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Science, Technology, Society and Education

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Educational Theory in the 21st Century

Science, Technology, Society and Education

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Preface

Education as a main social institution has transformed alongside other social systems throughout the history of the world. In particular, changes in science, philosophy, culture, and economy have deeply affected the purpose, content, and methods of education. Shaped in accordance with the social and political systems that had been dominated by agriculture and trade-centered production until the nineteenth century, education seems to have since found a new way with the formation of industrialization and modern society from the nineteenth century to the last quarter of the twentieth century. The pragmatic character of education has become more prominent within industrial society, and education has become more sensitive to the demands of industrial economy and nation-state politics. During this time, humanity faced the phenomenon of state-offered mass education. Modern science, culture, and philosophy have also deeply influenced education. Positivism and behaviorism first formed different educational schools, after which existentialism and humanism did the same.

Since the 1970s, the transition to information society, developments in information technologies, globalization, and postmodernity seem to have given birth to the constructivist paradigm in education. The constructivist paradigm places emphasis on the individual in education, the subjective nature of knowledge, individuality in the construction of knowledge,

student-centeredness, and teachers' withdrawal from their previous placement. Culture, values, character development, and social and emotional development have increased their prominence in educational practices.

While postmodern and constructivist education theory continues to be effective today, the first quarter of the twenty-first century has made some structural transformations in education more evident due to the accelerated developments in information and communication technologies. Technologies, essentially being a tool, have begun to change both the structural features as well as the aims of education. The COVID-19 pandemic has also given new impetus to digitalization in education. Advanced educational technologies are most evident in teachers' roles, school designs, and educational administration. This first quarter of the twenty-first century is a time when educational institutions have sought direction; attempted to determine their future; and actively discussed the purpose, function, and methods of education. Concepts such as twenty-first-century competencies, digital education, Industry 4.0, Society 5.0, and the Singularity Age are some of the concepts that have been frequently discussed in this search.

This book aims to review the major controversies of twenty-first-century educational theory and to make a modest contribution to the future of education. In this direction, it primarily deals with how changes have been reflected in science and philosophy followed by how new social conceptions and cultural paradigms have been reflected onto educational goals and content. Finally, the book examines the effects these changes have had on learning-teaching processes, school designs, educational administration, and teacher-training practices, which are the more instrumental components of education.

This work is the first book of the *Maarif Global Education Series* and is planned as a prelude to the books that will be published in the series in the coming years. For this reason, the chapters of this book address the main issues of twenty-first-century education using a macro perspective. We hope that the book will be a reference source for researchers, experts, and educators and would like to thank the experts from different parts of the world who have contributed with their impressive chapters.

Istanbul, Turkey — Yusuf Alpaydın
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Scientific-Technological Developments and Educational Paradigms

Challenges Facing the Philosophy of Education in the Twenty-First Century

Khosrow Bagheri Noaparast

The philosophy of education faced challenges in the twentieth century that had derived from the challenges general philosophical thought had faced. The following sections introduce the first three main trends in the philosophy of education in the twentieth century (i.e., early pragmatism, "ism" movements, and analytic philosophy of education) along with the challenges these trends faced. Next, the new horizons for the twenty-first century are explained under the titles of new pragmatism, post-structuralism, post-modernism, and constructivism. In the meantime, new conceptions of knowledge and education along with the weaknesses associated with them are introduced and discussed.

Main Trends in the Twentieth Century

This section introduces the three main trends in the philosophy of education: early pragmatism, "ism" movements, and the analytic philosophy of education revolution.

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Early Pragmatism

The philosophical view on education has occurred under different names such as philosophy of faith and philosophy of duty in different places around the world (Burbules, 2000). However, the philosophy of education arose as a particular discipline in 1935 with the formation of the John Dewey Society (Kaminsky, 1985). Thus, John Dewey can be claimed to be the father of the philosophy of education. This is why Dewey's early pragmatism was the first source of this discipline.

According to Dewey's pragmatism, which was inspired by Hegel and Darwin, dichotomies such as individual vs. society, mind vs. body, and theory vs. practice should be removed and ideas should be evaluated in terms of their practical consequences during the process of adjustment. Dewey held that the aim of education should be connected to the problematic situation in which students exist. As the aim of education, growth indicates that pupils need to have their end results in view in terms of the problems that should be solved. In this endeavor, methods of problem solving are much more important than absorbing cultural content for the sake of subject matters. This endeavor also needs to be conducted democratically, namely by providing all students with the opportunity to participate in the process of problem solving.

Even though Dewey attempted to eliminate the dichotomies in philosophical as well as educational thought, his emphasis on method of thinking in contrast to the cultural content of thoughts became the Achilles' heel of his philosophy of education. Inspired by the scientific method, Dewey's (1933) book *How We Think* suggested the best way to think in education to be the experimental method; Dewey formulated this as the method of problem solving being applicable to all realms of education. As the next section will show, post-modern thinkers have undermined the supremacy of the scientific method in thought as well as education. In particular, Richard Rorty (1991), a new pragmatist who once temporarily described himself as post-modern, attacked Dewey's view on the supremacy of the scientific method.

Another challenge to Dewey's reliance on science came from the new pragmatist Willard Quine (1981). He held an even stronger holistic view on knowledge than Dewey's. As explained below, Quine's holistic view undermined the supremacy of evidence on theory; instead holding a two-way road in which evidence has as much power to restrain or reject theory as theory does to restrain or reject evidence.

The "Ism" Movements

New movements appeared during the 1950s and 1960s. These movements are usually referred to as "isms" based on various philosophical schools being taken as a foundation in order to provide educational implications for dealing with educational problems. Thus, educational philosophies were introduced under titles such as idealism, realism, existentialism, and more. Based on these schools' philosophical assumptions, certain aims, subject matters, and methods were suggested for education. For example, Harry Broudy is one important figure who used realism as the basis for inferring educational implications. He referred to the derivative method as the main method for drawing such implications (Broudy, 1969, p. 118). William Frankena (1966) also suggested that Aristotle's practical syllogism could be used for analyzing educational affairs in terms of their philosophical underpinnings. According to him, one can start the analysis regressively from educational methods, subject matters, and aims toward their underlying philosophical assumptions. In this way, how educational questions are answered is made clear by drawing philosophical implications (Bagheri Noaparast, 2016).

Taking philosophical schools as the basis for inferring implications also resulted in some difficulties being encountered in dealing with educational issues. The strong version of this inferential view providing a merely speculative attempt at dealing with educational problems undermined education's empirical aspect. This weakness was the main problem for the "ism" movements. For instance, Sidney Hook (1969) attacked this view, accusing it of saying irrelevant things about education. He claimed that nobody would be able to infer new knowledge about learning from the epistemologies of the philosophical schools.

As mentioned above, the analytic philosophy of education was another source of the attack on the "ism" movements. According to the analytic view, the general task of philosophy, in particular the philosophy of education, was not to take the position of science, especially not the science of education.

The Revolution of the Analytic Philosophy of Education

The 1970s witnessed the climax of a so-called revolution in the philosophy of education brought about by the analytic philosophers of education. The analytic philosophy of education relied upon a general revolution in philosophy that, according to Gilbert Ryle (1956), had been in process since the beginning of the twentieth century. The transformation of analytic philosophy was called the second revolution in philosophy, the first being the one that had advanced with the rise of modern philosophy, particularly by Descartes.

Analytic philosophers of education take the philosophical inquiry as a second-order inquiry dealing with the language of education rather than educational activities per se. Thus, this trend in the philosophy of education looked to clarify educational concepts in order to help educationists understand and use educational terms properly and thereby avoid pitfalls in educational endeavors. Given the misuse of concepts such as teaching, punishment, and evaluation in educational settings, the analytic philosophy of education provided educationists with a therapeutic attempt by appealing to the educational damage they can prevent.

As Burbules (2000) pointed out, the analytic philosophy of education has had three important contributions. Firstly, it provided education with credibility and legitimacy. Credibility was due to the significant position that the analytic method had generally taken in philosophy and been transmitted to the educational sphere. Legitimacy was due to showing the analytic method's usefulness in education for analyzing educational concepts. As an example, Richard Peters (1967) analyzed the concept of authority to show the times when a teacher can have a justified/unjustified authority. By differentiating between having authority and being an authority, he showed justified authority to be internal in teachers in terms of their knowledge and character whereas unjustified authority is external to teachers in terms of their title and position.

According to Burbules (2000), the analytic philosophy of education secondly broke the dominance Dewey and progressivism had in the philosophy of education by introducing a new view to education in terms of concept analysis.

Thirdly, the analytic philosophy of education was successful in defeating the deductive view associated with the "ism" movements. While teachers had been urged to choose their own philosophy among the philosophical schools in these movements, the analytic view stated

that what teachers need is not to choose a philosophical school for drawing implications but rather to be able to think philosophically (i.e., analytically) on educational issues.

Two sources of challenges are found in the analytic philosophy of education: one from the inside and the other from the outside of the analytic tradition. The attack from the inside came from the towering figure of analytic philosophy, Ludwig Wittgenstein, who in his later period of thought rejected analytic philosophy's claim of having a particular method of analysis. Unlike the early analytic philosophers who took mathematical logic as the criterion for analysis, Wittgenstein (1953) gave supremacy to ordinary language and denied logic's dominance over ordinary language.

The outer source of the challenges to analytic philosophy came from its rival: continental philosophy. This source, which is referred to as a post-analytic philosophy, involves the different trends in Continental philosophy (e.g., post-structural and post-modern philosophy). Even though an attempt was made to have a conversation between the two traditions of European philosophy in 1958 in the Royaumont Colloquium in France, this attempt is mostly considered to have been fruitless. Michael Dummett (1993, p. 26) stated that analytical philosophy and phenomenology are like the two European rivers, the Rhine and the Danube, that "rise quite close to one another and for a time pursue roughly parallel courses, only to diverge in utterly different directions and flow into different seas." This rivalry led to continental philosophy's revenge over analytic philosophy at the end of the twentieth century due to the arrogance the latter had shown in relation to the former because of having a noble philosophical method. Thus, the end of the twentieth century witnessed the rise of rival philosophies of education in terms of the continental philosophies' concerns.

New Horizons in the Twenty-First Century

This section explains the responses to the above-mentioned challenges under the rubrics of new pragmatism, post-structuralism, and post-modernism.

New Pragmatism

The two most important figures in new pragmatism are Ricard Rorty and Willard Quine. Both of them challenged Dewey's pragmatism in terms of its conception of science. However, while Rorty undermined Dewey's reliance on scientific method altogether, Quine provided early pragmatism with an elaborated conception of science.

As for Rorty, the main weakness of early pragmatism was its reliance on the scientific method. In his essay titled "Pragmatism Without Method," Rorty (1991) held that pragmatism would be more promising if it put aside its obsession with method. Instead of a rigorous scientific method, Rorty suggested that communication and looking for some better ways for conversation is what is needed in philosophy as well as education.

Inspired by Hans Gadamer's conception of *Bildung* [self-formation], Rorty looked for a desirable conception of education. Referring to his preferred conception as "edification," he stated, "Since 'education' sounds a bit too flat, and *Bildung* a bit too foreign, I shall use 'edification' to stand for this project of finding new, better, more interesting, more fruitful ways of speaking" (Rorty, 1979, p. 360). Rory clearly saw a new way to speak about the lost element in education and gave edification two dimensions. One dimension indicates the edification of others and their cultures, which he referred to as hermeneutical activity. In this activity, what is needed is the ability to make the unfamiliar familiar. In other words, an educated person should have the ability to understand unfamiliar cultures instead of being closed minded in their own cultural conceptions.

The second dimension of edification consists of edifying oneself. Rorty referred to this dimension as poetic activity, by which he means the ability to make the familiar unfamiliar. In other words, a person with a university-level education should be able to question the basics of one's own cultural concepts and criticize them more profoundly. The desirable person at this level of education is called the "liberal ironist."

As far as the pre-university education is concerned, Rorty (1989) criticized Dewey's extreme emphasis on teaching and learning the problem-solving method. According to Rorty, however, learning cultural content is crucial in this period of education so that one might call the education of this period enculturation. Rorty puts himself on the side of E. D. Hirsch in his controversy with Dewey on supporting content vs. method. In a conversation with Olson in response to the question, "Do

you share E. D. Hirsch's desire for increased 'cultural literacy,' a sharing of a common vocabulary and a common body of knowledge?" Rorty responded, "Yes, I think he's perfectly right about that. The effect of the present system is to keep education for kids from relatively well-educated, middle-class families who pick up the common knowledge of society as a whole" (Olson, 1989, p. 7).

Quine's (1981) version of the new pragmatism centers its attention on the negligence of a whole-hearted holism. According to Quine, neither Dewey nor the other founders of early pragmatism (i.e., Charles Peirce and William James) took the holistic characteristic of knowledge seriously. In line with his rejection of the foundational theory of epistemology, Quine believed a tendency of strong coherence to exist in our knowledge and so talked about the theory of coherence of evidence. According to this view, no supremacy exists for the scientific method, rather a strong interaction is found between theory and experimental evidence so that they compromise with each other in order to keep the coherence of knowledge intact.

In looking for the consequences of Quine's view on education, Walker and Evers (1982) suggested that any form of compartmentalization of knowledge, such as Paul Hirst's (1974) forms of knowledge, is unacceptable, accordingly rejecting the distinction among disciplines and the search for a pluralistic methodology for different disciplines. Instead, knowledge should be taken to be in Quine's (1966, p. 56) words a "single sprawling system, loosely connected in some portions but no disconnected nowhere." This requires a very strong problem-based education in which the distinction among subjects is taken to be artificial. Instead of holding serious epistemological gaps among disciplines, any division among subjects is only acceptable when looking for practical utility. Such a practical utility can be seen in how libraries separate books for finding them more easily. Thus, curriculum design in terms of subject matter is allowed only if doing so has a practical utility.

As far as Rorty's new pragmatism is concerned, his suggested dichotomies appear indefensible. Rorty placed solidarity against the objectivity of science, supporting the former and undermining the latter. The question is why did he consider these two poles to be incompatible? In addition, he drew a clear-cut relation between pre-university enculturation and the edification of university education. The question here is how can a university student all of a sudden become a hard critic or liberal ironist without a background on critique during their pre-university education? I have dealt with these questions elsewhere and shown that they refer to some weaknesses in Rorty's view (Bagheri Noaparast, 2014).

Post-Structuralism

One of continental philosophy's reactions to the analytic philosophy of education is post-structuralism. The two important proponents of this view are Michel Foucault and Jacques Derrida. Foucault's views on archeology and genealogy have led to numerous studies on knowledge and power relations in education as well as the problematization of normalization in education (e.g., Gale, 2001; Macfarlane & Lewis, 2004). In what follows, I am going to mention Derrida's influence in more detail.

Derrida (1983) critiqued the Enlightenment on the grounds of its severe distinction between reason and tradition. He talked about a New Enlightenment that removed the hard contrast between reason and tradition. According to Derrida, if the old Enlightenment assumed reason to be faith, this was because of its hard rejection of faith alongside tradition and a compensation for the void due to this rejection. In fact, Derrida (1995, p. 130) combined fidelity and infidelity within tradition, stating, "We have gotten more than we think we know from 'tradition,' but the scene of the gift also obligates us to a kind of filial lack of piety, at once serious and not so serious, as regards the thinking to which we have the greatest debt."

This point refers to Derrida's key concept of deconstruction. Even though giving a clear definition of this term is too difficult, it indicates that structures are usually built upon a rejection of one element in favor of another one. However, justice that is somehow equal to deconstruction requires the rejected element being revived in a new guise. Thus, justice cannot be deconstructed; rather justice is the criterion for deconstruction, or in Derrida's words, "Deconstruction is justice" (Derrida, 1992, p. 15).

The basic concept of deconstruction has inspired educational studies. Accordingly, a suppressed element is always found in educational systems and their elements such as curriculum. This suppression develops during the process of deconstructing the foundational change in the educational system, mostly as an inevitable event.

The other important point in Derrida's view is the centrality of text, as he stated that nothing exists outside of the text (*Il n'y a pas de hors-text*; Derrida, 1976, p. 159). Accordingly, the reference is not outside the text but inside and undecidable. Plato regarded the art as a second mimesis because the artist imitates nature, which itself is an imitation of ideas. Along this line, Derrida talked about the simulacrum, a copy of copy

but one for which there is no original reference (i.e., a double invagination). Accordingly, knowledge does not refer to the bare facts beyond it. Thus, Derrida (1981, pp. 193–194) in a play with words stated knowledge to be not an "insight" but an "*in cit*ation." This conception of knowledge provides teachers as well as pupils with a cautious treatment of texts instead of a certainty with regard to knowledge that is considered written.

Derrida's influence on the philosophy of education can also be investigated, particularly in the realm of values (Trifonas, 2004). This is because, as mentioned above, deconstruction is more tightly related to justice. As an example, a study was advanced by Biesta (2001) with regard to children's rights that analyzed official international documents about children's rights in terms of their natural rights. However, Biesta showed that children have no natural rights; what is taken as natural is only the situation of children with a high quality of life. In the meantime, what is suppressed and hidden is the rights of street children in third world countries. Having done this deconstruction, Biesta concluded with a new concept of children's rights in a local meaning that would include both first world as well as third world countries' children. This is in accordance with what is called a quasi-transcendental analysis in which street children's rights are both the possibility and impossibility of talking about children's world rights.

Another example of a deconstructive study was performed on religious education (Bagheri Noaparast & Khosravi, 2011). This study argued the dominant sphere of exclusivity in most religions and religious education to be due to other religions being suppressed. However, the proclaimed truth for any religion was made clear to be at the expense of the rejection of other religions through the deconstruction. Again in another quasi-transcendental analysis, a conception of religion and religious education is suggested that emphasizes the commonalities of religions.

In the case of Derrida's post-structuralism, a question occurs as to what deconstruction amounts to. The dominant conception in Derrida's writings is that deconstruction is an event. I have argued his writing to have some indications to the effect that deconstruction may be taken as an action in addition to being an event. In fact, if one wants to combine these two aspects, deconstruction can be referred to as a timely action with time indicating an aspect of the event (Bagheri Noaparast & Khosravi, 2012).

Post-Modernism

Post-modernism is not actually a coherent system of thought compared to pragmatism; it is instead a coalition in which having a common enemy is pivotal. In other words, this term is mainly negative in tone, which entails a negation of modernity. For this reason, post-modern thinkers can include Marxists, feminists, new pragmatists, and post-structuralists.

The most important characteristics of modernity are as follows:

(1) Centrality of the subject, as derived from the Cogito of Descartes;
(2) An absolute and universal conception of rationality and, in consequence, looking for grand narratives of human affairs; this is associated with the idea of progress in human history, as these ideas can be seen in the thoughts of Kant, Hegel, and Marx.
(3) A strong reliance on science as the most important instrument of progress;
(4) Rejecting tradition and old things and embracing new/modern things.

Thus, roughly speaking, a post-modern thought indicates the following characteristics:

(1) Decentering the subject as it can be viewed in structuralism and post-structuralism;
(2) Rejecting any grand narrative, which Jean-Francois Lyotard (1979) who coined the concept of post-modernism took it as the main mark of post-modernism. As a consequence of this rejection, post-modern thinkers embrace the local rationality that is associated with reasonability. While rationality indicates a universal characteristic, reasonability has contextual connotations.
(3) An almost negative attitude toward the supremacy of science as elaborated upon by Rorty.
(4) Embracing traditions along with edifying them as seen in Derrida's remarks on what he called the new Enlightenment.

Post-modern thinkers have critiqued modern education on various grounds. Henry Giroux (1988), a left-wing thinker, rejected the idea of teaching in terms of techniques and instead talked about teachers as intellectuals who need to have a political position in undermining the ideology

(i.e., false consciousness) derived from late capitalism and to retain its dominance in educational matters.

Along this line of critique, Robert Scholes (1987) differentiated three kinds of book reading in schools: reading within, in which the information within a book is received; reading upon, which indicates going beyond the text and looking for an inter-textual relationship that provides pupils with an interpretation of the text concerned; and lastly reading against, in which a critical position is taken about the text by looking for its presuppositions and deconstructing it.

Another important element in post-modern thinking about education concerns the "other." The dominance of a higher culture is undermined alongside the rejection of universal rationality. Associating this culture with white men has become mainstream (male-stream) and is the means by which local cultures are marginalized. Putting emphasis on local and minor cultures, post-modern thinkers have talked about voice and border pedagogies, in which the "other" comes from the margin to the center of attention (Aronowitz & Giroux, 1991, Ch. 5).

Aronowitz (2004) also emphasized edifying tradition instead of rejecting it altogether as the opposite of the modern. Citing Hannah Arendt, he stated, "I agree with Hannah Arendt that education 'cannot forgo either authority or tradition.' But authority must be earned rather than assumed, and the transmission of tradition needs to be critical rather than worshipful" (p. 32). This shows that the relation to tradition needs to be twofold, a simultaneous acceptance and critique.

