solving different kinds of non-familiar problems. | 4 | 2.63 | 0.74 | 8 |
| Access and evaluate information | **3** | **3.25** | 0.46 | |
| Collaboration with others | 4 | 2.75 | 0.88 | |
| Think creatively | **4** | **3.00** | 0.53 | |
| Apply technology effectively | **3** | **3.38** | 0.51 | |
| Be self-directed learners | **4** | **3.50** | 0.53 | |
| Work effectively in diverse teams | 4 | 2.87 | 0.64 | |

### *6.2.6 Ud.L11 and his Students (N= 17)*

This lecturer has been teaching at the higher education level since 2012. He teaches some writing skills, grammar, reading, and speaking courses. He taught a Professional Writing course before and during Covid-19. This course was designed for bachelor's degree students. Both courses were classified into type 6 (the Ecosystem) based on self-positioning tool analysis. This result was almost consistent with his students' responses classifying HTLE in learning-centred environments (N= 17): type 4 (n=2), type 5 (n= 4) and type 6 (n= 11).

According to table 41, it is clearly shows that the lecturer has higher expectations than his students toward positive effects on students' 21st-century learning skills if they study in the HTLE course. Both of them agreed that HTLE had positive effects on applying technology effectively and becoming self-directed learners. However, his students seemed to

disagree that HTLE positively affects problem-solving, accessing and evaluating information, collaborating with others, thinking creatively, and working effectively in diverse teams.

**Table 41**

*The Perspective of Ud.L11 and his Students on 21st-century Learning Skills*

| | **Lecturer** | **Student** | | |
|---|---|---|---|---|
| 21st-century learning skills | Scale | *Mean* | *Std. Deviation* | *N* |
| Problem-solving by solving different kinds of non-familiar problems. | 4 | 2.76 | 0.43 | 17 |
| Access and evaluate information | 3 | 2.94 | 0.42 | |
| Collaboration with others | 4 | 2.53 | 0.71 | |
| Think creatively | 3 | 2.82 | 0.39 | |
| Apply technology effectively | **3** | **3.12** | 0.60 | |
| Be self-directed learners | **4** | **3.00** | 0.61 | |
| Work effectively in diverse teams | 3 | 2.53 | 0.62 | |

To sum up, we can conclude that the hypothesis links the lecturer and students in the learning representations type (4, 5 and 6) of the HTLE has similar perceived effects on the 21st-century learning skills such as applying technology effectively and becoming self-directed learners.

### *6.2.7 Uc.L12 and his Students (N= 13)*

This lecturer has been teaching in higher education since 2011. He teaches some courses such as Political History, Political Science, International Relations, and Public Policy. He taught Introduction to Political Science courses before Covid-19 (bachelor's degree) and Contemporary Political Thought course during Covid-19 (master's degree). Based on self-positioning tool analysis, his course before Covid-19 was classified into type 5 (the Metro), and the course during Covid-19 was type 6 (the Ecosystem). This result was consistent with his students' responses (N= 13) in the course "Contemporary Political Thought" with the learning-oriented environment type 4 (n=1), type 5 (n= 1) and type 6 (n= 11).

According to table 42, it is clearly shown that the lecturer has higher expectations than his students toward positive effects on students' 21st-century learning skills if they study in the HTLE course. They both agreed that HTLE positively affected accessing and evaluating information, thinking creatively, applying technology effectively, and becoming self-directed

learners. However, his students seemed to disagree that HTLE positively affects problem-solving, collaboration with others, and working effectively in diverse teams.

**Table 42**

*The Perspective of Uc.L12 and his Students on 21st-century Learning Skills*

| | **Lecturer** | **Student** | | |
|---|---|---|---|---|
| 21st-century learning skills | Scale | *Mean* | *Std. Deviation* | *N* |
| Problem-solving by solving different kinds of non-familiar problems. | 3 | 2.54 | 0.77 | 13 |
| Access and evaluate information | **3** | **3.00** | 0.40 | |
| Collaboration with others | 3 | 2.92 | 0.86 | |
| Think creatively | **3** | **3.00** | 0.57 | |
| Apply technology effectively | **3** | **3.31** | 0.48 | |
| Be self-directed learners | **4** | **3.23** | 0.72 | |
| Work effectively in diverse teams | 3 | 2.69 | 0.85 | |

As a result, we conclude and confirm the hypothesis that the similar type of HTLE (Type 5 and 6, the learning-oriented) responded by both lecturer and his students' perceived effects on accessing and evaluating information, thinking creatively, applying technology effectively, and becoming self-directed learners.

### *6.2.8 Uc.L14 and his Students (N= 10)*

This lecturer started teaching in higher education in 2011. He teaches English language, such as writing skills, reading skills, listening skills and speaking skills, literature study, English for business, and research writing. He taught an academic 'Writing Skill' course designed for bachelor's degree students before and during Covid-19. According to self-positioning tool analysis, these courses were classified as type 6 (the Ecosystem). This outcome is partially inconsistent with his students' responses (N= 10). Table 43 shows the variety of students' representations.

**Table 43**

*Type of HTLE for Writing Skills Course*

| Course | Type 1 | Type 2 | Type 3 | Type 4 | Type 5 | Type 6 | Total (N) |
|---|---|---|---|---|---|---|---|
| Writing Skills | | 1 | 1 | | 1 | 7 | 10 |

Because the students' representations of the type of HTLE were spatial, we provided a cross table of HTLE with the effects of 21st-century learning skills (table 44) to further analyse the data. The column corresponds to the 21st-century skills (A-G), and the row represents the type of HTLE recognized by the student (type 1 to 6). In each cell, the score on the Likert scale is indicated (1= Strongly disagree, 2 = Disagree, 3 = Agree, 4 = Strongly agree), when there is more than one student in a row (type 6, n=7) we calculate the median. As a result, this table shows no significant difference according to the HTLE representations in the students' appreciation of the learning effects (development of 21-century skills).

**Table 44**

*Crosstable of HTLE with 21st-century Learning Skills*

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| Type 1 | | | | | | | |
| Type 2 (n=1) | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Type 3 (n=1) | 2 | 3 | 2 | 3 | 4 | 3 | 2 |
| Type 4 | | | | | | | |
| Type 5 (n=1) | 3 | 3 | 3 | 3 | 3 | 4 | 2 |
| Type 6 (n=7) | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

***Note***
A = Problem solving by solving different kinds of non-familiar problems
B = Access and evaluate information
C = Collaboration with others
D = Think creatively
E = Apply technology effectively
F = Be self-directed learners
G = Work effectively in diverse teams

According to table 45, it is indicated that the lecturer has higher expectations than his students toward positive effects on students' 21st-century learning skills if they study in the HTLE course. The lecturer believed HTLE positively affects collaboration with others and working in diverse teams, while his students disagreed. Both agreed that HTLE positively affected problem-solving skills, accessing and evaluating information, thinking creatively, applying technology effectively, and becoming self-directed learners. However, they have different views about collaboration with others and working effectively in diverse teams.

**Table 45**

*The Perspective of Uc.L14 and his Students on 21st-century Learning Skills*

| | **Lecturer** | **Student** | | |
|---|---|---|---|---|
| 21st-century learning skills | Scale | *Mean* | *Std. Deviation* | *N* |
| Problem-solving by solving different kinds of non-familiar problems. | **3** | **3.00** | 0.66 | 10 |
| Access and evaluate information | **4** | **3.10** | 0.31 | |
| Collaboration with others | 4 | 2.90 | 0.87 | |
| Think creatively | **4** | **3.00** | 0.47 | |
| Apply technology effectively | **4** | **3.10** | 0.56 | |
| Be self-directed learners | **4** | **3.30** | 0.48 | |
| Work effectively in diverse teams | 3 | 2.60 | 0.69 | |

As a result, we conclude that in this case there is no significant difference of the 21st-century learning skills to each type of HTLE. However, based on both lecturer and his students' responses, HTLE positively affects problem-solving skills, accessing and evaluating information, thinking creatively, applying technology effectively, and becoming self-directed learners.