Post-modernism generally seems to be too quick to reject the modern tendency toward objectivity. This has led post-modernism to a strong relativism associated with constructivism. I have argued elsewhere (Bagheri Noaparast, 2018) that post-modernism is self-defeating in its rejection of objectivity and realism related to modern thought. This is because one should accept humans as a constructive being. In other words, the very statement of human being as a constructive being is not itself a construct or subjective. To put it in Tarskian phrasing, one can say "'The human is a constructive being' is true *if and only if* the humans is a constructive being."

Constructivism

Immanuel Kant laid down the basis of constructivism when he stated that sense data should be organized by the categories of human understanding; otherwise, sense without understanding would be blind. In the more recent times, a milestone in constructivism was Nelson Goodman's *Ways of Worldmaking* in 1978. Goodman formulated his argument in this regard as the inevitability of frame of reference: "If I ask about the world, you can offer to tell me how it is under one or more frames of reference; but if I insist that you tell me how it is apart from all frames, what can you say?" (Goodman, 1978, pp. 2–3).

Goodman held that we are making our world in terms of our frames of reference, which always intervene between us and the world as it is. The world as it is (i.e., World 1) is not "our" world; the latter is what we make by means of our frames of reference, which can be referred to as World 2.

According to constructivism, knowledge is composed of the constructs that have shown themselves to be "viable" (von Glasersfeld, 1993, p. 26). Viability is the constructivist's alternative to the truth of knowledge. In other words, constructs cannot be evaluated in terms of correspondence to reality; they can only be judged as viable or working in relation to answering one's needs. In addition, Desautels and Larochelle (1990, p. 236) held that scientific knowledge is made to give meaning to our theory-laden observations, and no such thing as the Great Book of Nature exists that our theories can consult in order to provide correspondence to reality.

Based on the account that constructivism gives regarding human knowledge, education should be concerned about pupils constructing knowledge rather than transmitting the already discovered knowledge. This is because knowledge is invented rather than discovered. Thus, constructivism requires pupils to be active in suggesting new constructs or evaluating the viability of what is called knowledge. Jean Piaget (1972) was a pioneer in showing mathematics to be rooted first in children's coordinated actions and to appear as concrete operations and then abstract operations. Accordingly, teaching and learning mathematics should not be conducted verbally; rather, the activity and manipulation of children is the right way in this regard.

As for constructivism, particularly its radical version, the most important weakness goes back to its subjectivism and affinity with idealism. By

concentrating on Goodman's position as the milestone of constructivism, one might say that Goodman did not escape the reality understood as World 1. However, he treated this world ambiguously and sometimes paradoxically; as such, he might be misunderstood. This can be seen in his argument "no perception without conception." In giving this argument, Goodman was appealing to idealists. Even though his unrealism does not indicate him as an idealist, he did take idealism as an important background and support for his argument against realists:

> The overwhelming case against perception without conception, the pure given, absolute immediacy, the innocent eye, substance as substratum, has been so fully and frequently set forth—by Berkeley, Kant, Cassirer, Gombrich, Bruner, and many others—as to need no restatement here. Talk of unstructured content or an unconceptualized given or a substratum without properties is self-defeating for the talk imposes structure, conceptualizes, ascribes properties. (Goodman, 1996, p. 65)

I have two comments on this passage. First, if any kind of talk about unstructured content is self-defeating, then Goodman himself gives the same self-defeating talk when he refers to World 1 as "the world well-lost." (Goodman, 1978, p. 4). Anyway, this talk turns the lost world into a found world due to describing it with the label of the lost world. But if Goodman considers the use of such a phrase to be legitimate or takes it to be a non-descriptive description, then the same should be admitted for the talk about unstructured content.

Second, from among the idealists whom Goodman takes as his supports, Kant has shown that idealism itself needs to be supported by a kind of realism. As Philips pointed out, Kant (1929, pp. 345–348) differentiated between transcendental idealism and transcendental realism on one hand and empirical idealism and empirical realism on the other in his *Critique of Pure Reason*. Empirical realism indicates that an external world exists with material objects in space and time, while the empirical idealist denies the existence of such a world. The transcendental idealist denies that external objects have an existence independent of the senses. Kant holds that transcendental idealism is compatible with empirical realism but that transcendental realism leads to empirical idealism. This is because the transcendental realist holds that objects of the senses have an existence independent of the senses, whereas he cannot deny objects of the senses being dependent on us (Philips, 1978, p. 58).

The question to be asked from Goodman is whether he can admit the combination of his constructivism with an empirical realism like that of Kant. If not, then he should embrace skepticism or solipsism.

Goodman, along with idealists and constructivists, has shown that the mind matters when taking human knowledge into account as he puts emphasis on the frame of reference in talking about reality. Accordingly, we cannot escape our frames of reference. In other words, we are bound up in the world (or worlds) of our frames of reference. However, admitting that we are in the prison of the Kantian world does not indicate that we are living in illusive worlds. What this indicates is only that World 1 cannot be experienced as it is without being modified by our frames of reference in the first place. Our World 2 (i.e., right versions of World 1) is made up not in a vacuum but in relation to World 1. Thus, the viability of our constructs or workability of our maps is dependent on the reality of World 1, as this viability is dependent on the construct or the map itself because, after all, the construct is what is viable and the map is what works.

Given that our right versions (i.e., World 2) are related to World 1, this relation is the one in which they are considered to be right, and we have different right versions, logic follows that the compatibility of our right versions implies that they are supported one way or another by World 1. This support might be what Rescher (1987) referred to as the error tolerance of nature, as is seen in the case of the flat Earth theory. To follow Rescher's phrasing, the support may occur through what I term as the "difference tolerance" of nature, as is seen in how different ways exist for defining the points and lines mentioned above. Still, a third way of support is what may be termed as "impaired objectivity." Take the example of a man with impaired vision who systematically sees one thing doubled. He truly cannot see things as they are, but given that he systematically sees one thing as two and two as four ad infinitum, then he holds an impaired objectivity in his perceptions. Living in a Kantian world, we might nevertheless be considered like this man with impaired objective perception and knowledge. On the whole, our right versions need not correspond straightforwardly to the reality of World 1 to be considered right, but they are not needless of its support in any way.

Our different right versions, having different languages and being irreducible of one another, can be in harmony with each other. This harmonious relationship can be grasped in terms of different aspects

of one reality, with each being approached from a distinct perspective. Interdisciplinary research has made this kind of relationship reasonable.

As each right version in World 2 is a version of World 1 in the final analysis, the harmonious relationship among the right versions will also be a version of World 1. In other words, the mono-reality of our right versions is an indication of the mono-reality of World 1. At the same time, the mono-reality of our right versions is not a reduction as it does not force us to eradicate the language differences pertaining to the right versions; we are only forced to take a higher mono-realistic stance.

What we seem to need in our future philosophy of education is a complicated combination between the subjective and objective aspects of mind, education, and culture. Finding the optimum point of balance between these two aspects has been the target of many thinkers, but its time is still to come.

Conclusion

Although the new trends in philosophy of education have their own weaknesses, they have provided educational thought with new directions. Let's have a look at some examples from these new trends.

First is the new pragmatism. One important area from the pragmatist point of view that has influenced the idea of curriculum since Dewey has been the concept of democracy. Dewey (1916) in his important book, *Democracy and Education*, revealed the connection and proximity between democracy and education. Dewey's basic concept in this regard, namely individuals' shared experience in dealing with and solving problems, has paved the way for a specific approach in curricula. Accordingly, curricula should be centered on the common problems individuals have during their shared experiences; consequently, special emphasis should be placed on the common interests and problems individuals have and their contributions in solving them, not on matters such as disciplines, books, lessons, or the like.

From the point of view of new pragmatism, revisions have been made to Dewey's concept of democracy and its implications for curricula. Jim Walker (1987) addressed these revisions, and his main point is that, from the point of view of new pragmatism, criticisms are found regarding Dewey's classical pragmatist ideas.

Due to these criticisms, Walker assigned a different role to democracy in curriculum planning.

According to Walker, Dewey believed that democracy depends on the shared experiences between individuals. In other words, he saw democracy as requiring individuals to have an active and dynamic relationship with each other in order to solve problems. Dewey, while skeptical of the need for a state, generally acknowledged that the modern nation-state framework was itself the basis for shared experiences between individuals. However, the critique on Dewey's view in this regard is that the relationship between individuals' shared experiences and the realities of government power in present-day societies is so complex that it does not necessarily allow for shared experiences between individuals. From the perspective of educational curricula, this has led to a kind of centralized government-run policy. According to Walker, shared experiences between individuals are impossible in today's large and complex societies, especially because government and power relations can be other obstacles. However, despite democracy as a community of individuals being impossible, we are able to talk about a community of organizations.

Another point in Walker's (1987) view regards educational planning. According to Walker, trusted groups evidently include parents and students' representatives, and when students reach legal age or possibly after the stage of compulsory education, the majority of delegates should be students who determine the curriculum. The compulsory education stage has no need for a patriarchal curriculum, but the existence of optional units in a curriculum may prevent such a relationship. In addition, the general education curriculum should address common issues that stakeholders (parents and students) face; this can lead to a common curriculum, one that should not be considered the same as the core curriculum because in the former, special attention is given to stakeholders' common issues while the latter is determined by experts and focuses on different topics in different sciences.

As for the influence post-structuralism has had on educational thought, one good example is Michel Foucault's view. As Roger Deacon (2006) pointed out, Foucault's studies have provided educational thought with new concepts (e.g., discipline and problematization), analytical techniques (e.g., archaeology and genealogy), and arguments (e.g., in terms of knowledge/power relations). Let's consider a type of knowledge/power analysis. According to Foucault (1977), knowledge is intertwined with power, even though not necessarily always in a detrimental way. This idea leads to the notion of normalization, for which educational settings are the most appropriate. During normalization, individual differences are

not so much tolerated, particularly those of individuals who might be in sharp contrast or critical to the existing settings. The destruction of existing norms is not necessarily always abnormal; rather it might exceed norms and formalities. However, the process of normalization regards geniuses and critical people in line with abnormal and anti-social persons. The important point that Foucault referred to is that power in combination with knowledge can punish students in elegant ways that are apparently non-violent. However, pushing students softly toward norms and formalities by means of things such as the laws of learning discovered by psychological knowledge can be as harmful to students' psychology as violent methods are.

Post-modern thought has also provided education with change. As Usher and Edwards (1994, pp. 1–2) claimed, post-modernism provided a different way of seeing things and an ironical, self-referential state of mind. In terms of this new way of seeing things, clear-cut distinctions are blurred, and a relativistic viewpoint is advanced. Thus, the absolute supremacy of things like male over female, whites over blacks, self over "other" is rejected. Even though this relativism is a double-edged sword, the positive side of post-modern thinking in supporting the oppressed and justice is admirable. Thus, post-modern thought provides a manifesto that, as Parker (1997) identified, requires us to be reflective educationists in order to provide a space for other voices.

Constructivism has also provided educational thought with new ideas. For example, Von Glasersfeld (1989) emphasized the construction of knowledge in the human mind in the direction of his extreme constructivism. According to this view on education, the teacher should try to create unbalanced conditions to motivate students to build knowledge in order to regain balance rather than try to convey information to students. In the lessons of history, constructivists believe in replacing teacher lecturing with student inquiry. In addition, creating a sense of empathy in students with historical figures and people participating in each event appears necessary due to the importance of storytelling and the construction of new historical narratives consistent with sources. According to Orril and Shapiro (2005, p. 738), the lessons of history require sympathy, imagination, and emotion on the part of the student because of their special dependence on humanity. Constructivists' emphasis on storytelling as a historian's task highlights the need for strong imagination to process historical narratives.

All these new trends in the philosophy of education need to be examined over the processes of time, particularly in terms of their strengths and weaknesses as addressed above.

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Scientific Paradigm Shifts and Curriculum: Experiences in the Transition to Social Constructivist Education in Turkey and Singapore

Mehmet Ulukütük

Science-knowledge paradigms are epistemological frameworks that have emerged over long periods of time, changed and transformed sometimes slowly sometimes suddenly, and present models of knowledge, understanding, and interpretation at a specific period of time. Science-knowledge paradigms penetrated into curricula through textbooks in the "normal science" stage as conceptualized by Thomas Kuhn (1962). Therefore, a science-knowledge paradigm shift in turn changes the curriculum. While Newton (Bechler, 1991; Newton, 1999), the pioneer of the modern scientific paradigm, understood physics based on the notion of absolute time and space, Einstein (1960), the pioneer of the postmodern scientific paradigm, understood physics by placing time and space on relativistic foundations that were strengthened by Heisenberg's uncertainty principle. In time, changes in scientific paradigms have reflected upon the curriculum through a constructivist approach. The

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problem is how to explain and define the relationship between science-knowledge paradigms and curriculum. Many countries have started to adopt constructivist education since the late 1980s/early 1990s.In terms of shaping the educational approach and affecting curriculum, constructivism has started to become a dominant paradigm in different countries around the world. Thus, countries such as the USA, England, Germany, Spain, Canada, Australia, New Zealand, Finland, Israel, Taiwan, and Singapore have based their education reforms on constructivism (Bukova & Alkan, 2005). In addition to becoming student-centered, replacing collectivism with individualism lies beneath the educational approach in these countries. Student centeredness has been articulated as increasing student performance in Japanese education reform, as improving student's overall abilities and skills in full in Australian education reform, and as providing learner-centered education suitable for students' abilities and skills in Danish reform. Based on these examples, constructivism and student-centeredness can be concluded to be the bases in these countries' education reforms.

Constructivism, which has become the dominant approach in the world since the 1980s in teaching natural sciences in particular, has become an accepted approach by Turkey's Ministry of National Education (MoNE) with regards to program development after 2004. Likewise, MoNE has declared the adoption of the constructivist approach after 2004 regarding learning styles and theory of multiple intelligences in programs developed for the primary and secondary levels. MoNE officials stated a change toward a non-positivistic, probabilistic, and multicausational thinking style as opposed to a positivistic, deterministic, and linear thinking style. The only possible approach that allows for such a chance is argued to be epistemological constructivism with its subjectivist, relativist, and anti-realist manner (Ünder, 2010, pp. 199–200). The MoNE officials from 2006 interpreted the shift toward a constructivist approach in developing the curriculum as a transition to new thinking and a paradigm shift from the positivist paradigm, which they regarded as the sole perpetrator of all the negativity in the Turkish Education System. The essence of change was toward fuzzy logic, from positivism and the Newtonian, deterministic, linear, Aristotelian logic that was being left behind toward chaos theory as uttered by those dissatisfied with positivism, such as the postmodernists, feminists, and constructivists. It was a shift from analytical and behaviorist thinking toward a holistic, constructivist, cognitive style of thought based on quantum principles and multiple

causalities/probabilities. New constructs and concepts also occurred in the documents related to the developed curricula. MoNE has expressed constructivism to have been adopted during the curriculum development in its schedules and documents explaining the curricula (Ünder, 2010, p. 201). The president of the Turkish Board of Education (BED, 2005) stated that the need for rearranging education programs had emerged in order to create sustainable development and competitive power (pp. 8–9). In addition, they underlined the need for a contemporary system based on knowledge production rather than memorization in order to keep track of the constantly changing world, to reach and use the produced knowledge and accumulation, and to gain production skills (p. 6).

This study explores the curriculum changes after 2000 in the context of the abovementioned problem through the cases of Turkey and Singapore. These countries are of interest due to their experience in transitioning to constructivist education after 2000 and still constructing education through this experience. Our study looks for the answers to general questions that get more specific such as: What do science-knowledge paradigms mean? Through which processes are science-knowledge paradigms constructed? How have these paradigms been reflected on the curriculum? Can the traces of paradigm shifts be seen in the curriculum? In brief, what was the education curriculum like in Turkey and Singapore before 2000? Were there any curriculum changes in Turkey or Singapore after 2000? If any apparent changes occurred in the curriculum, how can they be explained in terms of the science-knowledge paradigm shifts? Our study in which we ascertain Singapore and Turkey after 2000 to have adopted the contextual and subjectivist paradigm, which changes based upon idiosyncratic situations, as opposed to the objectivist science-knowledge paradigm based on the positivist paradigm, attempts to depict how this shift has been reflected onto their curricula. The study attempts to present the constructivist curriculum understanding that guides both countries' curricula as well as learning theories and the scientific paradigms based on the re-constructivist approaches.

Our study will focus on the relationship between these two countries' curricula and the scientific paradigm shifts. We specifically need to mention that our study will be conducted in alignment with comparative education research. A discipline that allows an understanding of the similarities and differences among two or more education systems, explains the similar points, and proposes helpful suggestions with regards to educating people should be able to be understood by being aligned

with comparative education research (Türkoğlu, 1985). Comparative studies allow a flexible perspective through a multidisciplinary approach. Qualitative research has been observed to be used more frequently in comparative studies compared to quantitative research. We will also conduct a qualitative study. Qualitative studies are the most frequently used research method for international comparisons (Demirel, 1992; Lawerys et al., 1979; Türkoğlu, 2020). Comparing a researcher's own country to other countries is also a very common method. Comparative education compares the educational approaches, education expenses, school building characteristics, average education periods, education–state relations, student numbers, and many other similar points between two or more countries (Türkoğlu, 2020, pp. 9–10). Despite benefiting from previous comparative education studies, we have had to limit the study to how constructivism has been reflected on the curricula and its results because the main question in our study is to elucidate the relationship between the parameters of scientific paradigm changes and curriculum after 2000, specifically with regards to the main parameters of the countries being compared. Although specifically investigating textbooks as the embodiment of a curriculum is necessary and important, we have had to leave this topic to future specific studies due to the concerns of exceeding the boundaries of our study.

Science Paradigms and Curriculum

Thomas Kuhn's (1962) notion of paradigm consists of the methods and methodologies that are accepted by the members of a certain scientific community. Paradigm is a theory that determines the scientist's gaze on the outside world, regulates laws, and measures the research activities in the field of science the scientist directs (Kuhn, 1962). The traces of paradigm shifts can be seen in curricula. When scientific developments happen fast and life is everchanging, a static human nature is objected to. In such times, the educational approach presents itself as constructivism. The most important thought that defines constructivism as an educational theory is that problem-solving lies at the foundation of learning, thinking, and thus development as a result. Accordingly, people construct their understanding and comprehension through problem-solving and reflecting on their experiences or actions. As a result, learning needs to be an active process in which the learner inevitably changes.

At least two paradigm shifts have occurred throughout human history. The first happened when hunter and gatherer communities transitioned into police states and feudal societies with agricultural support systems, and the second occurred when tribal and feudal communities transitioned into capitalist, industry-based economies based upon scientific technology, consumption of unlimited resources, social advancement, unlimited economic growth, and rational thinking (Hall, 1954; Slattery, 2006, p. 19). For instance, the printing press changed the nature of intellectual communities, their information exchange, and their attitudes toward authority and what they deemed natural. The arrival of new tools (e.g., telescope, microscope, barometer, prism) and new theories (Galileo's law of free fall, Kepler's laws of planetary precession, Newton's theory of light and color) allowed the new science to gain a novel identity through a new language regarding phenomena, theories, hypotheses, and laws (Jacob, 1988). As such, these five fundamental changes created the modern science by interacting and intertwining (Abd El Khalick et al., 1998; Woottan, 2015, p. 630). Accordingly, the historical transition from industrial society (capitalist social structure) to information society (informationalism) has also brought along important changes in the field of education (Bell, 1973). In that sense, the course of industrialism since the eighteenth century has brought forth new information theories and application-based information. An understanding of a mechanical universe functioning like a mechanical watch persisted until the nineteenth century (Butterfield, 1951; Eddington, 1959). Besides its mental function, the practical, occupational, and economic function of education also became prominent. As a result, education programs (Lakatos, 1970) and applications that consider the economic and technological changes in the social structure of the West were introduced. The foundations of today's Western science has been laid through a series of scientific, technological, economic, and political changes across the seventeenth, eighteenth, and nineteenth centuries.

At the beginning of the twentieth century, two important revolutions paved the way for questioning and critiquing thoughts on modern nature based on deterministic-mechanistic premises. Albert Einstein's theory of relativity alongside quantum theory (Bohm, 1989; Ommes, 1994, 1999), which was established and developed by a group of physicist-philosophers such as M. Planck (1996), N. Bohr, W. Heisenberg, (1949, 1958), E. Schrödinger, de Broglie, P. Dirac, and W. Pauli, revealed modern natural thinking's insufficiencies based on deterministic-mechanistic premises at

great distances, high speeds, and subatomic levels (Arslan, 2011, p. 14). Naturally, education curricula were affected by this. If we are to understand curriculum as an interdisciplinary examination of the experience of education as William Pinar does (2011, p. 2), we must accept that curricula possess a unique past, complex present, and ambiguous future. Curriculum development won't have any paradigm shifts as long as the paradigm is in congruence with reality. For instance, from the moment Einstein proposed his theory of relativity for the first time to our day, no foundational changes have occurred as no concrete evidence has been presented to refute it (Cohen, 1994; Maftoon & Shakouri, 2013, p. 303).