### *6.2.9 Uc.L19 and his Students (N= 11)*

This lecturer has been teaching in higher education since 2011 with some courses, such as philosophy, sociology, psychology, anthropology, organizational behaviour, and leadership. For the past few years, he has taught only leadership and psychology. When asked to choose a hybrid course before and during Covid-19, he chose the "Leadership skills" course. According to self-positioning tool analysis, his course was classified into type 5 (the Metro) before Covid-19 and type 6 (the Ecosystem) during Covid-19. Table 46 represents different types of HTLE from students' responses.

**Table 46**

*Type of HTLE Course "Leadership Skills"*

| Course | Type 1 | Type 2 | Type 3 | Type 4 | Type 5 | Type 6 | Total (N) |
|---|---|---|---|---|---|---|---|
| Leadership Skills | | | 1 | 1 | | 9 | 11 |

Because the type of HTLE was spatial, we did a cross table of HTLE with the effects of 21st-century learning skills (table 47) to further describe the data. The column corresponds to the 21st-century skills (A-G), and the row represents the type of HTLE recognized by the student (type 1 to 6). In each cell, the score on the Likert scale is indicated (1= Strongly disagree, 2 = Disagree, 3 = Agree, 4 = Strongly agree), when there is more than one student in a row (type 6, n=7) we calculate the median. As a result, this table shows no significant difference according to the HTLE representations in the students' appreciation of the learning effects (development of 21-century skills).

**Table 47**

*Crosstable of HTLE with 21st-century Learning Skills*

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| Type 1 | | | | | | | |
| Type 2 | | | | | | | |
| Type 3 (n=1) | 2 | 2 | 3 | 2 | 3 | 3 | 3 |
| Type 4 (1) | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Type 5 | | | | | | | |
| Type 6 (n=9) | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

***Note***
A = Problem solving by solving different kinds of non-familiar problems
B = Access and evaluate information
C = Collaboration with others
D = Think creatively
E = Apply technology effectively
F = Be self-directed learners
G = Work effectively in diverse teams

Based on table 48, it is indicated that the lecturer has higher expectations than his students toward positive effects on students' 21st-century learning skills if they study in the HTLE course. They both agreed that HTLE positively affected collaboration skills and applied technology effectively. However, his students seemed to disagree that HTLE positively affected problem-solving, accessing and evaluating information, thinking creatively, being self-directed learners, and working effectively in diverse teams.

**Table 48**

*The Perspective of Uc.L19 and his Students on 21st-century Learning Skills*

| 21st-century learning skills | Lecturer Scale | Student *Mean* | Student *Std. Deviation* | *N* |
|---|---|---|---|---|
| Problem-solving by solving different kinds of non-familiar problems. | 3 | 2.82 | 0.40 | 11 |
| Access and evaluate information | 3 | 2.73 | 0.46 | |
| Collaboration with others | **3** | **3.00** | 0.00 | |
| Think creatively | 3 | 2.91 | 0.53 | |
| Apply technology effectively | **4** | **3.09** | 0.30 | |
| Be self-directed learners | 3 | 2.91 | 0.30 | |
| Work effectively in diverse teams | 3 | 2.91 | 0.53 | |

To sum up, we conclude that in this case there is no significant difference in the 21st-century learning skills to each type of HTLE. However, based on both the lecturer and his students' responses, HTLE positively affects collaboration and applies technology effectively. Compared to the previous case, Uc.L14, HTLE positively affects problem-solving skills, accessing and evaluating information, thinking creatively, applying technology effectively, and becoming self-directed learners.

### *6.2.10 Intercase Analysis*

We noticed some crucial points on the effects of HTLE on 21st-century learning skills after data analysis. First, based on most lecturers' perspectives, HTLE positively affected 21st-century learning skills such as problem-solving skills, accessing and evaluating information skills, collaboration skills, critical thinking skills, applying technology skills, being self-directed learners, and working effectively in a diverse team.

Second, most lecturers (N=20) and students (N=106) confirmed that HTLE positively affected applying technical skills and self-directed learners. However, the students generally seemed not to believe HTLE positively affected problem-solving, accessing and evaluating information, collaboration with others, thinking creatively, and working effectively in diverse teams (see table 49).

In general, the result indicated that lecturers had higher expectations than students regarding positive effects on 21st-century learning skills. The result also confirmed no significant difference in the type of HTLE (type 1 to 6) on the effects of 21st-century learning

skills. However, the number of cases where the students' perception differs strongly from that of their teacher is too small to draw a firm conclusion on this.

**Table 49**

*Effects of HTLE on 21st-century Learning Skills*

| 21st Century Learning Skills | Lecturers (N =20) | | Students (N =106) | |
|---|---|---|---|---|
| | Mean | Std. Deviation | Mean | Std. Deviation |
| A. Problem-solving by solving different kinds of non-familiar problems. | 3.40 | 0.59 | 2.76 | 0.54 |
| B. Access and evaluate information | 3.40 | 0.50 | 2.92 | 0.46 |
| C. Collaboration with others | 3.45 | 0.60 | 2.75 | 0.69 |
| D. Think creatively | 3.20 | 0.52 | 2.96 | 0.55 |
| E. Apply technology effectively | **3.40** | **0.50** | **3.22** | **0.60** |
| F. Be self-directed learners | **3.35** | **0.58** | **3.10** | **0.64** |
| G. Work effectively in diverse teams | 3.00 | 0.64 | 2.69 | 0.63 |

*Note*. a scale ranked from 1 to 4 (1. Strongly disagree, 2. Disagree, 3. Agree, 4. Strongly agree)

By reflecting on this result, we see that HTLE affected students' 21st century learning skills by applying technology (m= 3.22, std.= 0.60) and becoming self-directed learners (m= 3.10, std.= 0.64) based on students' responses. Probably, working with a computer offered them more learning pathways, suggestions, amendments, searching for information independently, and deleting information that they do not want with a single click. However, students provided a low-rate effect of HTLE on collaboration skills (m= 2.75; std= 0.69). In reflection of this low rate, students might receive more individual tasks than collaboration with their peers. This is also related to the nature of the course and the tasks assigned by the lecturers.

### 6.3 Understanding the Effects of HTLE on 21st-century Learning Skills

This section describes individual learners' characteristics, learners perceptions of the HTLE and digital learning environment characteristics based on teachers' responses by using

the Systemic Perspective of Circular Causality model (Charlier et al., 2015; Charlier & Lambert, 2019). These three factors interact with each other generating a new learning experience, which leads to perceived outcomes that allow us to understand and interpret the effects of HTLE on 21st-century learning skills.

### *6.3.1 Individual Learners' Characteristic*

Individual learner's characteristics play an important role and impact on learner's success in academic study, particularly higher education. According to statistical analysis (table 50), the result showed that 106 students felt comfortable or happy when working with a computer or a technology (m= 3.01; std= 0.48), felt confident when using a computer to deal with schoolwork (m= 3.07; std= 0.57), felt committed to the course (m= 3.07; std= 0.50) and often related ideas to real-life content (m= 3.01; std= 0.50).

However, the statistical analysis also indicated less satisfied results on students' previous experiences of online learning or distance learning activities (m= 2.85; std= 0.70), adaptability to the learning environment when a change occurs (m= 2.97; std= 0.52), willingness to understand for oneself (m= 2.95; std= 0.46), putting a lot of effort into studying (m= 2.92; std= 0.52), looking at evidence carefully to draw conclusions about studying (m= 2.93; std= 0.48), and reviewing and checking the work carefully (m= 2.94; std= 0.41).