Scientific change has been advocated to be very slow, and human nature doesn't change from culture to culture, era to era, or society to society when life is static. The educational understanding of such eras presents themselves as perennialism and essentialism. After 2000, a transition to a constructivist educational approach appeared in place of the educational philosophies that had been constructed based on classical scientific paradigms. New science paradigms started to affect curricula in the 1960s and have accelerated since 2000. Progress in science and an increase in information have been observed in mathematics, medicinal sciences, and technology more than the social sciences. One of the most important factors in this leap of progress is that research has become a new component of social and intellectual practices. This situation has also had the same effect on education and its development (Abd-El Khalick-Lederman, 2000). This is because school curricula have come to consist of the newest and most reliable information regarding all subjects. Paradigm shifts in the scientific field can be asserted as having an important role in the field of curriculum development without denying the impact of political, cultural, and societal effects. As such, the reality one sees will change based on one's perspective and the point where one stands in terms of perceiving and making sense of reality (Kocabaş, 2001). Newton, Galileo, Kepler, and Einstein looked at the same sky and reality yet had different things to say because their paradigms were different. The repercussions of understanding reality differently have a natural effect on a curriculum over time. As far as we can confirm in terms of curriculum development however, no specific study existing that directly links the scientific foundations of curriculum development to these types of situations, scientific paradigm shifts or curriculum is a grave shortcoming, even if they do mention theoretical, societal, cultural, psychological, or ideological foundations.

The Effects of Scientific Paradigm Shifts on Learning

The early effects of changes in information, science, and paradigms can be seen in learning theories (Moses-Knutsen, 2012). Thus, we in a way witness the paradigm shifts today by accepting various perspectives and experiencing deep conceptual transformations in our thinking structure due to scientific, technological, social, or cultural developments. When we experience a paradigm shift, our thought structures acquire conceptual systems and new ways of thinking unlike the ones before; perhaps we start to think about topics that we had perceived and explained in the same manner for years from a fresh perspective (Shapin, 1996). In that sense, the transitions from a geocentric to heliocentric universe, from phlogiston theory to oxygen-burning theory, and from Newtonian physics to quantum physics (Köseoğlu & Tümay, 2013, p. 1; Peacock, 2008) can be examples of paradigm shifts in science. The twentieth century has also had important changes with regard to paradigms about the nature of learning. Due to the evidentiary questioning and discussions on the pros and cons of the alternative theories that have been proposed in regard to the nature of learning in the past century, an important paradigm shift toward cognitivism and constructivist learning theory has occurred after 2000 in particular with regard to how learning is thought to occur (Cooper, 1993, pp. 12–19; Köseoğlu & Tümay, 2013, p. 2). This paradigm shift has altered perspectives on education; as a result, philosophy of education and teaching methods have been greatly reconceptualized (Köseoğlu & Tümay, 2013, p. 2).

As a result of these shifts and in order to enhance education, the question of how can we teach better was left behind for the question of how do people learn, especially in the 1960s. Accordingly, cognitive psychology, started to flourish and would rock the foundations of educational traditions. The mind is no longer understood as a black box as conceptualized in the behaviorist approach; learning cannot be understood based only on stimulus–response behavior, and learning is a process with cognitive and emotional components. According to cognitive learning theory, the individual in the learning process creates cognitive models, and these models change through new experiences (Köseoğlu & Tümay, 2013, p. 2; Phillips, 1995, pp. 5–12). The constructivist approach, which is based on cognitive learning theory which has become became prevalent since 2000, prefers a cognitive structuring

based on the process rather than based on product. Constructivism has dramatically affected all aspects of education around the world these days and become the pioneering paradigm in education (Jonassen, 1991).

In the 2000s, the reconceptualist movement also brought a paradigm shift in the field of education scheduling alongside constructivism, underlining the need for experts to focus on understanding the existing syllabus and the field in place of the syllabus development approach that had been the focal point of the field until the 1970s (Korkmaz, 2016, p. 39). According to Cooper (1993, pp. 12–19), an important paradigm shift toward cognitivism and constructivist learning theory happened, especially since 2000, with regard to how learning is thought to occur due to the evidentiary questioning and discussing of the pros and cons of the alternative theories that had been proposed regarding the nature of learning over the past century (Köseoğlu & Tümay, 2013, p. 3). The most important effects of such a paradigm shift have been students being placed at the center and ejection of empty information from the curriculum, with learning to learn being brought to the fore.

The Parameters of Curriculum Change in Turkey Since 2000

More than one effect has been influential on Turkey's curriculum formation. Just as scientific paradigm shifts influence curricula, so to do political and societal factors. When evaluating the Republican Period education system in terms of the philosophy of education, the effects from various educational movements appear such as perennialism, fundamentalism, progressivism, and re-constructionism; all are found in the fundamental aims of national education (Güler, 2020, p. 212). The Republican Period philosophy of education had not been influenced by any one philosophical movement but had been shaped by the philosophical movements and thoughts in the world at the time (Güler, 2020, p. 212). Constructing a unique philosophy of education in Turkey has had its risks due to the political mechanism being in charge of education and the country being governed by a bureaucratic administrative mentality. The reason no unique philosophy of education occurred since the Republican period is that education has been under political control and the developments resultingly cannot be monitored as desired: no unique, societal, transcendental aim exists (Güler, 2020, p. 213).

In that sense, individuals would have usually been evaluated based on their quantitative and verbal abilities and thought in line with the education paradigm adopted in Turkey before 2000. However, in line with the new intelligence paradigm that started being adopted after 2000, having individual evaluations of quantitative and verbal abilities, which are only two of eight potential dimensions, in line with the education paradigm that had been adopted in Turkey would mean neglecting the other dimensions. This can be considered as a waste of the wealth of individuals' potentials (Erdoğan, 2004, p. 61). Therefore, education and teaching efforts have allowed students to develop their potentials multi-dimensionally. Education and teaching are structured based on students learning styles, interests and abilities, and thoughts and emotions. Textbooks have been designed based on the theory of multiple intelligences (Öztürk, 2011). The teacher doesn't need to stick with only one method as topics now have several activities. In this way, students with different intelligence structures are given a chance at being successful, with students having started to use the learning method that is easiest for them with regard to topics they have trouble learning.

The developments occurring in the world regarding learning and teaching methods greatly enhance individuals' learning possibilities while giving individuals an active role rather than a passive one. When the learner-centered approach became prevalent worldwide at the turn of the millennium, Turkey also transitioned to the constructivist method, which has since 2005–2006 allowed itself to be effectively and efficiently used for redesigning primary and secondary curricula (Kenan, 2013, p. 26).

As a natural consequence of such developments, certain changes have also occurred since 2000 on how knowledge is conceptualized, which is the main topic of education. The notion that knowledge is emphasized to not be dogmatic, yet this is still debated even though its validity has been proven through the scientific method. Knowledge according to constructivist theory is associated with the beliefs and values of the society in which it is produced. The need to reproduce knowledge through science-based interactions has been underlined rather than the pure transference of science. Not future functionality of science but its present functionality should be given attention; accordingly, knowledge should be regarded as a temporary accumulation that makes sense in relation to the individual and society. Individuals shape knowledge in their own way as opposed to just memorizing it as it is. In other words, individuals are actively involved

in their knowledge production. Therefore, education is based on reproducing knowledge, not transferring pure knowledge. Individuals reason out everything around them and everything they confronted, reflecting on these things thoroughly, trying to understand who they are, and connecting with life after merging and comparing with previous knowledge. Therefore, thinking correctly and showing the correct use of the mind and knowledge should be the basis instead of learning more things and transferring knowledge. This should be given attention in education and teaching. Education systems should pave the way for students' thinking and use of reason.

The document On Our Activities Regarding Curriculum Renewal and Change, issued by Turkey's Ministry of National Education (MoNE, 2017), states that, starting with the fall 2016 semester to the present, a comprehensive renewal activity has been occurring on 51 curriculum levels indicating transformation. The current curriculum has been renewed in line with the necessities of the era in the context of innovations and developments in teaching-learning theories and approaches as well as the changing needs of individuals and society. The changes made regarding this renewal are explained in response to the questions of why the curriculum was renewed, how has the curriculum been renewed, what has been done in the renewed curriculum, what are the prominent innovations in the curriculum, and how will curriculum activities continue (MoNE, 2017). How the curriculum is renewed is answered by stating that various countries' curriculums that were renewed for similar reasons have been investigated, new studies in the field of education have been scanned worldwide, teachers' and administrations' opinions regarding the curriculum and weekly schedules had been collected through officially conducted surveys, and data from an online survey consisting of subject-specific open-ended questions have also been gathered (MoNE, 2017). When examining the answers on how the curriculum has been renewed, the process can be concluded to have been conducted in accordance with the process of the scientific paradigm shift.

The question of what has been done in the renewed curriculum is answered in the context of values with justice, friendship, honesty, self-control, patience, respect, love, responsibility, patriotism, and altruism having been determined as the root values the curriculum aims to transfer to students. In addition, society's expectations from its future members have changed with regard to the scientific, technological, and

societal changes and developments that have occurred alongside societies' transition from the technology era to the information era. Such developments and advancements entail that students acquire cognitive competencies/abilities such as critical thinking, original thinking, research, problem-solving; social competencies/abilities such as societal and cultural participation, entrepreneurship, communication, and empathy; and personal competencies/abilities such as self-control, confidence, commitment, and leadership in addition to acquiring foundational knowledge and abilities (MoNE, 2017).

When looking at answers to the question of what have been the prominent innovations in the curriculum, placing emphasis on the simplicity and comprehensibility of the new curriculum draws attention, as well as the examination of most countries' (Canada, Australia, India, New Zealand, America, Uganda, Thailand, England, Malesia) curricula and written materials as prepared by the European Union and UNESCO, in addition to academic articles regarding education. In addition, the reason why these values are in the curriculum has been stated, as well as how they took place, how they can be transferred to students in the teaching–learning process, and explanations regarding which teaching methods and techniques should be used while conveying values. Most importantly, the effort was made to take the diversity in cultural and civilizational reservoirs into consideration while renewing the curriculum in order to have balanced exemplifications. The acquisitions and explanations regarding scientists and thinkers from various backgrounds are expressed by introducing their works as having resulted in the emergence and development of science and scientific thinking, this to have occurred through the contributions of such individuals, and science and scientific thinking to have universal value (MoNE, 2017). The section stating the knowledge, abilities, and attitudes regarding the competencies and skills students are aimed to acquire in the renewed curriculum particularly emphasizes subjects such as information and technology competency, digital competency, and learning to learn (MoNE, 2017).

Some cautionary expressions can be seen regarding subjects such as information and technology competency and digital competency in MoNE's paper titled Turkey's Education Vision 2023. As such, comments in the text such as the balance between humanity and technology are spread out in favor of mechanization; scenarios once considered to be science fiction have become ordinary, alive, and current representations of today. The singularity period aims to merge the biological, digital,

and physical into one mold (MoNE, 2018). Evaluating these cautionary comments along with transhumanism and posthumanism as the recent Western debate topics and in a sense as the culmination of a series of developments since the seventeenth century gives clues about the future of the emphasis on the singularity in the new curriculum (Dağ, 2019).

While the theoretical importance and meaning of MoNE's efforts regarding the new curriculum is still under debate, most of the problems occur in their implementation because the new curriculum has been planned independent of the foundational components of education. In practice, other components such as teachers and learning-teaching environments hadn't been taken into consideration in terms of how ready and suitable they are for this practice. Even though the new curriculum, which aims to make students more active, is beneficial in terms of individually paying attention to students and presenting various learning options rather than one, in practice, the experience has shown teachers and school/class environments had to be adapted and teachers and schools to not have been readied enough in how to implement to achieve the desired outcomes (Gür & Çelik, 2009, p. 32).

With regards to the statements and practices MoNE made in 2004, 2006, 2017, and 2018, MoNE can be concluded as evolving incrementally toward an education in line with the new curriculum and in parallel with scientific developments. Even though MoNE had struggled between positivism and constructivism on an eclectic level, lacked meaningful integrity, and encountered some problems in practice, it is moving step-by-step toward a curriculum in alignment with the contemporary scientific paradigm. Analyzing the problems in practice and turning them into an experience rather than a misfortune is possible.

The Parameters of Curriculum Changes in Singapore Since 2000

Singapore's special importance among the other countries that have transitioned into constructivist education becomes immediately apparent. Even though Singapore seriously differs from Turkey in terms of population rates and structures, geographical location, and political structure, comparing Singapore to Turkey is thought to be meaningful due to Singapore's determined and consistent implementation of the scientific paradigm shifts into the curriculum and its successful results. The most important reason why we conduct such a comparison is to explain

how Singapore has accomplished more compared to Turkey on assessments such as and Program for International Student Assessment (PISA) despite experiencing similar reform activities. As such, while the Singapore education system showed mediocre performance in 1985, important accomplishments have been observed post-2000 with the help of education reforms (Bakioğlu & Göçmen, 2013). The role the notion of new education has had on Singapore's success needs to be explained, as well as what kinds of changes happened in the curriculum regarding its understandings of learning, student, and teaching.

Singapore's education system can be divided into three periods (Levent & Yazıcı, 2015, pp. 123–126; Ng, 2019, p. 45). The first period was based on salvation and was known as the standardization stage (1959–1978). The second period was the benefit-oriented period, also known as the stage of local accountability (1979–1996) The third stage is the skill-based development period, also known as the diversity and innovation stage (1997 to the present). We will mainly focus on the skill-based development period from 1997 to the present. In 1997, Singapore President Goh Chok Tong declared a new vision called Shaping Our Future: Thinking Schools, Learning Nation, and within the framework of this vision, he specifically ensured the development of critical and creative thinking in addition to process-based evaluations rather than outcome-focused ones. The Thinking Schools, Learning Nations Committee (TSLN Committee) was founded next by Singapore's Ministry of Education (MoE) in August 1997 in order to strategize for future education reforms. This committee prepared the report titled A Curriculum Investigation Suitable for Learning, Creativity and Communication (Levent & Yazıcı, 2015, p. 126). In 2000, the inspection system was removed, and a school self-evaluation system called the School Excellence Model was installed. In 2005, MoE transformed the concept regarding program and teaching administration and implementation and began conceptualizing the Teach Less, Learn More (TLLM-2005) initiative to ensure students' deeper learning (Ng, 2019, p. 59). This was because Singapore was understood to have only been successful by overloading content on small students and leading them to study, but these practices had in turn prevented the emergence of creativity in the students (Ng, 2019, p. 51).

The learning principles of the new vision and the characteristics of the curriculum have been presented as follows (Ng, 2019, pp. 139–140):

- Structuring as opposed to transferring knowledge
- Comprehending content rather than memorizing it
- Mindfully applying methods rather than mindless activities
- Social constructivism rather than individual study
- Self-guided tasks rather than teacher-guided tasks
- Structuring and self-evaluation rather than general evaluation
- Learning to learn rather than learning a subject.

These principles apparently suggest a serious change in the fundamental qualities of learning and teaching in the Singapore education system.

In 2003, the master plan of the new vision started to be integrated into the curriculum, and innovative schools started to become widespread. In 2004, special programs from 7th through 12th grade with greater learning opportunities began being implemented to some students. In the same year, a program allowing strengths to be brought forth rather than academic grades was offered to students. In 2005, the pedagogic change encouraging active and independent learning as underlined for developing questioning, critical thinking, and inquiry-based learning among students started to be implemented by reducing the curriculum. In 2006, students started to have the chance to choose learning and different levels of study among each subject as students worked on at least one subject different from their specialty (MoE, 2007). In 2009, in addition to previous applications, curricula and environments suitable for students' self-directed and collaboration-based learning, the emphasis on confident individuals, self-directed active students, and sensitive students as had been emphasized in 1997 was restated within this framework. In 2010, social-emotional competencies intended as the four results of education and the vision supported by the group of values were declared within the complete curriculum framework. In line with this, the Primary Education Review and Implementation (PERI) committee was founded in order to evaluate and enhance the quality of primary education in Singapore, including social-emotional development, non-academic curriculum, and life-long learning (MoE, 2009). A more effective strategy had been adopted over the topics of holistic evaluation, active learning programs, physical education, and arts and music education as one of the key initiatives.

In 2014, the Singapore MoE defined a framework for twenty-first-century skills and student outcomes. This framework is focused on a more holistic approach for students to develop preparedness qualifications

such as creativity, innovation, intercultural understanding, and resilience. In 2015, the education dissemination was transformed into SkillsFuture Singapore (SSG), a movement that represents life-long learning and encourages life-long skill development throughout adulthood (Ng, 2019, p. 52). Accordingly, the main purpose of schooling in 2015 was emphasized as creating a confident, self-learning, actively contributing, and sensitive citizen. The aim was for individuals to gain the series of twenty-first-century competencies that were deemed necessary for living and working in the globalizing world. This is in line with the current global discourse regarding curriculum policy, implementation, and evaluation that emphasizes the importance of helping students develop twenty-first-century competencies (Dede, 2010; Deng, 2013, p. 264; Voogt & Roblin, 2012). However, even though Singapore's aims with the new education paradigm are comprehensive, their success at reaching these aims can be said to be limited to examinations because the Singapore education system is still very centrist, examination-focused, competitive, and stressful for students. Singapore is still in the process of catching up with other developed countries regarding early childhood education and special education (Ng, 2019, p. 280).

According to 2012 PISA results, Singapore students are the best problem solvers. However, this result can be deceiving because Singapore students are famous for their over-practice on questions, even memorizing them. The Singapore education system is transitioning from the past paradigm to the new paradigm, a transition where two opposite discourses are present at the same time. Example practices are found that show the essence of the new paradigm, but the old paradigm still prevails. That's why Singapore separately possesses both problem-solving students and memorizing students. Singapore even has students who solve problems while memorize them. In order to completely understand the nuances of the change, emerging multiple realities in the apparently contradicting examples and stories sometimes needed to be adopted simultaneously. However, such contrasts are not the two ends of the process but two faces of the same coin. This produces the creative tension that is necessary for change. The incongruence between them may produce new ideas. Exploring the boundaries of Singapore's accomplishments is impossible without adopting different perspectives, comprehending different levels of realities, and accepting contrasts. In fact, such variety has helped Singapore turn into a better system (Ng, 2019, pp. 19–20).

Comparing the Paradigmatic Features of the Curricula Change in Turkey and Singapore after 2000

Turkey and Singapore possess quite similar aspects and features regarding how they've reshaped their curricula based on scientific paradigm shifts. In short, the education approach in Singapore is a student-centered and value-based education. They seriously try to implement this situation in their curriculum. Being student-centered is in alignment with the effects of scientific paradigm shifts and changes on learning. Values-based education, on the other hand, is at the center of the new curriculum understanding of Turkey. Despite the problems in implementation, Singapore and Turkey seem determined in being student-centered and value-based education.

However, both Turkey and Singapore struggle with theoretical problems in addition to practical ones. For instance, the Turkish education system adopted constructivism over positivism in 2006. However, according to Ünder (2010), such a comprehensive change is unfortunately absent in the prepared program. Although the traces of constructivism can be improved in terms of relativism and anti-realism, constructivism with a realist ontology and an understanding of empirical knowledge is mainly encountered in the program rather than a relativist and anti-realist constructivism. Additionally, Kuhn's understanding of science is only applied while explaining the changes in the scientific models and choosing between theories. The positivist and constructivist educational approaches were not put together by synthesizing them but in a makeshift eclectic manner. The repercussions of falsifiability, social factors, and instrumentalism have not been consistently accounted for. The benefits of radical constructivism with regards to raising non-scientific values have not been utilized in curriculum development. According to Ünder (2010), claiming the foundational philosophy of the program to be constructivist as the Ministry states is as a result impossible. Considering program changes as a paradigm shift is also impossible. If these teaching programs are considered constructivist, Glasersfeld's ordinary constructivism fits here perfectly (Ünder, 2010, p. 211). As an example of this contradiction, Ünder points to the constructs used in science and technology textbooks such as fact, truth, discovery, and representation (pp. 207–208). When examining the Turkish curriculum, the most problematic issue in terms of content is that it is additionally based on

information overload. Even though a transition since the 2005–2006 academic year has been going on toward a constructivist philosophical understanding that is student-centered and activity-oriented in which information is structured and the teacher is simply a guide, claiming that the goals have been reached is currently impossible. A comprehensive renewal (update, review, replenishment, and change) activity regarding the curriculum was done for this purpose in the 2016–2017 academic year.

The many studies regarding constructivism's integration to the Turkish curriculum as claimed by the Ministry of National Education resulted in opposite findings. In a study by Karadüz (2009), constructivism in the assessment and evaluation process was unrelated to claims. In another study by Yıldırım, teachers were found to experience problems in creating constructivist learning environments. Bayraktaroğlu (2011), however, underlined the problems with regard to implementing constructivism. Specifically, changing the national education program based on the results of other countries without conducting detailed studies that introduce the aim and features of the constructivist theory in Turkey, and more importantly, without allowing the practitioners to practice and present wide information regarding implementation methods and techniques, has only resulted in a simple content change. The inadequacy and lack of knowledge in implementation is also creating a chaos of sorts, let alone not increasing the effectiveness of education.

The number of activities per page in the textbooks of Singapore students is found to be five times more effective compared to the textbook representing Turkey that students use in terms of activity segments per page. In addition, the activities in the textbook representing Turkey are not suitable for the activity concept of realistic mathematics education. First of all, the aim of these activities is the use of thought information rather than strategizing or modeling for a problem situation that has roots in real life. In other words, the presentation of formal information is followed by its application. However, an activity that is designed in accordance with the realistic mathematical education, which is influenced by the constructivist educational approach, will have a problem situation with comprehensible beginning points and include real-life situations the students can envision and tackle. Students do the math and create a model over the problem situation. However, the activities in the

textbook representing Turkey serve the aim of applying the listed instructions by making use of some materials to filter all individuals through the same comprehension level (Gün & Atasoy, 2017, p. 82).

Despite the new curriculum understanding in Turkey, education practices and textbook have not enabled students to fully learn by themselves. Excessive class hours, barriers in developing personal skills, and underdeveloped ability to self-direct are important problems. However, the most important problem is probably the mentality problem regarding internalizing and justifying changes. As such, both existing teaching staff and student roles that are shaped based on social acknowledgements are barriers for now. The most important consequence of this barrier is the examination-centered education system. The most important cause of the inequalities in education is also the examination-centered competitive environment. However, the scientific paradigm shifts are singularly challenging not just for some countries, but for the educational approach and curriculum of the whole world, forcing all to change tomorrow, if not today.

Conclusion

In this research we conducted regarding knowledge-science paradigm shifts, we first explained the terms knowledge, science, and paradigm. Then, we elaborated on the relationship curriculum has with the knowledge-science paradigm shifts. We've seen knowledge-science paradigms historically to have eventually affected the education curriculum. In other words, we've seen developing a curriculum independent of scientific paradigm shifts to be impossible. Even though Turkey and Singapore are very removed from one another geographically as well as in terms of cultural, economic, and political features, they have both been affected by the new scientific paradigm that had emerged in the seventeenth century, developed in the eighteenth and nineteenth centuries, and became apparent in the practices of the twentieth century: They have aimed to implement this paradigm to their curricula through constructivism. Instead of an approach that is Cartesian, positivist, or purely information-based, the aim is for an approach that puts the individual at the center, where they learn to learn, restructure what is learned in the mind, have an understanding of truth and reality that changes over time and space; an individual who is pluralist and open to alternatives rather than truths that apply to life and are indisputable. The new theory

of curriculum that has begun being prevalent in Turkey and Singapore can be said to be superior in terms of its student-centeredness, pluralist structure, and openness to alternatives compared to the old curriculum based on the old paradigm. Being open to new technological innovations and actively using technology more in learning processes are also prominent features of the new curriculum. However, the new theory of curriculum waits for future comprehensive studies in terms of its relationship with transhumanism and posthumanism.

Now we can present some of our findings in bullet points:

(a) The post-2000 curriculum changes in Turkey have brought along problems such as creating an examination-focused and competition-based educational atmosphere due to discourses such as "Mapping out the life of an entrepreneur" and "designing a product in the best possible way and marketing the projects" (MoNE, 2004, p. 35). The most important consequence of this situation has been the deepening of inadequacy experienced in education. Even though the individual has been brought to the fore in the curriculum, statements such as "having students be sensitive toward societal issues" and "realizing the societal existence of the individual" (MoNE, 2004, p. 45) were only mentioned once in a while. In the curriculum, the aim is to highlight students' aspects such as critical and creative thinking, communication and empathy, research, problem-solving, decision making, using information technologies, and entrepreneurship.

(b) Even though constructivism in Turkey has allowed for positivism to be questioned, the changes in the MoNE 2005 and MoNE 2006 programs were neither fully necessary nor sufficient. MoNE's curriculum has adopted a realist ontology and empirical understanding of knowledge, even though constructivism possesses a relativist and anti-realist perspective. This is a consequence of the imported education approach that we pointed out in the previous section. This shows constructivism to have been unable to create a real paradigm change in the Turkish education system. The Singapore curriculum program seems more consistent in this sense. Singapore has a constructivism that has evolved over time as opposed to a relativist and anti-realist one with a positivist understanding. However, comparing Singapore's accomplishments

to Turkey's is also questionable as the consequence of Singapore's transition to constructivism has been limited only by their success on examinations. Singapore also has a smaller population compared to Turkey's. When taking these factors into consideration, comparing the successes and failures of both countries can be re-thought.

(c) Singapore and Turkey's education systems and their understanding of their curricula started to change almost at the same time, and they both have set out with similar questions in mind. The main concern of both countries is how to adapt to the globalizing education system in a changing world while educating students accordingly. Both countries want to design a curriculum in alignment with the scientific paradigm shifts, and neither want their students to lag behind the world.

(d) One of the commonalities between the two countries is also the parallels between their political independence process and transition into a new educational approach. At the beginning of the foundation of the republic, Turkey has also started to search for a new paradigm regarding education; after trying out some education approaches, they have started to implement the constructivist paradigm in the education system since 2000. Singapore also started to search for a new paradigm in education after their independence from England in 1959 and separation from Malaysia in 1965.

(e) The Singapore education system and understanding of curriculum have essentially been developed as a response to globalization. Even though many problems have occurred in its implementation, Singapore's success in TIMSS and PISA are striking (OECD, 2010). This should serve to remind that no success is without its problems. To be successful is not to have an issue-free education and curriculum. Singapore is an interesting example in terms of finding success in the face of implementation problems. In terms of the curriculum, Singapore's approaches developed regarding education and the methods followed in problem-solving provide a rich experience and serious knowledge accumulation. In addition, we hope that Singapore's accomplishments and struggles will be of interest to curriculum developers, researchers on curriculum, and other practitioners in the system.

Suggestions

1. The question of why Turkey and Singapore have ended up with different results despite using similar methods awaits extensive examination. We are of the opinion that both structural and varying factors will become apparent once such comprehensive studies are conducted.
2. The textbooks in Singapore and Turkey can be investigated by year, and their changes can be compared in terms of the effects scientific paradigm shifts have on the curriculum. Doing so allows examination of which country has achieved its intended results and how.
3. How close Singapore and Turkey are to predicting the future as much as catching up on the present as well as what the relationship is among the new education trends, transhumanism, and posthumanism can be explored through comprehensive research.
4. The literature in Turkey regarding the degree to which the curriculum has been affected by the changing and transforming paradigms is scarce. Specifically, the relationship between the new education approach after the 2000s and the scientific paradigms prevailing in the world should be researched extensively and in-depth.

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The Impacts of Online Education on Ecology of Learning and Social Learning Processes

Cahit Bağcı

The subordinate goal of education policies is to train people who can understand the times and world in which they live. Today, everything about education, from its methods to the role of the teacher and student, educational tools and equipment, and content, is undergoing an unavoidable change. As a direct result of today's zeitgeist and modernism, schools and educational systems are being transformed with regard to their role, mission, function, curriculum, methods, and forms of management.

Since the last quarter of the twentieth century, forming an information society has been regarded as the main gateway to becoming an industrial society, as social and economic change is believed to only be possible through technological transformation and progressing to the information age. Industrialized society, which has changed rapidly through technological advancements, in this way has had to be reconstructed accordingly to remain up to date. Meanwhile, current education systems lack the essential tools to keep up with rapid technological innovations and changing working patterns (Caccavello, 2020).

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At the beginning of the twenty-first century, Industry 4.0 was implemented for an economic, social, and political order based on a form of technology-supported production and relations (World Economic Forum, 2020). Education 4.0 meanwhile was implemented to train the people who will realize this goal by receiving advanced technological training. The aim is to finally reach a super-intelligent society (i.e., Society 5.0) using digitalization and artificial intelligence.

While considered globally to be moving along its normal course in parallel to its goals, the process of technology- and artificial intelligence-supported industrialization has faced an unusual circumstance. In late 2019, the corona virus that was detected in Wuhan, China and spread rapidly, became the pandemic known as COVID-19. 2020 has been a year of global upheaval that has affected every individual, every system at work, and every implemented policy implemented. During the ongoing COVID-19 pandemic, disturbing news came from many countries around the world. Due to the pandemic, curfew restrictions have led many sales and services to move to the digital sphere; from global companies to SMEs, additional investment needs have emerged in this field while companies operating in the areas of technology, media, communications, software, pharmaceutical products, and retail services have grown exponentially over a short period of time in their respective not-so-competitive markets. Direct selling is the sector that has grown the most among these.

This social isolating and quarantining due to the pandemic have suddenly and deeply affected the economic order and social life on a global scale. Every institution and organization has had to make quick decisions to adapt to the changing conditions. Educational institutions have turned to rapid digitalization and online education as a temporal solution against the interruption in education.

Lamanauskas (2017) noted that students' and youths' experiences have varied in the field of new technologies, although their relationship with learning and teaching has yet to be fully measured. The problem is that the educational meaning and use of such services are not sufficiently known, as they have not yet been discussed. The results from various studies have demonstrated digital teaching content to improve institutional resources, strengthen student motivation, attract their interest in general, and improve their rational thinking. Thus, digital teaching-learning content has now posed itself as one of the essential aspects of education. One must agree with the fact that digital teaching tools render teaching and learning processes much more interesting and effective.

One of the results from these studies is related to teachers' technological competences. Therefore, teachers who want to help students are expected to learn, model, and facilitate the development of such competencies altogether. In analyzing the problems of this field, many fundamental questions arise that require answers.

The effects of digitalized education and this uncalled-for methodical change to online education will be examined and evaluated thoroughly in comparison with face-to-face education in terms of online education's pedagogical dimensions, contributions, strong and weak points, advantages, and threats. The COVID-19 pandemic often saw particular online education-based solutions to be offered as a response to the urgent issues of distance education. This rapid transition period has revealed many layered issues regarding investment decisions and budget needs, internet infrastructure, technological equipment, administrators, educators, students from every education level, parents' digital literacy, and the suitability of specific social environments to online education. Additionally, the minimum requirements for all these processes and the lack of basic principles point to a necessity. Digital literacy has become the new indicator of development and has increasingly become one of the official goals of education.

This study is the result of descriptive research. To this end, the study examines experiments on the subject and scans books and articles, evaluating the discussions and case studies in this field. Based on all these views, the study conducts a case assessment and descriptive analysis. This article discusses the role, function, method, and content of today's education while addressing the action plans and strategies for future education in the context of Industry 4.0 and Education 4.0. Furthermore, digitalization stands as the urgent solution to many issues during the COVID-19 pandemic, and the article also addresses its effects over education, social learning processes, and the ecology of learning.

Online/Digital Education's Effects on Teaching and Learning During the COVID-19 Pandemic

Due to the COVID-19 pandemic, people who have to stay and work at home have turned to various urgent and palliative solutions, the most common of which is online education. With this method, each teacher gets in touch with their students through video conferences over the Internet at scheduled times. In order not to interrupt the usual course of

education, lists about urgent needs have been prepared with this method, which was formed to be put quickly into practice. Heading the lists of urgent needs are good quality Internet infrastructure; high-speed Internet connections; various equipment for online education such as PCs, tablets, smart-phones, speakers, and earphones for every student; and digital content.

Due to the pandemic, educational practices have been carried out beyond the traditional class environment for about a year. From the list of urgent needs due to the pandemic, only the large supply of equipment for online education has been crossed off while the two other urgent needs still wait to be addressed. Undoubtedly, this condition owes its existence to the opportunity gap, methodical and pedagogical change in education, and the rapid growth of the capitalist market alongside the imbalance of supply and demand. This new condition has many sociological complexities such as new forms of global exploitation, lack of control in digital spaces, panopticism (Hope, 2018), surveillance, algorithms, and the dominance of artificial intelligence.

The COVID-19 pandemic has instigated serious policy changes in terms of making major investments in the digital sphere in countries that already have sufficient infrastructure for online education such as the United States, China, Japan, and Canada as well as EU countries such as Germany and France alongside developing and less developed countries. Meanwhile, online education in Turkey formed its infrastructure back in 2011, which has better facilitated adopting online education strategies (Ministry of National Education [MoNE], 2020).

The post-corona virus period will see virtual/online education become a necessity rather than a matter of choice. Thus, the rate of online education platforms being used with virtual classrooms has increased rapidly during the pandemic. Platforms such as Google Classroom, Moodle, JoVE, Kahoot, Pearson, Cisco Webex ClassMaster, Zoom, Adobe Connect, Age of Learning, Bloomz, CirQlive, Edhelper, G Suit for Education, Kiron, Collaborate, Teams, and TeamLink are actively being used all over the world, from elementary education all the way to post-graduate studies. Even non-governmental organizations (NGOs) have resumed their training using these virtual environments. In addition, Turkey's Council of Higher Education (CoHE) immediately passed a legal regulation that permits 30% of education in Turkish universities to be virtual (Arkan, 2020).

China, where COVID-19 originated, quickly implemented online education and the project Suspending Classes Without Stopping Learning. Analyzing this issue, Zhou et al. (2020) tried to grasp the binary of the parent–child co-relationship in the educational process with the already existent parent–child relationship. They also tried to understand the parents who were included in the educational process during the pandemic period as active surveillants and intendants in addition to analyzing the teacher–student relationship. Suspending Classes Without Stopping Learning has provided a prominent and valuable space for families to collaborate with school in education. Students' individual learning processes have been monitored and evaluated. Additionally, students have been presented with the opportunity to experience self-growth in collaboration with school and family by directing themselves to gain more liberty, learn independently, and plan their own schedules. Students' individual learning capacities are found to have expanded during this particular period, as well as parent–teacher relationships to have gotten closer, and school and family education to have further integrated (p. 514).

Research emphasizing the importance of the online education process in strengthening the relation between home and school has revealed many gray areas regarding how to lead parents in mentoring their children and participating in their learning processes as well as to inform the parents on scientifically proven ways to raise children and establish healthy family relations (Hodges, 2020; Zhou et al., 2020). The most important of these gray areas are about the changes that will occur in post-pandemic learning systems. Gomaratat (2015) stated that educational systems are increasingly evolving into a system that will implement a learning process based on three areas. These three areas are grouped as follows (Öztemel, 2018, p. 28):

- Regulate understanding—The 3Rs (Recall, Relate, Refine)
- Trigger research—The 3Is (Inquire, Interact, Interpret)
- Draw a conclusion—The 3Ps (Participate, Process, Present).

Although online distance education implementations offer solutions such as openness, accessibility, and flexibility in education, the HyFlex learning model has been placed in the forefront based on these implementations requiring self-directed and self-managed skills and learners getting to choose which ways to use in the "new normal" to access

content. Additionally, the flexible roles the traditional educational institutions will assume in the "new normal" and learners' efforts to gain information through different media are estimated to add much more value to informal learning processes (Bozkurt, 2020, p. 117).

In recent years, discussions have occurred emphasizing the urgency to come up with solutions and to make quick analyses for eliminating the challenges posed to teachers, students, parents, and educational institutions in the field of education with the rise of digital teaching and learning. A large body of academic work has been published in this field that serves as the groundwork for these studies, as they identify the stronger and weaker points of online education and make suggestions on how to improve the online experience. In analyzing the issues present in this field, many fundamental questions arise that require answers (Lamanauskas, 2017).

The main issue is defining the relationship between the traditional sources for learning (published textbooks) and digital content (e.g., Should digital content replace traditional textbooks? Does digital content greatly increase the effectiveness of the teaching-learning process and help achieve better results? How will the quality of teaching-learning change using digital resources?). Despite these questions and gray areas, digital tools are widely accepted to make teaching and learning processes more interesting and effective. In any case, answers based on objective data are needed, and this will create new research fields soon (Lamanauskas, 2017, pp. 131–133).

Although many local observations and quantitative studies are found on the effects of digital education, no data from an effective measurement study have been sufficiently accumulated to form a theory or affect existing theories. Many are goal-oriented and do not yet have strong pedagogical references to see what impacts may occur on the learner. The questions of what, how, how much. and how far do not have satisfactory or formal answers. A comparative study on the impact online education has on learning processes is needed to analyze the target audience's reactions to the presented content, to the way the content is presented, and to the platform of the content. Carrying out representative research studies with encompassing policies that objectively support pedagogical studies is essential.

Digital literacy has become an extremely important phenomenon in educational policies, pedagogical formation, and research. Supporting research practices is necessary to analyze children's cognitive abilities

as they grow up, what they want to learn, how and the extent to which current educational instructions and the fields they emphasize affect children's ways of thinking, as well as the negative effects these educational instructions may have (Lankshear & Knobe, 2006). On the other hand, current educational systems lack the essential tools to keep up with rapid technological innovations and changing working patterns (Caccavello, 2020). Centralization in education restricts freedom of education, resulting in weaker and lower-performing young employees.

The European Commission (EC, 2017) reported important notes on Education 4.0. The report states that teachers are essential factors in terms of teaching how to train people with technology, thus they need to be trained on digital education. Students may be studying full-time or part-time, may be receiving vocational education, and may come from diverse cultural and ethnic backgrounds. Mobile devices, social media, and modular study programs are several options. E-learning, blended learning, the flipped classroom model, applied learning (i.e., learning on-site), and non-stop, increased data input have become our realities.

The education of the future is being designed. In this designation, student-centered teaching methods and IT-assisted class presentations should be prioritized. Exam methods and students' abilities should also be improved further. Like in other fields, Education 4.0 is the realization of digital transformation in the world of education. Additionally, the powerful use of educational tools in the field of Education 4.0 is an indispensable element. Teaching new technologies to help keep up with social transformations will be considered a basic need. During this period, lifelong learning will be among the main missions of educational institutions. Contributing to development and ensuring qualities such as knowledge, leadership, cooperation, creativity, digital literacy, effective communication, emotional intelligence, entrepreneurship, global citizenship, teamwork, and problem-solving skills will be some of the learning outcomes in response to the new technological-educational needs. When considering this, Education 4.0 should not be viewed as a mere educational system. Critical-analytical thinking, innovation, productivity, responsibility, multicultural information sharing, and career development will be the focal points of Education 4.0 (Öztemel, 2018, p. 27).

While teachers and students interact in the classroom environment and discuss a given day's topic according to the curriculum during school hours in the traditional education system, new forms of education have also emerged revealing that this educational model can be modified by technological and scientific advances. One of these new education systems is the flipped classroom model, which prioritizes involving students in

extracurricular activities as opposed to traditional education. According to this educational model, students may complete course requirements with extracurricular activities.

Research on digital use and computational thinking is constantly evolving to support digital and non-digital educational tools in preschool learning programs. Through research conducted in this field, pedagogical responses have been made regarding what should be in the curricula in the future and how these curricula will be proposed. Digital literacy combines interaction and epistemic participation with knowledge. In this sense, digital literacy involves interacting with information. Digitalization is the reshaping of the social phenomena that affect the masses, such as human relations, economics, social movements, and politics. These relationalities ascribe power to the term digital. The ways through which this digital power might be manipulated, how it may change in the future, or how it may be beneficial to society should be explained to people and be the topic of academic discussions.

Collins and Halverson (2010) stated schools to have made invaluable contributions to the development of the world, adding that they would continue doing so in the future. After emphasizing the need for educators and policymakers to revise the relationship between school and education as education becomes a lifelong learning experience, Collins and Halverson also stated education to encompass ages starting from around 5 to 18–21, pointing at the reality of education today which mostly takes place outside school.

Meanwhile, the lifestyle in which today's younger generation have been born into and have known no other is defined as the Carpe Diem culture, a consumer society that encourages innovation and arbitrary change (which results in restlessness). Such a society and culture has the problem of not only desire but also of extreme demand for products and services and of disposing of the old immediately as soon as the new emerges (Bauman, 2020, p. 39). Learners of the digital age find printed matter boring. All kinds of information have become shorter-lived. Speed, visuals, and entertainment are at the forefront of accessing information, while multimedia materials such as images, audio, animations, and videos are preferred for gaining information on a certain topic. The educational methods of previous generations appear insufficient for the individuals of the younger generation (Ardıç & Altun, 2017, p. 18).

The learning behaviors of individuals of the digital age are highly diverse and distinct. Approaches such as changing the methods of the

educational system for the better to prevent students from dropping out, providing them with employment opportunities after graduation, and making education and the workforce market respond better to the education the young receive as well as the demands of the workforce market show that policymakers base the reason why young people drop out over the question of employment (Cansever & Namal, 2019, p. 131).

Many research studies are carried out in preschool education to ensure the cognitive development of students through the use of digital resources, and constant improvements occur in supporting digital and non-digital tools in learning programs. These studies form pedagogical responses and revisions in terms of what should be placed in future curriculum designations.