**Table 50**

*Individual Learners' Characteristic*

| | **Mean** | **Std.** | **N** |
|---|---|---|---|
| A. I feel comfortable or happy when I work with a computer or technology. | **3.01** | **0.48** | 106 |
| B. I feel confident when I use a computer to deal with schoolwork. | **3.07** | **0.57** | 106 |
| C. I feel committed to the course | **3.07** | **0.50** | 106 |
| D. I have had experience with online learning or distance learning activities | 2.85 | 0.70 | 106 |
| E. When a change occurs in my learning environment, I feel open to adapting to change. | 2.97 | 0.52 | 106 |
| F. I usually set out to understand for myself the meaning of what we have to learn. | 2.95 | 0.46 | 106 |
| G. I generally put a lot of effort into my studying. | 2.92 | 0.52 | 106 |
| H. I look at the evidence carefully to reach my own conclusions about what I am studying. | 2.93 | 0.48 | 106 |

| | | | | |
|---|---|---|---|---|
| I. | I review my work to check my reasoning and see that it makes sense. | 2.94 | 0.41 | 106 |
| J. | In making sense of new ideas, I often relate them to practical or real-life contexts. | **3.01** | **0.50** | 106 |

*Note*. a scale ranked from 1 to 4 (1. Strongly disagree, 2. Disagree, 3. Agree, 4. Strongly agree)

**Students' personal environment technical resources**. Technological learning resources are essential in the 21st century of learning. These learning resources include a smartphone, computer, and internet connection. They function as a fast vehicle to bring teaching-learning everywhere and at any time with a click. Based on the table (51), the result indicated that 99 percent of the students possess a smartphone, 92.5 percent have a computer to do their schoolwork, and 85.8 percent have Wi-Fi or internet connection at home to use. However, 42.5 percent of Wi-Fi or internet connections for online learning activities did not work well. This reflects that most of them might find it hard to complete online learning activities due to their internet connection, especially impoverished people living in rural and remote areas.

**Table 51**

*Technical Resources*

| | **YES** | **No** | **N** |
|---|---|---|---|
| A. Do you have a smartphone to connect internet? | 105 (99%) | 1 | 106 |
| B. Do you have a computer to do schoolwork? | 98 (92.5 %) | 8 | 106 |
| C. Do you have Wi-Fi or an internet connection at home? | 91(85.8%) | 15 | 106 |
| D. Does your Wi-Fi or internet connection at home work well for online, offline learning activities? | 61 (57.5%) | 45 | 106 |

### *6.3.2 Digital Learning Environment Characteristics (Description by the Teachers with the Support of the Self-positioning Tool)*

There are 6 types of HTLE described in the HY-SUP European project. They are the Scene (type 1), the Screen (type 2), the Rural Gite (type 3), the Crew (type 4), the Metro (type 5), and the Ecosystem (type 6). Types 1 to 3 are more teaching centered approach, while types 4 to 6 are more learning centered approach (Charlier & Lambert, 2019). According to the result analysis, all of the courses of HTLE are type 5 and 6 (table 52), thus oriented towards learning. However, most lecturers face difficulty monitoring students'

learning, limited knowledge of using tools, and time-consuming responding to students' questions and learning design.

**Table 52**

*Type of HTLE Described by Teachers*

| Course | Type of course | | Total of course |
|---|---|---|---|
| | The Metro (type 5) | The Ecosystem (type 6) | |
| **before Covid-19** | 10 (50%) | 10 (50%) | 20 |
| **during Covid-19** | 1 (5%) | 18 (95%) | 19 |

### *6.3.3 Interactions between Individual Characteristics and the Learning Environment*

By looking at students 'responses, we see that most students recognize learning-center HTLE before and during Covid-19 (table 53). By calculating types 4, 5, and 6 plus the missing value, it was clearly seen that 93.4% of courses before Covid-19 and 98.1% of courses during Covid-19 were recognized as learning-centered. This finding parallels the lecturers' result, which indicated that most of the courses are types 5 and 6.

**Table 53**

*Types of HTLE by Students' Response*

| | Course before Covid-19 | | Course during Covid-19 | |
|---|---|---|---|---|
| | Frequency | Percent | Frequency | Percent |
| Type 1 (Scene) | 0 | 0 | 0 | 0 |
| Type 2 (Screen) | 1 | 0.9 | 1 | 0.9 |
| Type 3 (Rural Gite) | 2 | 1.9 | 3 | 2.8 |
| Type 4 (Crew) | 1 | 0.9 | 3 | 2.8 |
| Type 5 (Metro) | 14 | 13.2 | 15 | 14.2 |
| Type 6 (Ecosystem) | 48 | 45.3 | 83 | 78.3 |
| Not determined | 4 | 3.8 | 1 | 0.9 |
| Missing | 36 | 34 | 0 | 0 |
| Total | 106 | 100 | 106 | 100 |

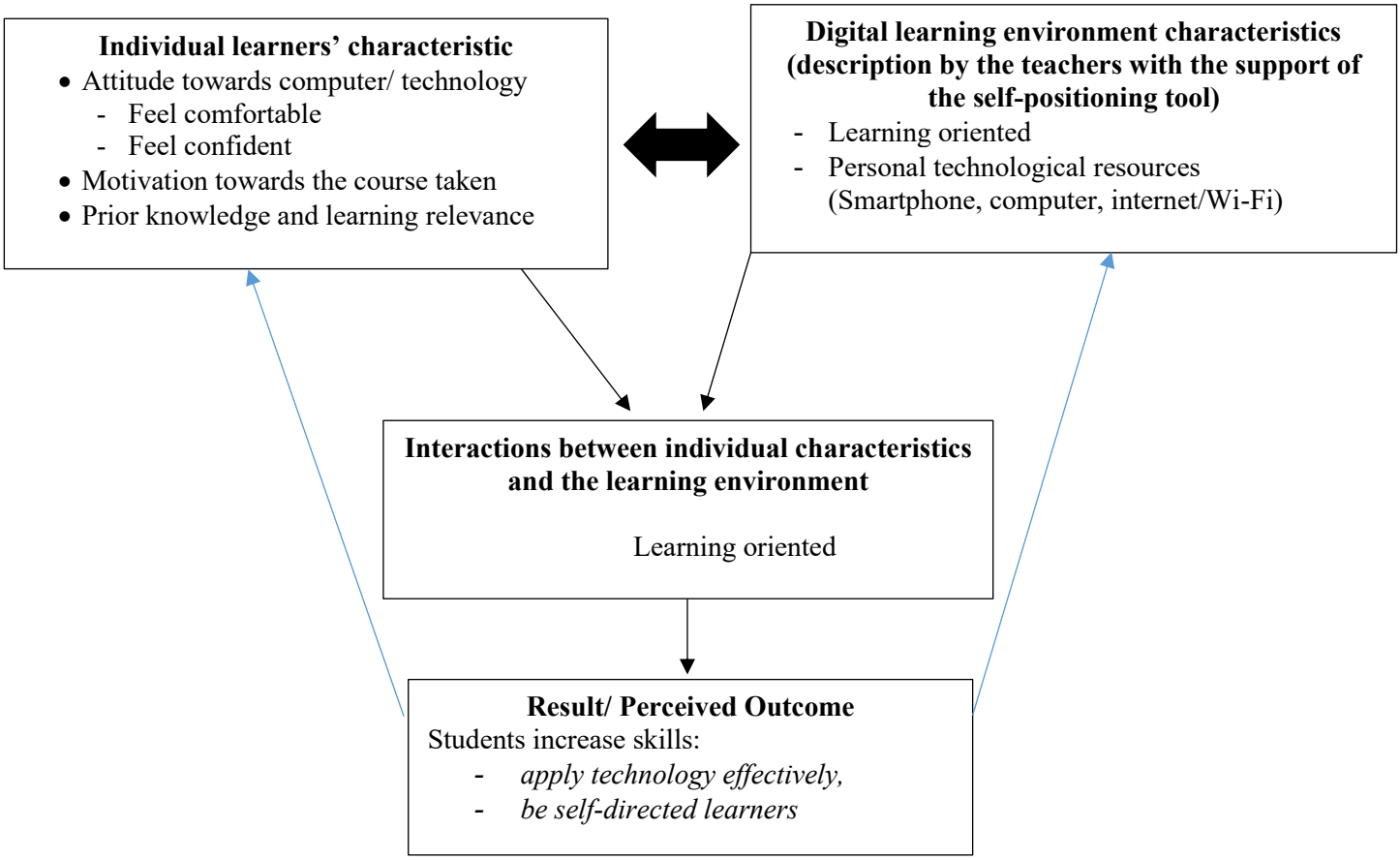
### *6.3.4 Result/ Perceived Outcome*

The result indicated that most of the lecturers (N=20) agreed HTLE positively affects 21st-century learning skills (see table 49). However, according to students' opinions, HTLE seems to impact applying technology effectively and becoming self-directed learners