A striking correlation exists between the time spent at home during the pandemic and the rise of the use of digital tools during this period. This time has seen a rapid increase in online digital activities and time spent using the internet. Serious differences exist between genders in terms of digital activity preferences. Women spend more time with movies, TV shows, entertainment, music, and text messaging, whereas men mostly prefer sports, games, movies, and TV series.

Redefining and Reconstructing the Relationship Between School and Education

Education has important functions such as ensuring the socialization of people, changing society for the better, and matching its educational systems and methods with the particular society's lifestyle (Er, 2000, p. 68). Education greatly contributes to social harmony when it is compatible with individual lifestyles and community values. These qualities, which should adapt to the individual, are the values desired to be acquired. Dynamic, progressive, and innovative societies allow individuals to form ideals and expectations. Here, the function of organized educational institutions comes to the surface. Educational institutions reflect the current values of society while also training individuals capable of meeting the future ideals and expectations of society (Aslan, 2001, p. 29).

Students' motivation for learning is influenced by having emotionally healthy relations in a healthy environment, and most importantly by learning in a student-friendly environment where they are motivated to participate more during lectures, which demonstrates the importance of establishing healthy learning environments. Research shows the

importance of the learning environment even for countries with the infrastructure and potency to resume education online during the COVID-19 pandemic. Students missing their school, classmates, and teachers during online education hints at the importance of education environment in the pedagogical dynamics of teaching. The United Nations Educational, Scientific and Cultural Organization (UNESCO, 2020, p. 17) emphasizes that schools must be considered a central feature of education systems at all levels as the main places of learning regarding the importance of out-of-school learning during the ongoing pandemic.

Schools are organizational forms that function as an extremely important factor in carrying out systematic educational activities. One of the fundamental functions of schools is to help students gain self-confidence and provide them with the opportunity to check what they know. In this regard, the roles teachers and students play in the process of acquiring knowledge and learning must be reversed so that the teacher also assumes the role of listener and learner. The difficulty all traditional forms of learning and teaching will face in this scenario is closely related to the fact that students can also know in forms beyond teachers' knowledge. According to the epistemological world behind empirical-analytical knowledge and the didactic pedagogy born out of this world, no student can know more than their teacher, while the epistemological world of historical-hermeneutic understanding may verify the existence of this phenomenon. According to the understanding of critical self-thinking, however, the state of new knowledge evolves into one that excels the knowledge of the teacher and is even encouraged to excel (Lovat, 2018, p. 126).

If knowledge is acquired cumulatively and linearly, then knowledge by learning increases quantitatively. However, this way of learning also formulates new ways for individuals (even groups and societies as a whole) to grasp reality; it paves new ways of interacting with others and of perceiving their identity. Information acquired through interaction necessitates responsibility. Self-reflection teaches an individual to become aware of the ideologies that affect them. The crises to which the world had yielded in this century lead us to question the validity of linear models, while the recognition of cultural pluralities in the postmodern world view leads us to question the idea of individual identity itself. This strong new form of knowledge seems to have contributed to the crisis of identity in our society by forcing systematic education to question its purpose. The critical theory of Frankfurt School was born out of this kind of

socio-cultural crisis, and Habermas' reconstruction of the first-generation critical theory provides insight into a possible reformulation of education itself. The foundation of modernity lies in the commitment of post-Enlightenment societies to the ideals of truth, justice, freedom, rights, and virtues. From Rousseau and Kant to Dewey, the connection between education and democracy is implicit. While Durkheim published on social convention, Kant judged education to be a way to both humanize the individual and form democratic will, ultimately forming a republic world dedicated to preserving peace at all times. Discourse ethics and the concept of communicative action as Habermas coined will realize cultural transformation, help overcome current crises, and resume and develop individual and societal learning processes without losing sight of the current accomplishments of modernity (Terry, 1997, p. 278).

Research shows strong and clear relationships among social climate of schools, social learning environments, the ecology of learning, and student success (Smith & Shouppe, 2018). One long-term discussion about education has been on how to identify the concept of student success and whether this concept serves the majority in learning and assessment using the basic instrumentalist approach (direct instruction, standardized curricula, norm-based evaluation) or whether student success requires a more holistic approach (Lovat, 2018, p. 128).

Educational practitioners and researchers have become more aware of the contextual importance of where learning takes place, especially in regard to school climate and its influence on students' academic results as well as their social and emotional states. The concept of school climate/environment is described within the Oxford Research Encyclopedia of Education as:

> School climate is based on the subjective experiences of school life for students, staff, school leaders, parents, and the entire school community. A school's climate reflects its norms, goals, values, interpersonal relationships, teaching and learning practices, and organizational structures. A positive school climate improves children's learning and healthy development in school. A positive school climate is also an essential component within comprehensive school improvement processes. Nonetheless, the divergence and disagreement in defining and measuring school climate in the literature are evident. There is a major interest in school climate improvement and school climate policy. However, the policy context that supports school climate varies considerably internationally and across the United States. Clarification regarding the dimensions of school climate and continued

> research on how a positive school climate contributes to both school and student results are important. (Berkowitz et al., 2017, pp. 1–28)

School climate is like the air we breathe: It often goes unnoticed until something goes wrong.

The UNESCO report, Education in a Post-COVID World, names nine ideas for future education. Among these recommendations is one regarding schools and their social learning environment:

> We must preserve the social spaces provided by schools while transforming education. The school is indispensable as a physical space. Traditional classroom organization must give way to various methods of 'doing school', but the school as a separate space-time of collective living, specific and different from other spaces of learning must be preserved. (UNESCO, 2020, p. 6)

In its broadest sense, school climate refers to all the characteristics of the school environment that influence students' academic and social development (MacGibeny, 2016). A carefully constructed school climate is known to increase student achievement and reduce problematic behavior in students; it has been widely studied both empirically and theoretically. The Systems View of School Climate (SVSC) has been proposed to best assist efforts in developing the causal models that explain how school climate works. This theoretical framework was formed by deconstructing previous models and transforming empirical research on school climate into themes and clarifying the implicit assumptions around it. This school climate, which uses SVSC to synthesize the existing literature, is defined as the affective and cognitive perceptions regarding the social interactions, relationships, values, and beliefs of students, teachers, administrators, and staff within a school. School climate is situated within ecological systems theory to guide future research in this domain and help specify the levels of research or analysis, thus providing utility as a theoretical framework for future causal models. SVSC provides a road-map for research by demarcating school climate from its related constructs, making suggestions related to contextual and structural constructs, and delineating proximal and distal systems that can shape the nature of school climate (Rudasill et al., 2018).

Information society, Education 4.0, and the changing roles, functions, and climate of schools due to the pandemic with the implementation of new educational practices all necessitate the integration of new professions

into education and training processes within education management. Within the context of social learning environment and ecology in the early 1970s, employing school sociologists was brought to the agenda in the belief that they are as necessary as school counselors. The famous sociologist Sklar has indicated now is the time for sociologists to become useful members of school communities (school organizations) and to help resolve the issues being faced today (as cited in Bayhan, 2015, p. 261). However, the desired developments in this domain have not yet been achieved. Having been constricted by the social and philosophical foundations of education for years, this domain has recently assumed a broader sociology-based form that promotes research on issues relating to students, schools, and their environment.

In the conceptualization of school culture, culture as a word has its roots in developing and growing something. In this regard, the careful training of people lies at the core of the definition of school. Culture describes a common lifestyle with its implicit and explicit agreements. A school's contribution to socialization cannot be denied. In terms of education management and educational processes, school sociologists will assume an essential role in the matters affecting the social learning environment and student motivation, such as students' socialization process, friendships, peer-student and school–family relations and interactions, schooling, the school's social environment, eliminating factors that disturb school culture (e.g., violence, student gangs, substance abuse), and discipline (Bayhan, 2015, pp. 264–268).

School climate engenders a culture that indicates how a given school improves and embraces differences. Reflecting the culture of a school community, school climate and culture have profound impacts on students' achievement and behavioral development. Thus, the school will help shed certain toxic characteristics of a child and replace them with motivation for learning with the help of a positive environment (Lindstorm & Drolet, 2017). When schools equate to learning, they exclusively focus on what falls in and out of the curriculum, as well as additional resources, recommendations, and supplements. Thicker books have been produced and school hours extended to adapt to the diversification of informational resources (Collins & Halverson, 2010, p. 20).

The school will never disappear, but its role and function in learning are expected to narrow down and get redefined. The classroom environment is difficult to replace in terms of aspects such as measuring students' levels of understanding, the effects of competition in the classroom on

learning and student success, how students overcome anxiety and gain self-expression, the holistic presentation of a physical classroom, participatory discussions, and group work. Discipline in schools is tacitly accepted to undergo a more relaxed process with digitalization. While the new processes are open to constructive opportunities that may give individuals the chance to transform themselves, these new processes may also lead to destructive measures being taken. Therefore, individuals must develop new ways of perceiving and thinking. To adapt to changing conditions, they must find paths to explore new ways of living. Nevertheless, the role and function of the school as a pedagogical and social environment should never be undermined in terms of its contributions to behavioral development, provision of values education, and promotion of art, sports, painting, and music, and development of children's talents.

Schools offer a state of praxis that contains complex levels of knowledge. Terry (1997, p. 275) placed great emphasis on culture, mentioning that education traditionally functions as a mechanism of social reproduction and cultural preservation in many contexts. According to Terry, culture is a vibrant phenomenon that constantly changes. Educators should respond to the new conditions brought about by these changes by encouraging students to ponder upon these cultural conditions and assist their development through this process of thinking. In particular, Terry emphasized that educators should come up with an approach and methodology to make culture suit students, not themselves.

The Future of Education: The Roles, Functions, Learning Processes, Models, and Methods of Learning-Teaching and Ecology of Learning

During the pandemic, global digitalization in education and the transition to online education had to be implemented without any preparation or prior testing. The experience of teaching during this process foreshadows the necessity of blending traditional education with distance/digital/online education to establish a hybrid education model that will function more healthily in the future. Thus, after the pandemic, we can neither go back to the traditional education model nor resume a strictly online education. Each country should also take global trends and needs into account in developing a teaching-learning model also suitable to their gradual transition processes. Universities in particular should carry

out a series of academic research using a functional structuralist approach to thoroughly inspect and analyze the online education that has been implemented urgently due to unforeseen circumstances while taking into account the aforementioned dimensions.

COVID-19 has had serious consequences regarding the reshaping of educational perspectives; the reevaluation of the necessary educational technologies; the design of distance education courses; the assessment and evaluation of student performance; digital data and ethics; newly emerged educational roles; digital competencies; skills; conversion, and division; the philosophy of openness in education; social equality; preventing and treating trauma and anxiety disorders; the pedagogy of care, understanding, and empathy; and inspecting economic dimensions of higher education with support groups and mechanisms (Bozkurt, 2020, p. 112).

As a direct result of today's Zeitgeist and modernism, schools and educational systems will transform their role, mission, function, curriculum, methods, and forms of management. Over time, serious differences will occur in schools' role and function in terms of education and training. Teaching will take place in digital space through different modules and package programs, while assessment and evaluation of student performance, accreditation, and certification will also mostly occur online. While the current education system forms itself based on this situation, school as a social learning environment most probably will be reshaped with a functional mission in mind in terms of behavior, morality, values, culture, civilization, history, arts, sports, developing talents, teamwork, students' social and psychological development, and improving analytical thinking.

Influential in many fields, Industry 4.0 is the application process of traditional manufacturing and industrial practices. Education is one of these affected fields. The rapid development of technologies and the growing need to integrate them into teaching obliges teachers to keep up with new technologies and design the pedagogical implementation of new technologies (Dong et al., 2020). Digital learning has become an issue concerning teachers' digital literacy, more so than that of students due to a lack of interest and knowledge in the "digital information network" (Çiftçi et al., 2020, pp. 126–127). Yet, we undeniably need to train the labor force to design, develop, produce, and use the produced technology in all fields necessary for Industry 4.0. Industry 4.0 needs individuals with high-level cognitive skills using methods that require not only knowledge but careful thinking. Educating individuals in all fields to perceive

and define global problems correctly (critical thinking), produce innovative ideas as a solution (creative thinking), and use the proper methods and techniques to solve the problems (scientific and analytical thinking) is of utmost importance. This is an issue that needs to be addressed in a broad perspective and thought concerning other parts including preschool, primary, secondary, and higher education as well as lifelong learning (Öztemel, 2018, p. 27).

The European Commission (EC) carried out comprehensive research between February and September 2020 regarding how to compensate for the interruption in education due to the COVID-19 pandemic and what to do to make up for it. Using a participatory method, the draft was made accessible for informing and evaluating member countries and the public, receiving a total of 2,700 ideas and suggestions by consulting all parties involved (EC, 2020a, p. 5). Taking this research as a reference point, the European Union has adopted the Digital Education Action Plan (2021–2027) to reorganize education and training. This action plan draws attention to the transformations in work, daily life, and labor force market through many aspects over the last ten years with the rapid digitalization, as well as the hardships employers from various sectors have gone through due to the insufficiency of digital literacy (EC, 2020a, p. 2). Another action plan, Skills for Industry Curriculum Guidelines 4.0, has a special place on the European Union agenda and has been prepared and put into practice to position Europe on a higher step in terms of industrial competitiveness in order for Europe to have more sustainable growth, create work opportunities, prepare road-maps for improving social welfare, and harmonize the technological investments required for a high industry with human resources (EC, 2020b, p. 21). The essence of the action plan involves the actions and lifelong learning philosophy summarized as "the re-alignment of the educational and training systems with the industry and institutional reconstruction by industry" combined with the motto "the society of tomorrow is the curriculum today" (EC, 2020b, p. 156). According to the report, robotics and other automation technologies, including technologically advanced manufacturing and material processing equipment and machines, have increased their potential and broadened the scope of their potential implementations to low budget, APR, and SME-friendly production opportunities.

Both within the context of Education 4.0 and Industry 4.0, some research fields and topics considered necessary for identifying and defining

the new situation caused by the pandemic and also for building the economic and social order of the future might be listed as follows:

- The purpose, tools, and methods of education, as well as the goals and roles of the school and teacher, need to be reconsidered within the context of the transformation of education and training.
- The education–school–teacher–student relationship should be redefined and reconstructed. Teachers' roles must be the support and facilitation of the learning processes, and students should be given a central role both in education and training processes (EC, 2020b, p. 156).
- Schools should continue being the central figure of educational systems at all levels as the main place of learning (UNESCO, 2020, p. 17).
- Teacher training should be reconsidered from the beginning following the needs of the time and future action plans, and an academic structure should be formed to this end.
- Studies regarding the pedagogy, tools, and policies of face-to-face, online, and hybrid education should be carried out in universities, and curricula should be revised in their entirety with respect to face-to-face, online, and hybrid education.
- Education needs to be rebuilt around learning and not around teaching (EC, 2020b, p. 156).
- Digital learning/teaching content should be adapted to the new curriculum and suit learners' various developmental stages.
- Digital space and the Internet have facilitated access to information, resulting in diversity and a multiplicity of informational resources. First and foremost, the impacts of information pollution and data problems on educational processes should be identified and carefully handled.
- The coeducation of families and school should be redetermined according to families' contributions and involvement in education.
- The procedures for becoming a teacher and getting promoted in this profession should be redesigned.
- Learning forms such as autonomous learning, planning, and independent learning should be included in the process of education, and assessment-evaluation tools should be developed accordingly.

- Pedagogy should be developed based on the parent–child relationship in education through parents' role in actively supervising and managing children.
- Modules should be developed for parents to receive training in fields such as guidance, how to participate in the learning process, scientific methods for raising children, and creating harmonious family relations.
- The technological infrastructure of education should be strengthened, virtual/online educating skills mastered, and their capacity constantly increased (Arkan, 2020).
- When education is stopped, efforts and in-service training practices should be greatly emphasized to ensure that teachers adapt to innovations.
- Digital literacy must be made a major topic of discussion.
- Education should have all kinds of digital content production, control, approval, and publication processes.
- Accreditation mechanisms concerning the impact, contribution, and quality of traditional teaching-learning content (textbooks) and digital teaching-learning content should be developed.
- Tools and methods for assessment and evaluation should be reviewed and updated.
- The importance of the school environment and school culture and the collectivity of education should be underpinned by pedagogical, psychological, and sociological research.
- Research in universities should center around studies addressing distance, digital, and online education with all their dimensions; therefore, new research centers should be established within the Faculties of Education and supported financially.
- Teaching-learning styles and models should be supported by up-to-date research.
- SWOT analyses should be reconstructed and reintegrated into the new system by contrasting various learning models and methods (such as collaborative learning, mobile learning, self-regulated learning, inverted learning, problem-based learning, constructivist learning, HyFlex learning, Gregorc and Kolb learning, 5E-7E learning, e-learning, process-based learning, active learning, blended learning, integrative learning, self-directed learning, and self-managed learning).

- Teaching-learning models should be extensively included in the teacher training systems.
- Future teaching-learning forms and educational models should be developed on the axis of the goals, expectations, demands, and dreams of Generation Z, who constitute the human resources of the future.
- The impact of rapid digitalization and increase in screen time on body health (obesity, bulimia nervosa, and anorexia nervosa; Bauman, 2020, p. 11), mental health (technostress, nomophobia, phone addiction, social anxiety, social isolation, and antisocial personality disorders, as well as pathologies such as fatigue and insomnia), as well as the psycho-social problems this impact causes (Bağcı, 2016, p. 1035), need to be studied, and solutions should be developed against these negative outcomes.
- The Individual, psychological, and physiological aspects, layers, and effects of overload and overflow of information should be carefully researched (Neuman, 2018, pp. 107–115).
- Sociologist reading should be carried out on the social segment knowns as Neither in Employment nor Education and Training (NEET).
- Extracurricular activities should be replanned and re-managed.
- Students should be encouraged to perform activities and use additional modules to support their creativity within the context of personalized education, which has increasing importance (Ardıç & Altun, 2017, p. 26).

Digital Education Action Plan of the European Commission of 2020 revealed how much help parents need to assist their children during the process of online and distance education that had been hurriedly implemented due to pandemic, how parents remain insufficient in terms of contributing to the ways their children spend their free time, and the need to transform educational understanding in accordance with the necessities of the digital age (EC, 2020a, p. 6). This situation indicates that traditional education and distance/online education have non-interchangeable roles and functions.

Although many successful as well as unsuccessful applications have occurred in the hurried distance education process, one of the biggest controversies and shortcomings was experienced regarding the assessment

and evaluation processes of student performance. Educational institutions' sudden transition to online education due to the COVID-19 pandemic has necessitated temporarily suspending assessment processes based on a pass/fail system or holding online exams without sufficient validity or credibility instead of the traditional exams. However, another fact that comes to light with this situation is that almost all educational processes are structured around results-oriented assessment and evaluation approaches while process-oriented assessment and evaluation approaches are not sufficiently used. As a probable result of digitalization, the analytics of learning or alternative solutions allowing for process-oriented assessment and evaluation will likely be used soon (Bozkurt, 2020, p. 121).

Another striking research and descriptive analysis proved the presence of technostress in teachers (Nimrod, 2020; Wang et al., 2020). Because some teachers are not accustomed to online education, they have to deal with psychological problems such as anxiety, tension, and anger. Additionally, the discipline of a traditional classroom environment may not be maintainable in online education, resulting in unwanted behaviors being observed in students such as undisciplined behavior, non-compliance with deadlines, and insensitivity (Çiftçi et al., 2020, p. 126). In online and distance education, technostress is a big factor causing problems such as lack of focus, tolerance, anger control, and attention (Kuday, 2020).

Education systems that fail to focus on understanding, research, and producing results can in no way meet the expectations for future human resources. This failure to transform result in the phenomenon of the emergence of a young unemployed group that is Neither in Employment nor Education and Training (NEET, as defined by ILO, 2005); Turkey has yet to find a unified concept to express this, instead finding the various abbreviations of NEIY, NE-NE, or NE-NI (Bauman, 2020, p. 73). NEET describes youths who are not enrolled in any kind of educational institution while also not showing any effort to seek work or participate in youth employment; namely, they are not involved in the labor force (Cansever & Namal, 2019, p. 112). Many observe a global generation about to emerge that is inactive and not interested in employment. The presence of this NEET social segment is in itself a great indicator of the deep inequality of opportunity, while also being a notable sociological manifestation of an increasingly bohemian outlook on life. The NEET group should be considered a minefield, a dangerous space that will place serious risk on countries' future; thus, NEET should also be seen as a problem related

to future survival, socio-economic peace, and welfare (Ulusoy, 2020). In the upcoming period, human resources, especially professions, will change shape and quality, while technological literacy, adaptation, and ability to adapt will produce either stunning or devastating results such as being included or excluded from the process of transformation. Setting out a human resources management policy and action plan to analyze the whole process will alleviate the devastating impacts.

Regarding another aspect, the rapid and uncontrolled growth of digital space has led to a discussion on the limits of modern surveillance. Endless and automatic observation of individuals' daily lives has led to a great increase in the use of classification systems. Individuals may not realize they are the object of surveillance; more importantly, they probably don't understand how citizen, employee, or consumer profiles are kept in databases on networks (Hope, 2018, p. 70), or they simply do not care. The digital footprint of any individual who connects to the Internet and carries out a task is not deemed important. However, constructing people's profiles by analyzing the information obtained from their ordinary actions through algorithms is a violation of the preservation of personal data. In this context, noting the presence of surveillance in studies aiming to achieve digital literacy within the education system is necessary. Surveillance culture is the provision of individual and student behavior in terms of controlling, socializing, normalizing, adapting, and assisting students on self-regulation (Bauman, 2020, p. 76). However, the entire online space has the structure of a panopticon with a "central watchtower which continuously sees the individual without being seen as the surveillant" (Hope, 2018, p. 65). This condition should be examined carefully by modern social theory in terms of how the individual becomes subject to this procedure, standardized, and objectified.

Conclusion

The future is no longer a bright and promising time for many of us. The future is a point of concern with a series of challenges to overcome that need to be constantly managed now. The now revolves around eliminating future threats (Bauman, 2007, p. 38). Schools as an institution, a social system with students, parents, teachers, and administrators, will adopt an institutional order to guide the narcissistic and alienated individual of the global neo-liberal order more than it had previously guided. With the Socratic motto of "Know thyself" as its groundwork,

the counseling system will be strengthened by sociologists analyzing the society and culture and implementing counseling activities by keeping the thought of the individual among society in mind (Bayhan, 2015).

The new global state due to the pandemic has generated many discussions around the concepts of school, teacher, information, education, learning, assessment, and evaluation and revealed the emergence of new forms to be inevitable. In this regard, several new strategies, action plans, and pilot implementation studies on new forms of formal education will be set in 2021. Secondary education will need to increase the digital literacy of educators and form new specialties integrated into education more than before. These specialties will be mainly IT (software and hardware) specialists, data analysts, content analysts, and data miners, as well as event managers, training coaches, school sociologists, science, culture, art, and sports experts.

One of the biggest observations during the pandemic has been the comparisons between distance education and face-to-face education (Kvashko, 2020). When approached critically from this point, the indicators of success are questionable for most universities in Turkey, as is also the quality of education and educational materials. Therefore, comparing distance and face-to-face education forms an artificial basis for discussion. From this point of view, the main focus of education, whether distance or face-to-face, should be to have quality assurance in the presentation of both education and educational content. Distance education is not a mere structure or a single pedagogical approach; it is a systematic approach consisting of several different learning materials, forms of communication, and interrelated parts serving a specific purpose. Resuming education online requires a systematic and preplanned understanding. To have the right balance in distant education, to run technology and pedagogy in a meaningful way for effective and efficient learning, and to ensure meaningful learning experiences are all equally important. Examples of the common use of technology include using learning management systems, live lesson tools, or digital environments. Although learning management systems are effective at providing content to the masses, they also have certain limitations in the context of supporting social learning processes and forming an ecology of learning. Within this context, the need to design teaching-learning with concepts such as blended learning and reversed learning is important in the context of having effective learning outcomes for maximum learner satisfaction (Bozkurt, 2020, pp. 118–119).

The intensive and rapid shift to working from home during the pandemic has led to serious changes in home and family dynamics, roles, and responsibilities. Pedagogues and families are concerned about the security and nourishment of children, especially for working families who spend more time outside school; their children receive online education at home and are mostly alone in an uncontrolled space. The conflicts and problems that might be caused by the increase in work-from-home practices and online education in our business life will become clearer over time. Whether this domain will function to the desired extent and effect is unclear, especially for the planning and management of extracurricular activities that students will perform.

Education's shift to the digital sphere has led to the emergence of discussions related to political, economic, and cultural hegemony and authoritarianism (Morozov, 2011, p. xvi). Digital space not being monocentric and uncontrolled leads to aggressive and restrictive measures being taken; this in turn leads other ontological questions to arise. Discourses that argue the evolution of future technology to necessitate an evolution of public order are increasing.

The traditional, sociological, philosophical, and pedagogical debate that digital-online education would never replace traditional face-to-face education is also growing. In particular, many dimensions of the digital field, which is mainly seen as a field of unlimited freedom, have gone unnoticed such as the drop in the quality of information and information pollution due to the uncontrolled space of the net. Neuman (2018, pp. 108–111) focused on "the exponential growth of information" and the information environment's hegemonic effect on the human brain, drawing attention to the following issues from Marjorie Connelly's (2020) article in the New York Times "More Americans Sense a Downside to an Always Plugged-In Existence." Some adverse effects of the age of information and digitalization have occurred such as digital tools depriving the brain of the time needed to rest, technology causing impatience and forgetfulness, the price paid for getting addicted to plugged-in devices, how visuals and audios control our lives, the mess caused by data overload, the lack of time management, and attention deficiencies.

In the work The Dark Side of the Internet, Morozov (2011, p. 28) emphasized the lack of control in the digital sphere, noting that "most policymakers instead choose sleepwalking through this digital minefield, refusing to face all the counter evidence by whistling their favorite cyber-utopian melodies."

A fundamental problem exists that is caused by the disagreement between a paradigm of proficiency and competence toward a certain goal in the educational field and the pedagogy-centered paradigm. In face-to-face education, arts, sports, culture, behavior, values education, personality and character development, socialization, and social interaction come to fore, while only teaching and teaching techniques are emphasized in online education.

The ongoing pandemic has once again revealed schools to be a social learning environment and climate to have extremely valuable functions due to school providing children and young people with a safe environment where they can take risks, see several possibilities, and discover and realize new goals. School is the key to opening the door for students on their way to becoming the person they wish to become. Most importantly, schools also offer a humanitarian environment, enabling both self-learning and learning with others (UNESCO, 2020, p. 16).

This study describes the results of urgent distance-online education practices implemented during the COVID-19 pandemic and the phenomenon of digitalization. Policy makers, theorists, educational institutions, educators, learners, and parents in particular as well as all other sections of society should pay due attention to the preparation of action plans and new strategic plans by taking into account the need for social and economic order. A new balance should be established between online and face-to-face education through comprehensive and extensive analyses and studies concerning all methods for training and teaching, methods of education for training teachers, the processes one has to go through to become a teacher, all curricula, tools and systems for learning management, assessment and evaluation systems and tools, social learning processes, school climate, and the ecology of learning. Distance/online/digital education, which has become an educational phenomenon with the pandemic, should have its weaker aspects developed (i.e., the lack of management culture and of an organizational structure that allows effective management of virtual education processes; Arkan, 2020). However, under the intense digital bombardment of information, "optimizing human capacity of positioning and benefiting from information" (Neuman, 2018, p. 113) stands as another question that needs to be urgently addressed.

In summary, the value of creating information within educational formats, social learning processes, and ecology of learning should not be overlooked, notwithstanding the efficiency of accessing information on the net with the rise of digital spheres.

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The Concept of Change and the Teachers' Role on the Implementing Technological Transformation at School

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Change in the educational system is a concept that must be thoroughly analyzed as it covers a wide range of aspects that impact the organizations in which they are implemented. According to Almog and Schechtman (2007), change can be defined as any significant difference in ideas, approaches, leaders, products, and technologies. Thus, change is a continuous activity of managerial positions in education. Successful change management requires first and foremost proper arrangement and preparation, and planned change is managed according to a clear and well-known strategy for its leaders and employees (Unger et al., 2011).

At the end of the twentieth century, Samuel (1996) suggested that the need for organizational change arises when a gap is created, a rather large implementation that cannot or should not be sealed by routine means; he added that changes do not occur under fixed and stable conditions

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but rather in response to values that threaten an organization's functioning (schools are an example of an organization) in various aspects either in the present or in the foreseeable future. Alternatively, changes are a response to transformations of values that are interpreted as opportunities to improve an organization's resilience and increase its achievements. Sarason (1995) claimed that any effort to bring a change that does not take into consideration an understanding of school culture will ultimately fail. Any change can be operated in the school if money is invested, but that is not enough. Investing money without understanding the school culture does not guarantee the success of such change. People, ideas, motivation, and resources are needed in order to create a significant change in an organization such as a school. The ideas should be translated into perceptions, lead people according to established guiding principles that transform them into action. For such a process to remain and to be maintained, change must become a part of the school's language and tradition, so that it stems not only from the people, but is also assimilated into the spirit of the organization as a part of its identity, belonging, and main objective (Kfir, 1997). Moreover, Fox (1995) stated that the process of change is dynamic and has permanence as well as periodicity. For change to be successful, the conditions that allow it must be present, and if they do not exist, they must be created before the transition begins. Managing change is not a one-time action but rather a permanent action that occupies a significant part of the administrator's day-to-day activities. In other words, a means (i.e., "how") must be present such as an organizational backbone through which the change will be implemented and assimilated in practice in order to create a change (i.e., "what").

In the twenty-first century, Cohen and Lechner (2011) established three main steps for a process of change to take place in the school:

(i) *First step*: The stage of initiative for innovation and change. The initiative should come from the school administration or the teachers. A change originating from an external factor or one dictated "from above" is not an initiative.
(ii) *Second step*: The implementation of change in a school depends on the type of change required (i.e., the implementation of technologies in teaching through the construction of "smart classrooms" equipped with interactive whiteboards). Teachers are the main actors of such change.

(iii) *Third step:* Continuity. The school must maintain the change for a suitable and rather extended time because the effects of change begin to be reflected after a year or more. After the initial experience of such a change, the school will be able to consider its suitability and success and decide if proceeding with it is worthwhile.

Shamir-Inbal and Kelly (2011) showed that, when teachers are involved in implementing change, they can better cope with challenges and develop themselves professionally. For such involvement to be possible, the teacher must be surrounded by a learning environment, a supportive school, and a regional system. The acquisition of innovative pedagogical-technological knowledge requires systemic interventions and detailed planning of teacher-training activities in accordance with the school's needs. Shamir-Inbal and Kelly (2011) addressed three aspects of systemic interventions for implementing a technological process into education:

(i) *The technological aspect:* This refers to the number of computers in the school, their degree of integration, their availability to teachers and students, accessibility to the Internet, and availability of technical support for the teaching staff. A high level in each of these factors is necessary for implementing technology into teaching. Only when teachers feel comfortable using technology can they face the challenges of combining it alongside the appropriate pedagogy.
(ii) *The pedagogical aspect:* A change in pedagogical rationale is also necessary in order for a pedagogical change to be effective and allow teachers to experience teaching methods combined with technology. Admittedly, teachers should develop some kind of willingness to accept changes by encouraging the integration of technology into their own learning process; this will lead to their involvement and create fruitful dialogue among teachers. In this way, cooperation among teachers may contribute both to learning novel content and adopting the suitable pedagogical approaches to apply when cooperation is not limited to time or space. The school should advise teachers on the necessary pedagogical changes so

that teachers will learn specific teaching methods that incorporate technology, develop collaboration with other teachers, and encourage development of the teacher-student-parent relationship. A pedagogical change must be separated from the change in the level of teachers' professional knowledge: They should be taught and trained to adapt to new and evolving technology.

(iii) *The organizational-administrative aspect:* A school must constantly adapt to innovation for the success of both its programs and the school. Staff cooperation and provision of assistance for organizing and planning school policies is a method suitable for implementing information and technology (IT) programs (e.g., acquiring new computers).

Ertmer and Ottenbreit-Leftwich (2010) emphasized the effective change in a school to only be possible if the change is also operated on teachers' personal level. Using the external tools provided by official institutions (e.g., Ministries of Education) tests the effectiveness (indicators of success), constantly presenting the benefits and gains from the change (increases motivation and willingness to help) and providing extensive, clear, and accurate information about the project and how its efficiency impacts the school management team and other teachers' departments. Presenting a clear plan with measurable goals is very important for ensuring staff guidance and instruction and for building confidence against failure. In addition, both expected and existing difficulties should be presented to foster attentiveness toward problems and difficulties. The school administration should aim to create a climate where room exists for developing new ideas.

According to Guskey's teacher growth model (2002), a change in teachers' perceptions is firstly a learning-based process rooted in experiences and educational activities. Therefore, one can assume that during the teachers' attempts to assimilate modern technologies in their teaching processes, they will expand and perhaps change their opinions and views on learning, teaching, and technology. Avidov-Unger (2011) affirmed cultural change to be an outgrowth of teachers and leaders' desires within and outside the school to reshape the school's reality and shift it from a "traditional" direction (frontal instruction, learning-focused teaching) to an innovative direction (student-focused learning combined with technology).

A number of theories exist that focus on schools as being organizations. Schools around the world are currently undergoing changes in relevant areas such as their social and educational mission, managerial methods, structure, connections with social communities, and more. For Nir (2017), these changes stem from a perception that sees schools as organizations for everything; this may help in understanding the nature of school functioning in terms of management style, teamwork, decision-making process, environmental relationships, teaching methods, and evaluations for academic and social achievements. According to Holt et al. (2007), schools that have adopted the culture of being a learning organization have found adapting to changes easier and are more successful than schools lacking such a culture. Such schools encounter no opposition from the teaching and administrative staff to a new technological culture because teachers participate in the processes of change and in constructing the necessary pedagogical knowledge. According to Mâță (2021, pp. 44–45), teachers can no longer close themselves off "in the ivory tower." Such a move substitutes opposition with innovation, leading toward change and aiding in its success. Sharing strengthens the sense of control; it is perceived as a legitimate move at the same time as allowing for a better understanding of the change and increasing the sense of commitment. The components of dialogue, sharing, knowledge transfer, and knowledge preservation create the behavioral patterns in a learning organization that is essential for effectively implementing innovative technologies. A learning community is characterized by respect, sharing, and communication among peers when teachers take making the change upon themselves of their own free will. If they believe that change is necessary, they will make great efforts to implement it effectively in class and at school.

Technology, Change, and Teachers' Ethics

An "online teacher" is an up-to-date teacher who uses information and communication technology (ICT) and routinely works online in their personal and professional works (Ham & Davey, 2005; Rotem & Oster-Levinz, 2007). A perceptual change in teachers' role and working methodology focuses not only on integrating ICT but also on updating educational goals, adapting the skills graduates require, redesigning the learning environments, and implementing innovative teaching and learning processes (Loveless, 2011; Prensky, 2008; Rotem & Avni,

2011). Integrating technology in teaching involves personal, creative, and dynamic decisions made within the contexts of education, society, and community. The new possibilities that ICT calls for also entail dealing with the moral aspects that arise from the characteristics that technology has and the possibilities for its use (Koehler & Mishra, 2008; Loveless, 2011).

Decisions about ways to integrate change into teaching are part of the ethics of a teacher's professionalism as an educational-social agent, one in which the teacher deals with complex and multifaceted innovations where ICT functions as a powerful and meaningful mediator (Fisher, 2006). In this process, the teacher undergoes both personal and professional changes as part of the process of development and growth that takes place over a lifetime (Hargreaves & Fullan, 1992). This change relies on practical experiences in unique situations based on time and context (Fox, 1995). Events teachers perceive as critical and formative, especially those that evoke negative feelings of panic, apprehension, and appeal, are the turning points in initiating change and development (Shapira-Lishchinsky, 2011). The search for and construction of a new path may be accompanied by resistance, apprehension, embarrassment, and coping with limitations and constraints (Bell & Gilbert, 1994, 1996; Jones, 2004). In the process of change, a teacher's perception of their professional identity gets built into a creative and critical educator who works to shape culture in a changing learning environment (Loveless, 2011). The transformation an online teacher undergoes is perceived by the literature not only as streamlining and role shaping but also as a professional and moral renaissance (Fisher, 2006).

Morality and ethics are the valuable infrastructure of human existence and education. The moral dimension of teaching is the basis for a good teacher's professional and personal identity (Clark, 1990; Sockett, 1993). The teacher as a moral agent has a double commitment: the commitment to their ethical standards as a moral person and moral professional and their commitment to guiding students to a moral life (Campbell, 2003). A teacher's ethical behavior is derived from their ethical knowledge and personal, social, cognitive, and emotional abilities (Berkowitz et al., 2006; Hoffman, 2000). Ethical knowledge involves understanding the essence and role of morality, developing an inner conscience that guides to the right and the proper, the ability to listen, sensitivity to ethical issues, the ability to think and judge morally, the ability to make moral decisions, and moral cognition. A person's ethical awareness is a significant part of their

own development and the formation of their professional and personal identity (Scheffler, 2004). In contrast to approaches that perceive moral identity as an integral and complete self-understanding, other approaches can be found that view human ethics as a multifaceted, dynamic, and polyphonic being (Tappan, 2006; Turiel, 2006). A person who functions at a high and conscious ethical level is considered an autonomous person who takes responsibility for their ethical behavior as part of their identity, worldview, and lifestyle (Campbell, 2003). A teacher with a high ethical awareness is aware of their role as a moral agent and is able to apply ethical behavior in the practical aspects of daily life (Campbell, 2003).

Ethical dilemmas are part of teachers' personal and professional lives and are seen as an important part of their function. An imbalance among ideal perceptions, personal voices, and considerations in practical applications can cause tension in a teacher's ability to deal with dilemmas. Such situations can lead to a loss of focus where actions are justified through defense mechanisms and ethical decisions are compromised (Cherubini, 2008). At the same time, some teachers can clearly express the upcoming ethical awareness to be expressed in their behavior, especially in the aspects they believe in and value.

Ethical knowledge includes understanding the essence of morality and its role, the development of an inner conscience that guides to the right and proper, the ability to listen, sensitivity to ethical issues, the ability to think, moral judgment, the ability to make moral decisions, and moral cognition (Narváez, 2006). A person who functions at a high ethical and conscious level is considered to be an autonomous person who takes responsibility for their ethical behavior as part of their identity, their perceptions of the world, and their way of life. A highly ethical teacher is aware of their role as a moral agent and can implement their ethical behavior in practical aspects of everyday life (Campbell, 2003). Thus, the added value of the ethical responsibility imposed on each teacher is the behavioral summation of all teachers (Sichel, 1993).

According to Campbell (2003), teachers are unaware of the ethical disturbances involved in their work and their actions. Even if teachers are aware, gray areas in everyday experiences can disturb their intentions, the rationality of their decisions, and their emotional instincts (Campbell, 2008).

Ethical dilemmas are a part of teachers' personal and professional lives and are perceived as an important aspect of their work (Campbell, 2008). An imbalance between the ideal concepts and inner voices regarding

the teaching praxis can cause tensions in a teacher's ability to deal with dilemmas. Such situations would lead to a loss of focus, justification of defense mechanisms and defensive actions, and compromises in ethical decisions (Cherubini, 2008). However, some teachers are able to clearly express the ethical awareness of their behavior, especially in the aspects they believe in and value (Campbell, 2008).

ICT not only increases the frequency and intensity of teachers' encounters with ethical issues but also raises new questions about values, rights, laws, norms, and etiquette (Campbell, 2008). The transformation of information and communication is not only a technological revolution but also a social and ethical change in a complex weave between technologies and their creators, users, interactions, and social contexts. In this way, both digital culture and human behavior are designed in such a way where morality and ethics is an integral part of what the technology and online experience provides; they are also accompanied by the psychological effects that are unique to the online environment. All this creates a new reality characterized among other things by easy access to information, the ability to use information and copy it by means of producing and publishing personal and collaborative information, and communication channels that enable free expression on a variety of platforms and identities. In this reality, values and rights change their appearance and get renewed (Bynum & Simon, 2004).

The ethical issues arising as a result of the use of technology are related to technological systems (both hardware and software), information, and human and social interactions. Among other relevant topics, such issues concern accessibility, equality, digital disparity, freedom of information, intellectual property, copyrights, collaboration, fair use of information, reliability, credibility, freedom of expression, privacy, anonymity, security, control, power relations, hierarchical structures, online bullying, and enforcement. Just to quote a few examples, these issues also deal with the blurring and transgression of limits such as space, location, and time as well as the limitations of personal and professional presence (i.e., legal versus virtual entities).

In addition to general ethical issues, online teachers are faced with ethical issues in the professional context (Avni et al., 2010; Rotem & Avni, 2011). In this context, a teacher may behave properly and act out of ethical and legal awareness. Conversely, the teacher may break the law and not respect the rules of ethics, sometimes from lack of awareness and sometimes deliberately. Teachers may also discover they are a victim of

illegal or unethical behaviors involving the use of technology. In regard to coping with such ethical issues, a teacher's expertise and skills can be defined as complex and intricated. Teachers' increasing use of ICT and their encounters with ethical issues summon and even force the awakening of ethical awareness (Brey, 2007).

Parallel to the development of personal ethical awareness, broad perceptions of ethics have been developed in the context of ICT. Gorniak-Kocikowska (2007) believes that local ethical theories will be replaced by a universal and global theory of the age of information that will address the whole of human relationships and actions in all cultures of the world. Bray (2009) believes that "netiquette" (network ethics) can develop only as an addition to the local ethics that resolve people's local problems.