positively. They disagreed that HTLE can improve problem-solving, accessing and evaluating information, improve collaboration, critical thinking, and working in diverse teams. This somehow positive result confirms the results of the HY-SUP research, which showed a higher perception of the effects of this type of HTLE on learning quality by both teachers and students. This result leads us to suggest a revision of our model (figure 6).

**Figure 6**

*A Revisionary Systemic Model of Educational Technology on Effects of Students' Learning*




***Are those Effects Different According to the Type of Environment Developed?***

It has been impossible to investigate this question because a majority of HTLEs are recognized as type 5 and 6.

# CHAPTER 7: CONCLUSION

Technology plays an important role not only in society but also in the academy. Therefore, the rise of applying hybrid teaching and learning environments in higher education has increased considerably in recent years. The outbreak of Covid-19 even makes us aware of the importance of technology in the workplace and education sector for communication, collaboration, and instruction. Covid-19 might be a silver lining to alarm Cambodian educators, policymakers, and educational leaders into re-thinking and re-designing the education system in the 21st-century. The findings of this study indicate that most lecturers implemented hybrid teaching and learning environments under specific conditions. These conditions include self-confidence to use ICT, like integrating ICT into teaching, being open to adopting innovation, getting enough freedom to innovate, having enough time to innovate, using English language to understand tools, good health and living standards, intrinsic motivations, and extrinsic motivation. Intrinsic motivation consists of *engaging students, offering external learning to students, preparing students for the workplace, introducing a new way of teaching and learning, saving time and materials, improving student self-study, and helping slow learners and absent students to catch up*. On the contrary, extrinsic motivation includes *Covid-19 and institutional requirement*s. These conditions are a stepping-stone for lecturers to cope with teaching and learning during the Covid-19 crisis and post-Covid-19. The finding indicated that most HTLE courses before Covid-19 were type 5 (the Metro, 50%) and 6 (the Ecosystem, 50%). During Covid-19, most courses developed into type 6 (95%). These reflected lecturers are keen on educational, technological tools and ready to adapt their teaching methods to the distance teaching.

Concerning the effect of HTLE on 21st-century skills development, it provides students with new skills, knowledge, and expertise to succeed in work and life, such as critical thinking, problem-solving, communication, and collaboration. According to the interview with 20 lecturers, the result indicated that applying HTLE could produce positive effects on 21st-century learning skills, such as problem-solving (m= 3.40, std =0.59), accessing and evaluating information (m= 3.40, std= 0.50), collaboration with others (m= 3.45, std = 0.60), thinking creatively (m= 3.20, std = 0.52), applying technology effectively (m= 3.40, std = 0.50), being self-directed learners (m= 3.35, std = 0.58), and working effectively in diverse teams (m= 3.00, std = 0.64). Lecturers have a high expectation of the positive effects of HTLE on these 21st-century learning skills because they might be aware of the usefulness of using technological tools in their teaching, working, communicating, collaborating, and

solving their academic problems. They were also able to use English language effectively, so it was easy for them to search information, type keywords, and understand learning resources. Therefore, they might be less aware of the difficulties of the students.

In contrast, the result of students' responses (n= 160) showed that HTLE tended not to improve problem-solving, accessing and evaluating information, collaborating with others, thinking creatively, and working effectively in diverse teams. However, they agreed HTLE could improve applying technology effectively (m= 3.22, std = 0.60) and becoming self-directed learners (m= 3.10, std= 0.64). Probably, they were forced to use application tools (Zoom, Google Classroom, Google Docs, Telegram, Facebook group) for their distance and online learning. They were also required to have self-initiative and self-study and do homework at home; otherwise, they would not catch up on the lesson. One of the lecturers stated that "In this current situation, if the students are not self-directed learners, they will fail. We need to acknowledge this". The findings were consistent with the previous study by Linder (2017). In her research article "*Fundamentals of Hybrid Teaching and Learning*" she highlighted that HTLE helped learners become self-paced learners in terms of flexibility of time and learn and use new technologies in a facilitated environment. This result also concurred to OECD (2016), who stated that "E-learning, open educational resources and massive open online courses, mainly aimed at autonomous learners" (p. 10). However, according to Charlier et al. (2015), these impacts may be different according to student characteristics, such as cognitive skills, academic background, level of pre-existing knowledge to learning field, and conceptions of knowledge and learnings (Charlier et al., 2019) in their article of describing and understanding learning in hybrid learning courses. Based on our reflection, English language proficiency also plays an essential role in helping students be able to apply technology effectively and become self-directed learners. As we observe, most of the application tools and online learning resources are developed and use English as a guide. Therefore, we believe the English language is one of the important factors to help students to become technologically literate.

Based on the interviews, the lecturers provided recommendations to implement a hybrid teaching and learning environment with good quality. The recommendations from these early adopters enable higher education institutions to understand their conditions to support lecturers and students to adopt innovation. First, the institutions need to have a good educational infrastructure, including a physical and technical support team to provide a good internet connection and training in using technological tools. They also need to have a hybrid teaching and learning policy, so lecturers and students can be flexible based on the policy.

For example, lecturers are allowed to use both synchronous and asynchronous or distance teaching when necessary. Additionally, institutions need to have their own LMS, so both lecturers and students can be familiar and benefit from technology in learning. By doing so, they can develop a positive attitude toward technology in teaching and learning. Second, lecturers need to strengthen and develop technology skills to teach effectively. Additionally, they might need to amend assessment and learning outcomes based on hybrid environments. Furthermore, lecturers should create an interactive learning environment with students, especially online or distance teaching, because online teaching is different from face-to-face teaching. For example, turning on the camera, randomly calling students' names, and group discussion might create an interactive learning environment during online teaching. Third, students need to read documents in advance. This requires lecturers to keep asking students questions in the class to summarize or understand what they understood from their reading at home. Then, they can share their understanding and reflection in the class. Students themselves also need to strengthen technological knowledge by joining workshops or training offered by the university or institution. However, there is a concern about the individual student economy installing WIFI at home and a computer to access learning.

This research study acknowledges limitations in sample size, time constraints, and available resources. We were supposed to get more responses from students among 20 lecturers. However, we received only106 students' responses out of 9 lecturers. Additionally, time was limited to us; therefore, we decided not to enlarge our sample study. Last but not least, some of the available theoretical resources were in French, so we spent time doing online translation and trying to grasp the meaning in the big picture.

Many questions remain open. Our very limited sample demonstrates teachers' commitment to their students' learning. What about the large population of Cambodian lecturers? Therefore, we encourage future research to increase the study's sample size. We were also focused only on actor’s perceptions. It will be important to try different methods, such as classroom observation or focus group discussion, to enhance the analysis. Furthermore, we have limited ourselves to students' and teachers' representations of the effects of HTLE on the development of 21st-century skills. What are the effects of these environments on students' learning? For example, on the development of their self-direction skills or self-regulation skills? These are just a few possible questions. Much more needs to be done to develop knowledge that is useful for developing higher education in Cambodia.

References

Anderson, G., & Arsenault, N. (2005). *Fundamentals of educational research*. Routledge. https://doi.org/10.4324/9780203978221

Ayres, D. M. (2000). *Anatomy of a crisis education, development and the state in Cambodia, 1953-1998*. https://kupdf.net/download/anatomy-of-a-crisiseducation-development-and-the_5af6ce64e2b6f59b70b44723_pdf

Boora, R., Church, J., Madill, H., Brown, W., & Chykerda, M. (2010). Ramping up to hybrid teaching and learning. *Handbook of research on hybrid learning models: Advanced tools, technologies, and applications* (p. 406). https://www.researchgate.net/publication/259266147_Chapter_25Ramping_up_to_Hybrid_Teaching_and_Learning

Bowyer, J. (2017). *Evaluating blended learning: Bringing the elements together*. *23*, 10.

Charlier, B., Cosnefroy, L., Jézégou, A., & Lameul, G. (2015). Understanding quality of learning in digital learning environments: State of the Art and Research Needed. In A. Curaj, L. Matei, R. Pricopie, J. Salmi, & P. Scott (Eds.), *The European Higher Education Area: Between Critical Reflections and Future Policies* (pp. 381–398). Springer International Publishing. https://doi.org/10.1007/978-3-319-20877-0_25

Charlier, B., Deschryver, N., & Pereya, D. (2006). Apprendre en présence et à distance. Une définition des dispositifs hybrides. *Distances et savoirs*, *4*(4), 469–496. https://doi.org/10.3166/ds.4.469-496

Charlier, B., & Lambert, M. (2019). Evaluating the effects of faculty development: Theoretical framework and empirical implementation. *International Journal for Academic Development*, *25*(2), 162–175. https://doi.org/10.1080/1360144X.2019.1659798

Charlier, B., Peltier, C., & Ruberto, M. (2019). *Describing and understanding learning in hybrid learning courses*.

Charlier, B., & Peraya, D. (2003). *Technologie et innovation en pédagogie: Dispositifs innovants de formation pour l'enseignement supérieur*. De Boeck Université. https://archive-ouverte.unige.ch/unige:17120

Chet, C. (2006). Cambodia: Overview of higher education developments. *Higher education in South-East Asia.* UNESCO Bangkok.

Chet, C. (2009). Higher education in Cambodia. In Y. Hirosato & Y. Kitamura (Eds.), *The political economy of educational reforms and capacity development in Southeast Asia: Cases of Cambodia, Laos and Vietnam* (pp. 153–165). Springer Netherlands. https://doi.org/10.1007/978-1-4020-9377-7_10

Christensen, C. M., & Eyring, H. J. (2011). *The innovative university: Changing the DNA of higher education from the inside out | Wiley*. https://www.wiley.com/en-us/The+Innovative+University%3A+Changing+the+DNA+of+Higher+Education+from+the+Inside+Out-p-9781118063484

Cohen, L., Manion, L., & Morrison, K. R. B. (2007). *Research methods in education*. Routledge. https://gtu.ge/Agro-Lib/RESEARCH%20METHOD%20COHEN%20ok.pdf

Costa Jr., P. T., & McCrae, R. R. (2008). The revised NEO personality inventory (NEO-PI-R). *The SAGE handbook of personality theory and assessment, Vol 2: Personality measurement and testing* (pp. 179–198). Sage Publications, Inc. https://doi.org/10.4135/9781849200479.n9

Davies, A., Fidler, D., & Gorbis, M. (2011). *IFTF: Future work skills 2020*. https://www.iftf.org/futureworkskills/

Depover, C., & Strebelle, A. (1997). *Un modèle et une stratégie d'intervention en matière d'introduction des TIC dans le processus éducatif*. 73–98.

Deschryver, N., & Charlier, B. (2012). *Dispositifs hybrides, nouvelle perspective pour une pédagogie renouvelée de l'enseignement supérieur.* https://archive-ouverte.unige.ch/unige:23102

Eliveria, A., Serami, L., Famorca, L. P., & Cruz, J. D. (2019). Investigating students' engagement in a hybrid learning environment. *IOP Conference Series: Materials Science and Engineering*, *482*, 1–7. https://doi.org/10.1088/1757-899X/482/1/012011

Ely, D. P. (1999). Conditions that facilitate the implementation of educational technology innovations. *Educational Technology*, *39*(6), 23–27. JSTOR.

Entwistle, N., Thompson, S., & Tait, H. (2020). *Guidelines for promoting effective learning in higher education*. https://www.researchgate.net/publication/339627823_ Guidelines_for_Promoting_Effective_Learning_in_Higher_Education

Fullan, M. (2007). *The new meaning of educational change* (4th ed). Teachers College Press. http://mehrmohammadi.ir/wp-content/uploads/2019/07/The-New-Meaning-of-Educational-Change.pdf

Fullan, M., Quinn, J., & McEachen, J. J. (2018). *Deep learning: Engage the world change the world*. http://www.arschile.cl/uort/recursos/3/Deep%20Learning_ %20Engage%20the%20World%20-%20Michael%20Fullan.pdf

Gallavara, G., Hreinsson, E., Kajaste, M., Lindesjoo, E., Sølvhjelm, C., Sorskar, A. K., & Zadeh, M. S. (2008). *Learning outcomes: Common framework--different approaches to evaluation learning outcomes in the Nordic Countries. Joint Nordic Project 2007-2008, by the Nordic Quality Assurance Network for Higher Education (NOQA). ENQA Occasional Papers 15.* /paper/Learning-Outcomes%3A-Common-Framework--Different-to-Gallavara-Hreinsson/5cee5a623fd07fd1b4eb4fbe10484855854069c3

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. https://doi.org/10.1016/j.iheduc.2004.02.001

Hannan, A., & Silver, H. (2000). *Innovating in higher education: teaching, learning and institutional cultures*. Open University Press, 325 Chestnut Street, Philadelphia, PA 19106 (paperback: ISBN-0-335-20537-2, 22.

Harding, A., Kaczynski, D., & Wood, L. (2005). *Evaluation of blended learning: Analysis of qualitative data*. 7.

Heng, K., Sok, S., & No, F. (2016). *School dropout in Cambodia: A case of Phnom Penh and Kampong Speu*. https://www.academia.edu/29062317/School_dropout_in_ Cambodia_A_case_of_Phnom_Penh_and_Kampong_Speu

Hughes, G. (2007). Using blended learning to increase learner support and improve retention. *Teaching in Higher Education*, *12*(3), 349–363. https://doi.org/10.1080/13562510701278690

Jason, V. (2013). Defining Technological innovation. *Library Technology Reports*, *49*(7), 10–46.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, *33*(7), 14–26. https://doi.org/10.3102/0013189X033007014

Karabulut-Ilgu, A., & Jahren, C. T. (2015). *Faculty perspectives on benefits and challenges of hybrid learning*. 1–11. https://peer.asee.org/faculty-perspectives-on-benefits-and-challenges-of-hybrid-learning

Kintu, M. J., Zhu, C., & Kagambe, E. (2017). Blended learning effectiveness: The relationship between student characteristics, design features and outcomes.

*International Journal of Educational Technology in Higher Education*, *14*(1), 7. https://doi.org/10.1186/s41239-017-0043-4

Koehler, M. J., & Mishra, P. (2009). *What is technological pedagogical content knowledge? 9*(1), 60–70.

Lebrun, M., Peltier, C., Peraya, D., Burton, R., & Mancuso, G. (2014). Un nouveau regard sur la typologie des dispositifs hybrides de formation. Propositions méthodologiques pour identifier et comparer ces dispositifs. *Education et Formation*, *e-301*, 55.