Dealing with ethical issues and legal questions is part of the reality of online teachers' lives, and regarding technology, they function as a consumer and user in both their personal and professional lives. The teacher as a consumer takes advantage of software, digital means, and online services; uses online information and content; and maintains a variety of interactions. As an active user, the teacher provides information, publishes content, initiates interactions and message delivery, leads activities in digital environments, and takes an active part in their personal and social presence on the web. Furthermore, the teacher as a social agent creates a learning community and shapes messages; the way they guide and mediate among students is aimed at activism, collaboration, involvement, and higher-order thinking (Velmer, 2011).

Every teacher who integrates ICT technology in their work must consider its proper use, the proper behavior in its environment, and students' education in this area (Beycioglu, 2009). Using the Internet for educational purposes means that ICT is integrated into controversial education such as learning on social networks (Velmer, 2011); this needs to be reconsidered.

As part of applying ICT in teaching and learning, the teacher faces ethical issues and legitimate questions that arise from various aspects of using technology. Some issues involve the use of hardware, software, digital tools, and online environments, while others involve information and rights over that information, intellectual property, copyright, sharing, information evaluation, and information security. Some issues also deal with interactions, presence in the online environment, ways of expression, freedom of speech, privacy, safety, and protection.

Although educators are generally honest and ethical, Johnson and Simpson (2005) argued that they very often break the law in copyright protection online. These researchers included lack of knowledge among the reasons for these offenses to be mainly due to two factors: (i) lack of sufficient information and difficulty in monitoring the complexity of the law and its interpretations, and (ii) lack of understanding and misconceptions. This is because educators treat information that is not marked with a copyright as free information for use, or they interpret "fair use" as any use made within the school or from which students can benefit.

The limits of the permitted use of law and the definition of fair use, especially due to the new Israeli copyright law (Israeli Ministry of Education, Culture, and Sports [IMECS], 2012), are also flexible and subjected to interpretation. Hobbs et al. (2007) carried out a study among teachers in the USA; they found teachers to be frustrated and fearful due to lack of or conflicting information regarding copyright and the fair use of information and materials in education. As a result, these teachers restrict their use, which harms their new ability to exploit innovativeness, cooperation, advertising, and distribution of materials and deliverables. Beyond legal recognition and understanding, teachers are in conflict between policies and action (Hobbs et al., 2007). Thus, they might be torn between copyright protection and copying materials that could help their students gain higher achievements. According to Johnson and Simpson (2005), every educator involved in technology should understand the legal and illegal uses of intellectual property and whether to protect the school from lawsuits or serve as a role model for students. Elkin-Koren (2004) warned that uncertainty about the permitted uses of works may lead to a "cooling effect" in promoting online teaching.

A study on unethical behavior among 314 teaching students at a university in Turkey (Beycioglu, 2009) used a scale identifying unethical behavior in the use of computers. The scale had been formulated by Namlu and Odabasi (2007) and identified five main categories (see Table 1).

Beycioglu (2009) found future teachers to be somewhat sensitive to the ethical use of computers, but their actual behavior undermines this. For example, they respect intellectual property, but in practice they use unlicensed software, usually due to financial considerations. In addition, female teachers were found to be more bothered than male teachers regarding ethical issues, and teachers who have more than five years of

Table 1 Categories identifying unethical behavior

Intellectual property	*Social impact*	*Security and quality*	*Network fairness/equity*	*Fairness/equity in information*
Using unlicensed software and distributing copyrighted files	Online harassment, extortion	Malicious software sabotage, hacking	Mass distribution of emails and chain letters for financial purposes	Plagiarism, use and alteration without citing the source

Source Namlu and Odabasi (2007).

experience with a personal computer address ethical issues more than those with less experience.

Teachers have to deal with legal and ethical issues that arise from students' behaviors. In a survey by the UK Association of Teachers and Lecturers (ATL, 2008), teachers raised the problem of pupils copying materials from the Internet without citing the source. In examining teachers' awareness of school policy regarding the plagiarism, close to a third of teachers stated not knowing if their educational institutions had any policy, and less than a third stated their school had no policy to address the phenomenon.

Online harassment and cyberbullying are other issues that teachers address or find themselves victims of (Hinduja & Patchin, 2012). Gudmundsdottir et al. (2020) found a positive relationship to exist between perceived competence with privacy issues and the handling of cyberbullying. Williamson et al. (2007) found 32% of teens who use the Internet in the United States to have been harassed online by receiving threatening messages, sending emails or text messages without permission, uploading embarrassing images without consent, and spreading rumors: 13% were reported to have sent abusive messages; 45% had received abusive messages through instant messaging applications, 16% through chat, and 6% by email. 18% of the teens had reported being bullied on the net, 16% had experienced molestation on the net, and 38% of those receiving an abusive message indicated that they had replied with an abusive message. A survey the Geocartography Knowledge Group (Degani & Degani, 2012) conducted in Israel over 600 participants (200 teachers, 200 parents of children aged 8–18, and 200 students aged 13–18), 12% of the teens reported having been harmed on Facebook (8% of

the abuse being verbal curses or insults, 3% being subjected to the spread of false rumors, and 3% had an insulting photo uploaded to Facebook). 21% of youths in Israel saw a video or photo on Facebook showing one of their friends or teachers in an awkward or humiliating situation (14% saw a video/picture of a friend, 5% saw a video of a teacher, and 3% saw a video/photo of both a friend and teacher). 13% of teachers responded that they'd received a request from parents or students regarding the abuse of their students through Facebook. 19% of the teachers indicated that they or one of their peers had experienced an assault by a student through Facebook (10% experienced insults, 7% were cursed at/verbally abused, 4% were humiliated, and 3% saw uploads of insulting images of themselves). The UK Teachers' Organization (NASUWT) published survey results in 2007 (Coughlan, 2007), according to which 45% of teachers had received an email attack, 15% had received threats, and 10% were concerned about messages written about them on websites. This organization presented about 100 cases in which teachers had fallen victim to online mobile phone and email hacking, as well as malicious slander and accusations on websites and social networks (Keates, 2007). These events can adversely affect teachers' health, safety, well-being, self-esteem, and even their careers (NASUWT, 2009). The organization has subsequently issued a public call for the UK government to take urgent action against online abuse and to protect the interests of teachers and other staff in the educational institutions who had fallen victim to this bullying (NASUWT, 2009).

Another important issue is information privacy. At all levels of the educational hierarchy, information can be collected, documented, and analyze in ways and on scales not previously possible. Information related to students (e.g., achievements, academic activity, hours of operation, frequency of activity on the learning site, student comparisons, sensitive personal information) requires security but also raises questions about its impact on teachers' student evaluations. Through information management environments, parents and teachers can monitor students and strengthen their control. Principals can also monitor teacher activity in class and outside of the school boundaries. Since 2006, social networks, especially Facebook, have invaded the lives of both teachers and students.

Israel has an educational program for "safe surfing" (IMECS, 2012), the goals of which are to maintain children's well-being and safety both in real and online environments, as well as to provide them with tools for intelligent conduct in cyberspace. This program generally deals

with teachers' exposure to the online environment and in particular to children's world; parents' exposure regarding the importance of being involved in their children's surfing habits; students' being educated to behave wisely online while maintaining ethics and safety, control, caution, intelligence, responsibility, honesty, and respect toward others and toward information; copyright protections; respect for privacy; and specifically being alert to dangers. Furthermore, the program provides behavioral and technological tools for dealing with online environments. Content deployment includes behavioral norms, cyberbullying, privacy, copyright, collaboration, online discourse culture, offensive content, online communication, and healthy lifestyle management while surfing the net. The program also includes guidelines for teachers and parents, activities, and tailored teaching and learning materials. The program exposes teachers to the subject but does not require them to acquire in-depth knowledge for assimilating it.

The study conducted in the United States by the National Cyber Security Alliance (2011) found 91% of the 1,000 teachers who participated in the study to have thought that ethics and safety should be taught in school while only half had thought their school to have prepared students properly. A little more than half of the teachers reported being willing to teach their students about ethics and safety online, but when asked what they actually taught in their classrooms, the most common answer was nothing. The issue of plagiarism was unusual, with about half of the teachers reporting to have talked to their students about it. The survey by the Geocartography Knowledge Group (Degani & Degani, 2012) found 25% of teachers to think the Ministry of Education should provide information or raise awareness about the harm done through Facebook, 15% to think that educational classes should be held on the subject, 6% to think that students should be punished for harm/abuse through Facebook, 22% do not know what the Ministry of Education should do, and 8% to think that the Ministry of Education is unable to do anything about it.

Discussion and Conclusion

As argued within this chapter, the massive change online teachers have experienced has had an impact on how they work and perceive their role and is described as part of the personal, professional, social, and cultural changes that ICT introduced into twenty-first-century life. As a result of

the increasing and ongoing use of technology, teachers nowadays have to deal with a wide range of events and occurrences involving ethical issues in which the educational community is deeply involved. Although educators generally show a high level of ethical literacy (Frolova et al., 2020), the analysis of the literature shows that teachers find themselves to have broken the law (Johnson & Simpson, 2005) when their actions are related to technology being applied in education. Following Shin (2015, p. 181), "Participants' awareness of critical, ethical, and safe use of information and communication technologies was raised through activities for evaluating and discussing the selection of instructional materials and the lesson activities associated with them." Therefore, a training program specifically designed for raising teachers' awareness of ICT, evaluating digital content, and learning the legal issues surrounding the use of technology for educational purposes could prove to be beneficial. Gudmundsdottir et al. (2020) stated that the ability to evaluate online digital content has a positive relationship with perceived competence in privacy issues. This means that specific training could help to improve their awareness not only of ICT and the legal uses of technology in educational settings but also of how it can impact their personal area. The mix of embarrassment and apprehension involved in teachers' need to deal with technological issues and educate students on the proper use of ICT and online behavior should drive the development of ethical awareness.

Mâță (2021, p. 44) stated, "The use of new technologies has the potential to generate numerous ethical dilemmas." Mass access to information has had humans take on the new role of an intelligent and active user who is responsible for personal information and should take care of information security and privacy. However, this also raises ethical decisions about what information to disclose and to whom, as well as what actions to take following the use of information. All this is especially important when teachers who must raise specific awareness on ICT usage, what it can or must not be used for, and how to teach ethical issues to their students regarding technology. Teachers are therefore responsible for educating students on how to intelligently use ICT, which entails safe surfing on the Internet (Rotem & Avni, 2011). Watty et al. (2016) showed one great challenge to not be technology itself but educators' ability to embrace the technological revolution. Even more so, teachers are responsible for educating their students on online ethics, though many teachers have yet to adopt technology as part of their work routine (Avni et al., 2010). Online teachers operate in different worlds, use

different languages, apply different teaching and learning materials, and hold different positions regarding integrating technology into teaching, as well as which norms and values to involve (Koehler & Mishra, 2008). Proper understanding not only of the benefits and challenges but also of the drawbacks and possible risks that technology places all on us is one of the main concerns of the political agenda of international institutions (e.g., UNESCO, 2006). Thus, training teachers in ethical issues regarding the use of technology should be also the priority of international educational policies to assure a better and more secure use of information for all.

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Education in The Context of New Culture and Society Conceptions

Shifting Cultural Paradigms in Global Education: Toward Decolonizing Knowledge

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The body of scholarship on the intersections of education and culture has branched into multiple subfields in education studies. The move away from cultural deficit models, which on one hand blame low achievement on students' culture and on the other on the problematization of Eurocentric approaches, has brought new approaches to the fore that consider the question of differences, especially as they relate to gender, race, ethnicity, language, and religion. This chapter offers an overview of current discussions and discourses on cultural sensitivity, multiculturalism, and interculturality in education before focusing on the significant parallel development of decolonization.

Education as a practice and academic discipline has universal application. Knowing, thinking, learning, teaching, and studying have occurred in myriad ways and settings over time and across geographies, sharing much in common. The human lifespan itself is biologically organized for progressive learning that appears to diminish surprisingly slowly with age.

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A multitude of learning practices has been designed for all ages; in addition to primary, secondary, and tertiary education, the notion of lifelong learning has received growing attention. At the same time, education is no longer viewed as a neutral activity that can be replicated universally. Despite their commonalities, the ways in which educational activities are configured, expressed, and theorized differ. In its most bureaucratic form, education remains enmeshed in cultural practices, even if they have been rendered invisible. The rise of mass schooling in the modern era, closely connected to the ascendancy of Western countries and market economies, has prescribed education as a key index of civilization, development, and democracy. Having emerged from Enlightenment ideas, modernity has conceived of education in universal terms with some variation while centering on certain modes of thinking (empiricism), as well as values and goals (individualism, secularism). Modernization policies have implemented these goals by way of mass education as state directives with support or in contention with the global doctrines issued by Western-based multilateral agencies such as the International Monetary Fund, Organisation of Economic Co-operation and Development, the World Bank, and UNESCO. However, contestations around the cultural content of educational policies occur at all levels, from ministries of education to classrooms. Education simultaneously remains a vehicle for reproducing culture as well as a site of resistance to hegemony. Teachers and students remain important actors in reinterpreting curriculum and questioning the efficacy of policies. Consensus on the normative claims of Western education collapsed long ago, and alternatives from the global South and minoritized groups in the metropole have been on the rise since the era of decolonization. Like other academic disciplines, the field of education in the metropole was slow to acknowledge this shift in thinking but has moved to the forefront today thanks in large part to indigenous scholars (McKinley & Smith, 2019; Smith et al., 2018; Watahomigie & McCarty, 1994).

Liberalism: Cultural Sensitivity, Multiculturalism, Interculturality

A *longue durée* view with respect to decolonizing perspectives, drawing chiefly on Césaire, Dussel, Fanon, and Wallerstein, provides depth for understanding the context of educational debates around culture. A centuries-long evolution saw elite tutelage give way to mass schooling;

the liberal arts curriculum of classical Western education, based on the trivium and quadrium, expanded and diversified to include more subjects aimed at the broader section of the population in working-class occupational structures. As a key arena of the modern state's interface with its citizens, education has been a crucial force in cultural reproduction and hegemony. Groups that have been historically marginalized in society (i.e., women, working classes, and ethnic minorities) have also sought access to and representation in public education while pressing for inclusion and the transformation of educational paradigms. Contestation of power in the political order echoes in the social sphere as a site of struggle for recognition.

With regard to religious values, the rise of the modern nation-state (at least since the Peace of Westphalia in 1648), and the Enlightenment, as well as the liberal political revolutions of the seventeenth and eighteenth centuries, Marxist revolutions, and state-led planning in the socialist bloc have promoted secularism as a central value of the West. With the post-Enlightenment divergence of reason and belief, the role of the church gradually diminished and was replaced with state power. The church-state separation confined religion to a severely limited sphere in terms of political power, while the state's expansion into social and private life effectively replaced the authority of religion, particularly in regard to intellectual production as clerical authority shifted to university-trained experts. In the late modern era, educational discourses have retained a secularist outlook while making culturally appropriate adaptations that take into consideration a plurality of groups and recognize complexities derived from colonial histories and economic imbalances rooted in unequal power relations. International mandates for development as the ideology of modernization in the postwar era have sought to make more efficient rational bureaucracy located at the state and regional levels while designing a social order receptive to Western political and economic interests. Eventually, the tendency to assign more value to local culture has been aided by technological advances after trending toward decentralization in development policy. Today, cultural competence and respect for indigenous knowledge and heritage are key features of development models, but are not without their share of critics suspicious of modernizing agendas from above.

In Western countries, liberal approaches to the relationship of education and culture are premised on tolerance and strive toward inclusion as a key policy. Cultural sensitivity, multiculturalism, and interculturality

seek to level the playing field or create a place at the table, as is said in the language of inclusion. In other words, such policies welcome historically excluded or marginalized groups on an ostensibly equal basis. Cultural sensitivity aims to heighten awareness of differences and neutralize intolerant behaviors in curricula and educational settings. Used primarily in the education of nurses, counsellors, and service industries, as well as in private enterprise that relies on clients' trust, cultural sensitivity boils down to effective communication and the implementation of policies that take into consideration cultural differences.

Multiculturalism is an umbrella term for policies that dispense with overt Western (Euro-American/white supremacist) assumptions and engage different cultures in turn; this is seen in the recognition of heroes and holidays at one end of the spectrum, and state support for autonomous culturalist organizations at the other. Multiculturalism seeks to integrate long established minorities and recently arrived refugees and migrants into the social, economic, and political order. Its logic of assimilation without imposing uniformity is seen as an antidote to social problems related to alienation and poverty as well as to segregation and separatism. Inclusion policies have also created a backlash from conservative groups that valorize the heritage of the majority, into which they insist ethnic minorities should be enculturated.

Interculturality has a theological background and practices direct engagement through dialogue based on the impetus to learn about the "other" and to forge mutual recognition around commonalities and differences. Due to its missionary origins, intercultural dialogue arouses suspicion of an ulterior motive of religious conversion. In the case of the first two approaches (i.e., cultural sensitivity and multiculturalism), criticism has been aimed at the framework in which inclusive practices are situated. The overarching structure is rarely called into question; rather, previously excluded groups are integrated into the existing order on presumably equal footing. The problem, however, is that the normative frame of secular liberalism does not challenge the roots of inequality and systemic racism. Instead, one has a seat at the table without any food, to paraphrase Malcolm X (1992, p. 97). Aside from psychological or symbolic effects, material deprivation has not been addressed adequately, let alone been ameliorated. The liberal project has lofty ideals and humanist values, but limited resources of critique as it is invested in a set of ideas that fundamentally privileges Western understanding and

history. Particular notions of the individual, mind–body duality, materialism, empiricism, and other implicit assumptions filter into codified methodologies. In this respect, acceptance of difference occurs on a qualified basis. With invisible boundaries one must not cross, the politics and policies of tolerance only extend so far.

Another issue concerning multiculturalism is its definition of cultures as static rather than fluid, mutable, and nonessentialist. As a corrective, interculturality focuses on interaction instead of multiculturalism's approach of co-existence. Interculturality, which has competed with multiculturalism since the 1980s, also identifies a different dynamic (Coulby, 2006, pp. 246–247). Proponents of multiculturalism offer a diagnosis, while those of interculturality offer a cure (Aman, 2017, p. 3). Some have stressed coexistence to represent living side by side rather than a deeper engagement: living with versus living in (Antonsich, 2016, p. 470). Others, however, have not detected any significant differences between the two approaches (Meer & Modood, 2012).

As a policy, multiculturalism fell from favor in a number of contexts, sparking predictable backlash from the right and criticism from the left. Perhaps no better example is found than the experience of the United Kingdom, which has become bitterly disunited over matters of cultural policy, immigration, religion, and education. In the 1990s, the Greater London Council implemented a policy of multiculturalism to offer institutional support to ethnic organizations. Since the 2000s, Muslims have also come under attack for immigration policies and multiculturalism gone wrong. Some of the responses to recent waves of immigration, including from Eastern Europe, have included the rise and mainstreaming of the far right, a governmental Hostile Environment policy meant to instill fear in immigrants, the Windrush scandal that threatened Afro-Caribbeans long resident in Britain with deportation, and the ongoing Brexit imbroglio. Of course, all of this cannot be laid at the feet of multiculturalism. Yet the reaction to cultural diversity has moved the national discussion to the right, wherein groups on the extremes of public debate have moved into the mainstream. In light of these developments, the shift of messaging from multiculturalism to interculturalism may have had an evasive aspect in jettisoning the old term and its associated baggage. The institutionalization of multiculturalism also led to a shift from solidarity across minoritized groups, once identified by the collective political label as "Black," against a common enemy of racism to an archipelago of identities often competing for attention and resources. The late Ambalavaner

Sivanandan of London's Institute of Race Relations and other activists and academics also lamented the new approach as a postmodern surrender to capital. They argued that working-class struggle and ethnic solidarity remain the most important strands of identity with which to forge "communities of resistance." Multicultural policies emblematic of Tony Blair's New Labour led to "navel-gazing" identity politics (Sivanandan, 1990, p. 28). While warning of proto-fascism and the racism inherent in the conception of Fortress Europe, the left critique of multiculturalism did not predict the extent of the reaction to Muslim immigration in the following decades. While the left critiqued the policy, its stakeholders did balkanize to an extent, with minority groups pursuing agendas independently of one another. Coalition politics never vanished, however, and efforts to defeat the extreme right (English Defense League, Nigel Farage, and the Brexit Party) have breathed new life into activism at all levels.

The experiments of the 1980s and 1990s came to an end with the upheavals of the new millennium. With the War on Terror, the new liberalism focused on the issue of integration (i.e., assimilation into dominant society) to the extent of banning visible characteristics of Muslim culture in the case of hyper-secularist nations like France. Proponents of Islamophobia have converged into a powerful, well-financed network that privately monitors and vilifies Muslim groups and individuals, while the state's surveillance apparatuses have also exercised coercive programs like Prevent (from the UK Counter-Terrorism and Security Act 2015), in which educators are required to report suspicious Muslim students to the government. Widespread concerns exist that such policies weaken free speech in the classroom, and more generally civil liberties and due process. In the United States, the Patriot Act and the National Defense Authorization Act have enabled the US military to detain citizens indefinitely without trial on the basis of secret evidence, effectively overriding 800 years of legal history. With the election of Donald Trump in the US, the pendulum swung in the opposite direction on the part of the establishment to support judicial independence and civil rights, which again united liberal, moderate, and traditional conservatives alike against the new popular rightist tendency.