Lievonen, M., Vesisenaho, M., & Lundström, A. (2016). *Hybrid learning situation as a challenge for design*. https://jyx.jyu.fi/handle/123456789/52708

Linder, K. E. (2017). Fundamentals of hybrid teaching and learning. *New directions for teaching and learning*, *2017*(149), 11–18. https://doi.org/10.1002/tl.20222

Mack, N., Woodsong, C., Macqueen, K. M., Guest, G., & Namey, E. (2005). *Qualitative research methods: A data collector's field guide*. FLI USAID. https://www.fhi360.org/sites/default/files/media/documents/Qualitative%20Research%20Methods%20-%20A%20Data%20Collector's%20Field%20Guide.pdf

Maeda, M. (2021). Exam cheating among Cambodian students: When, how, and why it happens. *Compare: A Journal of Comparative and International Education*, *51*(3), 337–355. https://doi.org/10.1080/03057925.2019.1613344

Mak, N. (2015, May 30). *Cambodian HE vision 2030 from policies to practices: "Efforts to excel Cambodia and to successfully engage in ASEAN Community through Education"*. https://slideplayer.com/slide/5384760/

McNamara, V. D., & Ahrens, L. (2013). *Cambodia: Evolving quality issues in higher education international trends: lessons from the literature*. https://www.academia.edu/11418365/Cambodia_Evolving_Quality_Issues_in_Higher_Education_International_Trends_Lessons_from_the_Literature

Mirriahi, N., Alonzo, D., & Fox, B. (2015). A blended learning framework for curriculum design and professional development. *Research in Learning Technology*, *23*. https://doi.org/10.3402/rlt.v23.28451

MoEYS. (2012). *Cambodia qualifications framework (CQF)*.

MoEYS. (2014). *Policy on higher education 2030*. http://www.moeys.gov.kh/en/policies-and-strategies/policy-on-higher-education-2030.html

MoEYS. (2018). *Policy and strategy on information and communication technology in education*. https://www.moeys.gov.kh/index.php/en/policies-and-strategies/3018.html

MoEYS. (2019). *Education strategic plan 2019-2023*. http://www.moeys.gov.kh/index.php/en/policies-and-strategies/3206.html

Nørgård, R. T. (2021). Theorising hybrid lifelong learning. *British Journal of Educational Technology*, *52*(4), 1709–1723. https://doi.org/10.1111/bjet.13121

OECD. (2012). *OECD science, technology and industry outlook 2012*. https://www.oecd-ilibrary.org/science-and-technology/oecd-science-technology-and-industry-outlook-2012_sti_outlook-2012-en

OECD. (2016). *Innovating education and educating for innovation: The power of digital technologies and skills*. OECD. https://doi.org/10.1787/9789264265097-en

P21. (2019). *Framework for 21st century learning definitions*. https://www.battelleforkids.org/learning-hub/learning-hub-item/framework-for-21st-century-learning-definitions

Peltier, C., & Séguin, C. (2021). Hybridation et dispositifs hybrides de formation dans l'enseignement supérieur: Revue de la littérature 2012-2020. *Distances et médiations des savoirs. Distance and Mediation of Knowledge*, *35*, Article 35. https://doi.org/10.4000/dms.6414

Saunders, M., Charlier, B., & Bonamy, J. (2005). Using evaluation to create 'provisional stabilities': Bridging innovation in higher education change process. *HAL, Post-Print*.

Strebelle, A., Depover, C., Stylianidou, F., & Dimitracopoulou, A. (2003). *Modelling space: The setting up of human nethworks as vital part of the design and implementation of a technology supported learning environment*. *1*, 16.

Stufflebeam, D. L. (2003). The CIPP model for evaluation. In T. Kellaghan & D. L. Stufflebeam (Eds.), *International handbook of educational evaluation* (pp. 31–62). Springer Netherlands. https://doi.org/10.1007/978-94-010-0309-4_4

Stufflebeam, D. L. (2014). CIPP Model for evaluation: An improvement and accountability oriented approach. D. L. Stufflebeam & C. L. S. Coryn, *Evaluation Theory, Models, and Applications* (p. 309). https://download.e-bookshelf.de/download/0002/8404/16/L-G-0002840416-0004532853.pdf

Thoman, E., & Jolls, T. (2003). *Literacy for the 21st century: An overview & orientation guide to media literacy education*. https://www.medialit.org/reading-room/literacy-21st-century-overview-orientation-guide-media-literacy-education

Trilling, B., & Fadel, C. (2009). *21st century skills: Learning for life in our times*. https://www.wiley.com/en-us/21st+Century+Skills%3A+Learning+for+Life+in+Our+Times-p-9780470553916

van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behavior*, *72*, 577–588. https://doi.org/10.1016/j.chb.2017.03.010

Walder, A. M. (2017). Pedagogical innovation in Canadian higher education: Professors' perspectives on its effects on teaching and learning. *Studies in Educational Evaluation*, *54*, 71–82. https://doi.org/10.1016/j.stueduc.2016.11.001

Walder, A. M. (2014b). *Pedagogical innovation: Between social reality and technology*. *18*(2), 59–79.

Walder, A. M. (2014a). The concept of pedagogical innovation in higher education. *Education Journal*, *3*(3), 195–202.

Wallace, L., & Young, J. (2010). Implementing blended learning: Policy implications for universities. *Online Journal of Distance Learning Administration*.

World Bank. (2012). *Putting higher education to work: Skills and research for growth in East Asia*. World Bank. https://doi.org/10.1596/978-0-8213-8490-9

World Bank. (2018). *Cambodia higher education improvement project*. http://documents1.worldbank.org/curated/zh/380891524967269938/pdf/Cambodia-Education-PAD-04092018.pdf

Xu, Z. M., & Wang, L. (2010). Discourse analysis on hybrid learning and teaching and the changing roles of teachers and students in Hong Kong. *Handbook of research on hybrid learning models: Advanced tools, technologies, and applications*, 284–298.

You, V. (2012). *The case of Cambodia higher education system and quality improvement*. 1–13.

APPENDIX 1: Semi-structure Interview for Lecturer

UNIVERSITÉ DE FRIBOURG
UNIVERSITÄT FREIBURG
Faculty of Humanities
Department of Educational Sciences
Avenue de l'Europe 20
CH-1700 Fribourg
Switzerland
www3.unifr.ch

Mr. KAING Sopheap
Ph.D. candidate
kaingsopheap@gmail.com
Phone: (+41) 076 3474822
1700 Fribourg, Switzerland
Supervisor: Prof. CHARLIER Bernadette

Research Title: ***Implementing Condition of Hybrid Teaching and Learning Environment in Cambodian Higher Education***

## Semi-structure Interview (For Lecturer)

*Dear Participants:*

*The purposes of this semi-structured interview are to get insightful conditions of Cambodian higher education lecturers implementing hybrid teaching and learning environment (integrate technology into traditional teaching), and to delve into the effects of hybrid teaching and learning environment on students' 21st-century skills. Regarding anonymity and confidentiality, a pseudonym will be used to guarantee that the participant's personal information and address will not be used or revealed in the final report. This will help to ensure that what you have said during the discussion will not be traced back to you by third parties. The final report will be sent to the university library and anyone who participates in the research if requested. The interview might take 30 minutes through online discussion. Please answer the questions carefully.*

**I. Lecturer information**

*The questions below are concerned lecturer information. Please answer them carefully.*

Q1: Could you present yourself? How long have you been teaching in higher education? What courses have you taught so far?

Q2: Could you describe how your teaching practice has evolved since the beginning of your career until now?

Q3: Please rate your teaching profile in the following. Please tick (√) it

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. You are self-confident to use technological tools in your course. | | | | |
| B. You like integrating technology into your course. | | | | |
| C. You are more open to adopting innovation. | | | | |
| D. You have enough freedom to innovate teaching practices in your course. | | | | |
| E. You have sufficient time to prepare online/offline activities for your course. | | | | |
| F. You receive incentives or rewards (letter of appreciation, increase-teaching rate…) for innovation practices. | | | | |

**II. Course information**

*Please choose courses in which you integrate technology (online, offline activities) into your teaching to engage students' learning.*

***A. Course Before Covid-19***

Q1: What is the name of this course_____

Q2: Could you describe your course (course description, course-learning outcomes, student's assessments, teaching activities)?

Q3: What level of the course have you chosen?

A. Bachelor
B. Master
C. Ph.D
D. Continuing education
E. Other: _____

Q4: How many students registered for this course (estimate)? _____

Q5: How often did the teaching sessions face-to-face take place ***before Covid-19***?

A. At regular intervals, every week
B. At regular intervals, spaced at least 2 weeks apart
C. Once at the start and once at the end of the course
D. A series of face-to-face sessions followed by a completely remote phase
E. Other:_____

Q6: Concerning face-to-face and distance articulation **before Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| A. You offer activities during the DISTANCE teaching phases online, offline (outside the classroom) | | | | |
| B. You offered activities during the face-to-face teaching phases (in the classroom) | | | | |

Q7: Regarding using the tools or the platform to engage students **before Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| A. You offer students an opportunity to use various tools to produce work (wiki, Video, concept map editor, blog, logbook, VideoScribe, PowToon, goformative, zeeting, etc.) | | | | |
| B. You offer students one or more communication, organization and collaboration tools (Telegram, Facebook, Zoom, Microsoft Team, WordPress, calendar, schedule, forum, etc.) | | | | |
| C. In the digital resources you use, you integrate images, photos, diagrams, maps, videos, etc. | | | | |
| D. In their work, students integrate images, photos, diagrams, maps, videos, etc. | | | | |
| E. You use SYNCHRONIC communication and collaboration tools (chat, videoconference, document and screen sharing, etc.) | | | | |
| F. Students can comment, modify the resources, documents available to them, and /or the work of their peers | | | | |

Q8: Regarding the educational objectives **before Covid-19**. Please tick (√) it.

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| Your course aims for students to learn to communicate, collaborate and better understand their learning processes | | | | |

Q9: Regarding the support, you offer students both face to face and at a distance **before Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| A. You provide methodological support (help with organization, time management, working methods) | | | | |
| B. You ask students to reflect on their knowledge and their learning process | | | | |
| C. You stimulate mutual help and support among students (answer other people's questions, provide learning resources to others ...) | | | | |

Q10: Regarding the openness of the course, both face to face and at a distance **before Covid-19**. Please tick (√) it.

| | No freedom of choice | Low freedom of choice | Great freedom of choice | Very great freedom of choice |
|---|---|---|---|---|
| Your course leaves students with choices in terms of learning activities, media and tools to use, methods, etc. | | | | |

Q11: Regarding the openness of the course, both face-to-face and at a distance **before Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| You bring *in resources or outside experts* in your course. | | | | |

### *B. Course During Covid-19*

Q12: What is the name of this course_____

Q13: Could you describe your course (course description, course-learning outcomes, student's assessments, teaching activities)?

Q14: What level of the course have you chosen?

A. Bachelor
B. Master
C. Ph.D
D. Continuing education
E. Other: _____

Q15: How many students registered for this course (estimate)? _____

Q16. How often did the teaching sessions face-to-face take place ***during Covid-19***?

A. At regular intervals, every week
B. At regular intervals, spaced at least 2 weeks apart
C. Once at the start and once at the end of the course
D. A series of face-to-face sessions followed by a completely remote phase
E. Other:_____

Q17: Concerning face-to-face and distance articulation **during Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| A. You offer activities during the DISTANCE teaching phases online, offline (outside the classroom) | | | | |
| B. You offered activities during SYNCHRONOUS activities (visioconference) | | | | |

Q18: Regarding using the tools or the platform to engage students **during Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| A. You offer students an opportunity to use various tools to produce work (wiki, Video, concept map editor, blog, logbook, VideoScribe, PowToon, goformative, zeeting ...) | | | | |
| B. You offer students one or more communication, organization, and collaboration tools (Telegram, Facebook, Zoom, Microsoft Team, WordPress, calendar, schedule, forum, etc.) | | | | |
| C. In the digital resources you use, you integrate images, photos, diagrams, maps, videos etc. | | | | |
| D. In their work, students integrate images, photos, diagrams, maps, videos, etc. | | | | |

| | | | | |
|---|---|---|---|---|
| E. You use SYNCHRONIC communication and collaboration tools (chat, videoconference, document, and screen sharing, etc.) | | | | |
| F. Students can comment, modify the resources, documents available to them, and /or the work of their peers | | | | |

Q19: Regarding the educational objectives **during Covid-19**. Please tick (√) it.

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| Your course aims for students to learn to communicate, collaborate and better understand their learning processes | | | | |

Q20: Regarding the support, you offer students face-to-face and at a distance **during Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| A. You provide methodological support (help with organization, time management, working methods) | | | | |
| B. You ask students to reflect on their knowledge and their learning process | | | | |
| C. You stimulate mutual help and support among students (answer other people's questions, provide learning resources to others ...) | | | | |

Q21: Regarding the openness of the course, both face-to-face and at a distance **during Covid-19**. Please tick (√) it.

| | No freedom of choice | Low freedom of choice | Great freedom of choice | Very great freedom of choice |
|---|---|---|---|---|
| Your course leaves students with choices in terms of learning activities, media and tools to use, methods, etc. | | | | |

Q22: Regarding the openness of the course, both face-to-face and at a distance **during Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| You bring *in resources or outside experts* in your course. | | | | |

**III. Conditions, Supports, and Effects of Implementing Hybrid Teaching and Learning**

1. What motivates you to integrate *online, offline activities* into your course?
2. How do you get supported to implement *online, offline activities* in your course?
3. What challenges have you encountered when implementing *online, offline activities* into your course?
4. What are your recommendations to implement *online-offline* courses?
5. Do you think integrating online, offline learning **in your course** can improve students in the following skills? Please tick (√) it.

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem-solving by solving different kinds of non-familiar problems. | | | | |
| B. Access and evaluate information | | | | |
| C. Collaboration with others | | | | |
| D. Think creatively | | | | |
| E. Apply technology effectively | | | | |
| F. Be self-directed learners | | | | |
| G. Work effectively in diverse teams | | | | |

And why? .....

Thank you very much!

APPENDIX 2: Questionnaire for Student

UNIVERSITÉ DE FRIBOURG
UNIVERSITÄT FREIBURG
Faculty of Humanities
Department of Educational Sciences
Avenue de l'Europe 20
CH-1700 Fribourg
Switzerland
www3.unifr.ch

Mr. KAING Sopheap
Ph.D candidate
sopheap.kaing@unifr.ch
kaingsopheap@gmail.com
Phone: (+41) 076 3474822
1700 Fribourg, Switzerland
Supervisor: Prof. CHARLIER Bernadette

Research Title: ***Implementing Condition of Hybrid Teaching and Learning Environment in Cambodian Higher Education***

## Questionnaire
## (For Student)

*Dear Participants :*

*The purpose of this Questionnaire is to delve into the effects of hybrid teaching and learning environment (integrate technology into traditional teaching) on students' 21st century skills. Regarding anonymity and confidentiality, a pseudonym will be used to guarantee that a participant's personal information and address will not be used or revealed in the final report. This will help to ensure that what you have written in the questionnaire will not be traced back to you by third parties. A copy of the final report will be sent to the university library, and to anyone who has participated in the research who has requested a copy. To complete this questionnaire, it might take around 7-10 minutes. Please answer the questions carefully.*

### I. Basic information

Q1: Name of your lecturer (lecturer sent you the link) _____
Q2: Name of your course_____
Q3: What is the level of your course?

F. Bachelor
G. Master
H. Ph.D
I. Continuing education
J. Other

Q4: Regarding your technical resources. Please tick (√) it.

| | Yes | No |
|---|---|---|
| E. Do you have a smart phone to connect internet? | | |
| F. Do you have a computer to do schoolwork? | | |
| G. Do you have WIFI or internet connection at home? | | |
| H. Does your WIFI or internet connection at home work well for online, offline learning activities? | | |

## II. Individual Learners' Characteristic

This section concerns on your learning characteristics. Please tick (√) it.

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| K. I feel comfortable or happy when I work with a computer or a technology. | | | | |
| L. I feel confident when I use computer to deal with schoolwork. | | | | |
| M. I feel committed to the course | | | | |
| N. I have had an experience of online learning or distance learning activities | | | | |
| O. When a change occurs in my learning environment, I feel I open to adapt change. | | | | |
| P. I usually set out to understand for myself the meaning of what we had to learn. | | | | |
| Q. I generally put a lot of effort into my studying. | | | | |
| R. I look at evidence carefully to reach my own conclusions about what I am studying. | | | | |
| S. I review the work I have done to check my reasoning and see that it makes sense. | | | | |
| T. In making sense of new ideas, I often relate them to practical or real-life contexts. | | | | |

## III. Challenges and Effects of Hybrid Teaching and Learning

1. What challenges have you encountered during *online, offline activities* into your course?
2. Do you think integrating online, offline learning in this course can improve you with the following skills? Please tick (√) it.

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| A. Problem solving by solving different kinds of non-familiar problems | | | | |
| B. Access and evaluate information | | | | |
| C. Collaboration with others | | | | |
| D. Think creatively | | | | |
| E. Apply technology effectively | | | | |
| F. Be self-directed learners | | | | |
| G. Work effectively in diverse teams | | | | |

## IV. Description of your course

Q1: Did this course start before Covid-19? *YES or NO* (IF YES please answer to all the questions, IF Not, start at question 9)

## V. Before Covid-19

Q2: How often did face-to-face learning sessions take place **before Covid-19**?

F. At regular intervals, every week
G. At regular intervals, spaced at least 2 weeks apart
H. Once at the start and once at the end of the course
I. A series of face-to-face sessions followed by a completely remote phase
J. Other:_____

Q3: Concerning the face-to-face, and distance articulation **before Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| C. Your lecturer offers activities during the DISTANCE teaching phases online, offline (outside the classroom) | | | | |
| D. Your lecturer offered activities during the face-to-face teaching phases (in the classroom) | | | | |

Q4: Regarding the uses of the tools or the platform to engage student **before Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| G. Your lecturer offers students an opportunity to use various tools to produce work (wiki, Video, concept map editor, blog, logbook, VideoScribe, PowToon, goformative, zeeting, etc.) | | | | |
| H. Your lecturer offers students one or more communication, organization and collaboration tools (Telegram, Facebook, Zoom, Microsoft Team, WordPress, calendar, schedule, forum, etc.) | | | | |
| I. In the digital resources that your lecturer uses, he/she integrates images, photos, diagrams, maps, videos etc. | | | | |
| J. You integrate images, photos, diagrams, maps, videos, etc. in your work | | | | |
| K. You use SYNCHRONIC communication and collaboration tools (chat, videoconference, document, and screen sharing, etc.) | | | | |
| L. You can comment on or modify the resources, documents available to you, and /or the work of your peers | | | | |

Q5: Regarding the educational objectives **before Covid-19**. Please tick (√) it.

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| Your course aims for students to learn to communicate, collaborate and better understand their learning processes | | | | |

Q6: Regarding the support your lecturer offers to students, both face-to-face and at a distance **before Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| D. Your lecturer provides methodological support (help with organization, time management, working methods) | | | | |
| E. Your lecturer asks students to reflect on their knowledge and their learning process | | | | |
| F. Your lecturer stimulates mutual help and support among students (answer other people's questions, provide learning resources to others ...) | | | | |

Q7: Regarding the openness of the course, both face-to-face and at a distance **before Covid-19**. Please tick (√) it.

| | No freedom of choice | Low freedom of choice | Great freedom of choice | Very great freedom of choice |
|---|---|---|---|---|
| Your course leaves you with choices in terms of learning activities, media and tools to use, methods, etc. | | | | |

Q8: Regarding the openness of the course, both face-to-face and at a distance **before Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| Your lecturer brings *in resources or outside experts* in your course. | | | | |

## VI. During Covid-19

Q9: How often do face-to-face learning sessions take place **during Covid-19**?

A. At regular intervals, every week
B. At regular intervals, spaced at least 2 weeks apart
C. Once at the start and once at the end of the course
D. A series of face-to-face sessions followed by a completely remote phase
E. Other:_____

Q10: Concerning face-to-face and distance articulation **during Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| A. Your lecturer offers activities during the DISTANCE teaching phases online, offline (outside the classroom) | | | | |
| B. Your lecturer offered activities during SYNCHRONOUS activities (visioconference, videoconference) | | | | |

Q11: Regarding the uses of the tools or the platform to engage student **during Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| A. Your lecturer offers students an opportunity to use various tools to produce work (wiki, Video, concept map editor, blog, logbook, VideoScribe, PowToon, goformative, zeeting ...) | | | | |
| B. Your lecturer offers students one or more communication, organization, and collaboration tools (Telegram, Facebook, Zoom, Microsoft Team, WordPress, calendar, schedule, forum, etc.) | | | | |
| C. In the digital resources that your lecturer uses, he/she integrates images, photos, diagrams, maps, videos etc. | | | | |
| D. You integrate images, photos, diagrams, maps, videos, etc. in your work | | | | |
| E. You use SYNCHRONIC communication and collaboration tools (chat, videoconference, document, and screen sharing, etc.) | | | | |
| F. You can comment on or modify the resources, documents available to you, and /or the work of your peers | | | | |

Q12: Regarding the educational objectives **during Covid-19**. Please tick (√) it.

| | Strongly disagree | Disagree | Agree | Strongly agree |
|---|---|---|---|---|
| Your course aims for students to learn to communicate, collaborate and better understand their learning processes | | | | |

Q13: Regarding the support your lecturer offers to students, both face-to-face and at a distance **during Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| A. Your lecturer provides methodological support (help with organization, time management, working methods) | | | | |
| B. Your lecturer asks students to reflect on their knowledge and their learning process | | | | |

| | | | | |
|---|---|---|---|---|
| C. Your lecturer stimulates mutual help and support among students (answer other people's questions, provide learning resources to others ...) | | | | |

Q14: Regarding the openness of the course, both face-to-face and at a distance **during Covid-19**. Please tick (√) it.

| | No freedom of choice | Low freedom of choice | Great freedom of choice | Very great freedom of choice |
|---|---|---|---|---|
| Your course leaves you with choices in terms of learning activities, media and tools to use, methods, etc. | | | | |

Q15: Regarding the openness of the course, both face-to-face and at a distance **during Covid-19**. Please tick (√) it.

| | Never | Rarely | sometimes | Often |
|---|---|---|---|---|
| Your lecturer brings *in resources or outside experts* in your course. | | | | |

Thank you very much!

APPENDIX 3: Declaration

I am aware of and understand the university's policy on plagiarism. I make a declaration that this dissertation was my original work, and it has not been submitted for any other degree of university or institute of learning. However, some parts of this work have been extracted to publish in a book chapter under the title 'implementing conditions of hybrid teaching and learning environment in Cambodian higher education before and during Covid-19' where it was explicitly stated in the footnote of this dissertation.

Sopheap KAING

Fribourg, 24th March 2022

Place and Date