The charge that multiculturalism leads to an illiberalism fundamentally incompatible with democratic order is usually furnished by a set of tropes, of Muslims immigrants speaking native languages only in "no-go" areas, where the hijab is worn, students attend madrasas, many mosques are

found, halal restaurants abound, and the community supports terrorism to the extent of sending recruits to participate in jihad. In this scenario of multiculturalism gone wrong, the redundant Sharia law is right around the corner just past the kebab shop, and not far behind an Islamic state is viewed as the end game of immigration. In such projections, multiculturalism thus enables a fifth column by which Muslims are colonizing European countries; this has been proclaimed without irony or reference to the actual conquests, colonization, or military interventions that have historically driven migration. The appropriation of policies on pluralist tolerance for an illiberal agenda has had little bearing on reality; based on majoritarian discrimination, minorities actually face barriers to participation in many social arenas, including education.

Critiques of liberal and illiberal multiculturalism have advanced progressive perspectives that center on human rights, gender, and social equality and wish to make substantive changes to structural inequality. More radical approaches that oppose capitalist models of development or even the notion of development itself have also gained momentum (see Arturo Escobar, 2011; Lakshman Yapa, 1996). Renewed research into indigenous models have built upon the ideas of Paulo Freire and Frantz Fanon in taking a decolonizing approach to the problem of colonial difference as it relates to education.

Eurocentrism and Decolonization

Discourses around education and culture have evolved from the era of brute conquest and destruction of knowledge, archives, arts, and appropriation of culture and transfer of heritage to civilizing mission and the subsequent imperatives of development and democratization. On the surface, these modernization narratives emerge from humanitarian justifications for intervention and increasingly recognize individual human rights and collective self-determination. At the same time, practices that marked the formation of modernity have also continued, understood once as neocolonialism and more recently with some additional nuance as "coloniality of power." The global designs that accompanied colonization are intertwined to the extent that modernization and colonization are indistinguishable to the subjects of colonialism in what is today called the global South. Thus, initial calls for independence from direct or indirect colonial rule have also sought dramatic change in the spheres of economy

and education. With national independence, many schools and universities have continued to replicate a European model, even while striving to create a new nationalist culture in sync with the modernizing drive.

Within Western societies, the presence of ethnic minorities, particularly those groups that have experienced displacement from their ancestral lands as indigenous people or as a coerced labor force, remains a paradox for the state. Based on myths of progress and equality, the practice of extermination and exclusion has yielded to the expectation that minorities assimilate into the dominant order. However, these groups often face severe discrimination from the same bodies that require them to integrate into society. The modernity narratives of settler colonial states (Australia, Canada, Israel, New Zealand, USA) provide justification for conquest while also disguising histories of the expropriation of land and resources, as well as exploitation of labor and culture, inhibiting the understanding of minority and majority alike.

Challenges to colonial practices and their associated narratives have been issued since their inception and have gained increasing force as global norms are called into question. Insurrections and social movements have challenged both the unequal dynamics of power as well as representations of marginalized groups. In the arena of education, ethnic groups have demanded control over schooling to teach history and culture, creating a new self-image and forging solidarity to change society. Steven Biko, student leader and founder of the Black Consciousness Movement in apartheid South Africa, stated that "the most powerful weapon in the hands of the oppressor is the mind of the oppressed." In *Decolonizing the Mind,* Ngugi wa Thiongo explained the rationale for writing in Kikuyu, arguing for Swahili as the *lingua franca* for Africa as opposed to French, English, or any other European language. Pioneering interventions such as these have gained force in the ensuing decades. In the United States, students successfully mobilized to demand ethnic studies in 1969, a struggle that continues today as K-12 schools and universities implement this curricular reform. From South Africa the Rhodes Must Fall student movement has spread globally and morphed into Fees Must Fall, pressing for decolonization of universities and state-subsidized tuition while changing the configuration of the cultural landscape. Of late, social movements in Western countries, made up largely of university and high school students, have also led the charge against overt racism and its symbols, calling for decolonization and an end to structural racism.

Islam, Culture, and Education

Multiculturalism draws attention to the histories of communities, while interculturality and cultural sensitivity respectively stress interreligious and interpersonal dynamics. As an example of a cultural paradigm of education, Muslim schools has been a source of intense debate in a number of contexts, chiefly for unsettling norms of modernity. The majority of Muslim pupils remain in public education in most countries; however, a parallel madrasa system largely depends on endowments (*waqf, awqaf*), local membership, and state support. In spite of the attention to Pakistani madrasas, only 0.3%–7.8% of students attend. At one time as a measure to promote girls' education, *madaris* in Pakistan received USAID and World Bank funding. Policies since the military interventions in the Muslim world after 9/11 have focused on madrasas as a "breeding ground for radicalization" (Sas et al., 2020, p. 6). The introduction of the madrasa system or variants of it into Western contexts provokes anxieties about the limits of cultural pluralism. Islamic education is often viewed as a foreign, antimodern culture in Western (European and North American) contexts, while being regarded as a living tradition that has been localized throughout the Afroasiatic world. Over a wide expanse of the globe, Islam has provided a robust foundation for organizing formal and informal education in numerous arrangements, including variations of the *halaqa*, *maktab*, *madrasa*, university, and *hawza*. Muslim educationists assert that Islam since its inception as a coherent theological and cultural system has valued learning for all, particularly through the written word. It has the reputation of a rich textual tradition (Hirschler, 2011), mass literacy (Wagner, 1993), female education (Sayeed, 2013; Bano, 2017), translation movements (Gutas, 2012), endowed colleges (Makdisi, 1981), revival of science (Huff, 2017), and intellectual rebirth in Europe that, somewhat ironically, prefigured the concepts of modernity (Makdisi, 1990). In modern times the return to the sources of the Qur'an and Sunnah have been used as a blueprint for fomenting resistance to both colonial rule and postcolonial regimes, and for indigenizing education. The multifarious attempts to accomplish these aims have sometimes meant conflict between Western and Islamic education; however, it has often been the graduates of Western universities that have gravitated toward Islamic thought as an ideology.

With regard to advanced learning, the Islamic Republic of Iran has been the foremost experiment in creating a new society, culture, and

educational values based on particular scriptural readings and historical experience of Islamic scholarship. A focal point of resistance to the Pahlavi Dynasty (1925–1979), the teaching establishment in Qom (*hawza-yi ʿilmiyya)* continues to specialize in Islamic law as well as numerous fields in the traditional disciplines. Since the Iranian Revolution a significant expansion of colleges and institutes and an increase in enrollments have been seen; it made an impact on the international stage, with Islam becoming increasingly integrated with governmental authority to an unprecedented degree. Also closely aligned with the state is Al-Azhar in Cairo, which has long been the most prestigious center of learning in the Sunni Muslim world despite the challenges from the reformist approach of Medina, Saudi Arabia. Hybrid institutions such as Islamic universities seek the best of both worlds by integrating traditional religious learning alongside conventional approaches to the disciplines using a modern arrangement. The Islamization of Knowledge project has established universities and institutes in Malaysia, Pakistan, and the United States (Abaza, 2002). The post-secular revival in Turkey has seen the proliferation of religious schools and organizations dedicated to Islamic instruction like Diyanet and other foundations that have been remarkably successful.

The search for new models or third ways has led a variety of actors (clerics, politicians, scholars, activists, missionaries, students) to posit religious belief as a comprehensive ideology that offers rejoinders to agnosticism and atheism. The global resurgence of Islam serves as an alternative to secular liberalism, ethnic nationalism, scientific materialism, and traditional conservatism. The process of seeking truth that is involved in embracing faith can be understood as an educational activity unto itself. Promoting varieties of Islam such as Salafism, Shi'ism, and Sufism, proselytizing individuals and entities compete for adherents and spur debates on the nature and scope of interpretation and enculturation. If Islamic orientations toward culture are attached to the Qur'an, hadith and scholarly tradition, then to what extent one reinterprets these sources also depends on the overall goals. For Arkoun (2002), Kadivar (2008), Madjid (1994), Soroush (2002), and Ṭāha (1987) and others, modernist approaches borrow heavily from Western thinkers. The approach of decolonization also imports categories from the Western experience, albeit non-European sources such as ethnic studies, and brings them into conversation with Islamic ideas. Thus "Islamic feminism," a recurring

theme in progressive and decolonial interventions, provokes epistemological questions of practice regarding Westernization from the left side of the political spectrum. The argument that feminism is intrinsic to Islamic theology shifts the onus from acquiring a new orientation based on external influence to rereading sources for a new understanding of endemic traditions.

While not a serious competitor with public schools in many Western countries, Islamic education is thought to pose a challenge to the normative secular orthodoxy. However, Muslim schools have been incorporated into a semi-private network through faith-based initiatives within the mainstream that redirects public resources by way of charter schools, vouchers, and other neoliberal reforms in state education that promote school choice. From this angle, Muslim schools might serve as less of a force for Islamization than that of privatization. Meanwhile, in conventional state schools (e.g., in the United Kingdom), accommodations for religious attire and the provision of halal meals and facilities for prayer have made education accessible to Muslims and thus modified school culture if not the content and delivery of curriculum. At the tertiary level as well, one can take courses in Islamic studies and attend university as an observant Muslim, participating in Muslim student unions or other organizations. The integration of Muslims into mainstream institutions marks an evolution in societies toward accommodating differences without necessarily addressing inequality in the communities from which they hail. Tatari (2009) used a dynamic compound framework to explain the state accommodation of Muslims that draw on several theories such as resource mobilization and political opportunity structure theory.

The questioning of nation-states and the inter-state system as colonial impositions to divide and conquer with lasting ethnic divisions has led to the formulation of "border crossing" as a political, cultural, and disciplinary practice (Anzaldúa, 1987, pp. 10–13). Traversing the border subverts the fixed territorialities of colonial projects. Because culture cannot be confined to a nation-state, the frame of diaspora provides another way to explore how people maintain connections to a homeland, while recreating and hybridizing culture from the vantage point of their dispersal. Moreover, South-South linkages decenter Western hegemony and remove the hegemonic power as authority and arbiter.

The decolonial turn in education has yielded incisive studies on curriculum, pedagogy, and literacy (Hernandez-Zamora, 2010; McLaren, 2000; Paraskeva, 2016). Looking from afar has brought nuance to

concepts such as *interculturalidad,* "to break out of the prison-house of colonial vocabulary" in the Bolivia of Evo Morales and the grassroots movement that elected him (Aman, 2017, p. 12). That decolonial concepts emerged in the Caribbean and Latin America provides a rationale for "creolization" of theory, a fusion of ideas grounded in experience that uses "new methods and noncanonical interpretations" (Gordon & Roberts, 2014, p. 3). A locus of critique beyond the metropole has facilitated paradigm shifts that depart from Eurocentric models. While intercultural approaches privilege dialogue on the basis of equality of cultures, the rediscovery of precolonial ways of education has problematized multiculturalism and highlighted epistemic decolonization. These scholars and practitioners question narratives of modernity, the Enlightenment, and progress in both the capitalist West and the socialist East, seeking a "third way" that does not reinforce categories borne of European experience. In this way the periphery produces knowledge of the center. It is imperative too that the cart does not come before the horse; in other words, traditions that have withstood the colonial onslaught and survived into the present should not be reduced to a unidimensional framework of decolonization in which one size fits all.

Conclusion

Theorizing the intersection of education and culture has implications for all aspects of organized education, including curriculum, learning, pedagogy, administration, and policy. In spite of modernizing tendencies, education itself is not a neutral practice, but a cultural form embedded in sociocultural practices, languages, histories, and power relations. As with ideology, culture shapes systems at multiple levels rather than operating as a discrete variable. Like teachers in the classroom, actors within educational systems require a self-reflective ethos to meet contemporary challenges, paying particular attention to the ways in which schools reproduce inequality. While some ideologies have taken an instrumentalist view of culture that identifies it as superstructure, neoliberal policies have leveraged the idea that cultural models possess an internal dynamic of its own, which can be employed in strategies of privatization.

Returning to its etymology, culture conveys cultivation and is closely related to education and refinement. Classical liberalism offers a broad framework that aims to provide a balanced curriculum extolling virtues of understanding, reason, and tolerance as exemplified in the liberal arts. It

remains the enduring approach to education and is based on assimilating difference by way of understanding into existing frameworks. However, in spite of recognition of minoritized groups, dominant frameworks tend to preserve established historical narratives of progress and order and thereby the grounds for perpetuating inequality. Challenging the myths of the majority, minorities voice uncomfortable truths by presenting counternarratives to that of the nation-state. A range of responses to such challenges include reinforcement of the dominant view by rejecting other voices (cultural backlash) or by establishing autonomous spaces for their expression (multiculturalism). The approach of interculturality offers relief from essentialist or primordial accounts of culture that on one hand may reject Eurocentric universalism or alternatively the contribution of minorities, including indigenous people whose societies prefigured the establishment of the modern state. Another approach currently riding a wave of popularity is found in the decolonial turn that has reframed debates, asserting coloniality to be the underside of modernity. Situating conceptual modernity in the age of the Iberian conquest of the Americas, rather than during the Enlightenment, contextualizes epistemic violence as the condition of possibility in the Western intellectual tradition, as well as the many responses to it. It raises the issue of epistemology (i.e., knowledge, theory, and methodology) and attempts to recover cultures of resistance to colonialism and coloniality without falling into nativism or primitivism. A new generation of scholars, educators, and activists has promoted decolonization in education by highlighting third (African, Arab, Asian, Islamic, Latin American) and fourth (indigenous, Pacific Islander) ways that yield new theoretical and practical engagements by questioning culture and education. In response to decolonial critiques, proponents of multiculturalism, interculturality, and cultural sensitivity are reinventing liberal discourses. More widely, public pressure to address legacies of colonialism and racism in educational organizations, theories, and methods has held forth the promise of reassessing conceptualizations of culture in future policy and research agendas.

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Does Religious Education Have a Future in 21th Century? An Anthropologist on the Continued Relevance of Islamic Education

Mohammad Talib

Religious education in different faith traditions combine the theoretical-moral and technical-practical sides of knowledge either in a single or a range of kindred institutions. The two sides of knowledge have seldomly been disunited as noticeably as one finds in the modern-postmodern contexts. Modern professions that dominate production and management of goods and services can easily dispense with moral-ethical skills that link a producer with co-workers as a community in the common universe of belief, belonging, and the broader collective living.

The present article focuses on Islamic education and how its tradition was able to provide vital moral resources that made material civilization possible. This chapter analyzes the tradition of Islamic education and its interconnectedness to other sites of the wider world where the symbolic resources of faith are routinely produced, circulated, and meaningfully

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appropriated in the making of the ideological and the material commons for collective living. For a start, one may refer to Norenzaya (2013, p. 59) quote from Jean Ensminger (1997, pp. 7–8) on how Muslim traders had a non-material interest in honoring their contracts that lowered transaction costs, boosted long distance trade, and crossed cultural barriers across the Sahara and the rest of Africa.

The moral and the technical-practical side of education resulted from a massive disjunction under colonial rule. This was the juncture where Islamic education was held to account for its relevance in the making of modern professions. At this point in the history of Muslim civilization, the tradition of education became stereotyped and demonized. This paper examines the modern popular discourse on reforming Islamic education as well as its critiques and limitations.

In considering religious education between Islamic tradition and its future, the present article seeks to unpack two contrasting scholarly imaginings of the issue: First, Islamic education has been imagined as part of the state-led discourse on curricular reform. The literature explicating this view seems to suggest that the madrasa system (an equivalent of religious seminaries in other faith traditions) through their curricula appeared to produce a mentality fostering faith-induced politics in the contemporary world. In this imagining, tradition is held to be part of the problem and modernity is where the problem is likely to be redressed.

The second imagining refers to the social and historical reality of Islamic education beyond the modern discourse reforming Islamic education. The word "beyond" here is about the realm outside the fold of the popular discourse, which is mostly in the observer immediate field of vision. It is about the institution of religious education and the kindred wider culture that exists within its social context, mostly anchored in its local constituencies.

When the two contrasting ways of being human in tradition and modernity stand face to face, an analyst is expected to resist viewing the two positions over an evolutionary or hierarchical period. To privilege modernity over tradition in matters of dealing with Islamic education is to ignore at least two aspects of the tradition of Islamic education: one is the variety of internal and external symbolic goods it produces, and the other is the equally diverse sites where these goods have been appropriated for varied outcomes. One way forward is to maintain conversation between the Islamic education and those of other religious traditions regarding

their common challenges in modern times and how a conceptual engagement of Islamic education can be used to make sense of the predicaments in modern times that its graduates are likely to face.

Contemporary Discourse on Reforming Islamic Education

This paper selects the emphasis of the popular discourse on reducing the content of religious sciences and substituting these with instrumental-secular studies. This is then reflected onto the global discourse on the reform of Islamic education, in particular the madrasas as the historic institution in the transmission of valued knowledge. This reform is focused on mainstreaming the curriculum. One hallmark of mainstreaming is how it replaces religious subjects with non-religious ones. The low employability of madrasa graduates in modern professions is raised as a serious issue. The proposal for remedying this is to develop skills that are supposed to match the requirements of the modern market. The discourse on mainstreaming madrasas assumes the religious curriculum to be ill-equipped for supplying the required aptitudes and skills that would enable madrasa students to secure productive roles in the modern industrial market. The view on employment in relation to the modern state and market sector is seen in a purely instrumentalist sense. A skill is considered relevant if it can be exchanged for a wage in the modern market. The instrumentalist relationship between the skill of a worker and employment is evident in the job's wage. Skills are supposed to be instrumental in bringing about certain productive outcomes like marketized goods or services. Does the popular discourse seeking to reform madrasas make a distinction between the process of doing work and the achievement of certain targets in the production of goods? The simple answer is that employment is strictly conceived in productive terms, namely in terms of pure outcomes without adequately recognizing the processes of skilled and spiritual engagement with the material. Philosophically speaking, the distinction between doing and making an article for exchange is predominantly ignored in the commercial-business world.

In contemporary times, the stereotyping of Islamic education is especially focused on madrasas, the way these exist as an institution, their curricular content, and the assumptions that their social relevance is questionable. The social science literature on the reform of madrasa education is limited to answering how the institution ought to become

more adaptable to the urgencies and requirements of the modern society and economy. Such a modernist reading of existing madrasas is focused on identifying certain knowledge deficits in the curriculum that render them obsolete in the modern market. Following this recognition, steps are taken to overcome this deficit by bringing the institution closer to the employment market as well as to the secular mainstream of modern society. In this manner of thinking, Islamic education is regarded as a passive entity that must adapt to the wider mainstream of society.

What follows is an analysis of one epitome of Islamic education: the madrasas as viewed from afar to see how the institution has responded on its own terms to contemporary challenges.

The stereotyping of madrasas acquired a global stature after 9/11. Its echo has been heard in the policy idioms for reforming or modernizing madrasas. Like the complex imaginings of Orientalism, the stereotype about madrasas is not merely a passing idea but a pervasive discourse. These ideas have been embedded in institutional frameworks and propagated through high circulation among like-minded mutually networked scholars. Scholarly preconceptions on madrasas are produced from a distance in the local contexts where they are applied. Applying the stereotype to a concrete case of a madrasa is not for validating its representations but for exercising policy regulations. As an ideational construct, the stereotypical madrasa scarcely equates to the institutions as they actually are.

A madrasa that produces militancy in its popular discourse is not about a concrete institution of Islamic education but a consequence of others' application of rules and sanctions to a party that is assumed to be deviant. Here, the religious institution is not what it believes, practices, or prescribes but what it has been labeled or imputed to be. The stereotype is not potent on its own, but it does acquire power to regulate, transform, and even demolish madrasas in certain contexts when factors such as state policy or the covert methods of powerful global actors come into play.

The institutions of Islamic education in the third world exist in an uncertain relationship with their governments that struggle to remain afloat in the strategic globalized mainstream. Most of these governments are caught up between compulsions of underdeveloped economies and the recurrent need to seek a popular mandate for internationally directed policies on reforming Islamic education. In contrast, the modal reality of the Islamic education is located on the margins of the state and the market. This accords a relative institutional and cultural autonomy to the

Islamic education that is helpful in anchoring it into its community of beneficiaries for its legitimacy and survival. This autonomy removes the pressure from modal Islamic education to compare their courses with the national curricula or their economic status with state-maintained schools and universities. As part of the rural and tribal economies in the countries with a Muslim presence, madrasas tend to subsist on what a peasant and tribal economy offers in terms of its agricultural produce to support their students, teachers, and the larger institution.

An Islamic education that is so-called "good" from the policy lens of a secular state is one that has reformed its curriculum by teaching subjects like sciences, social sciences, mathematics, English, and computer literacy. In fact, the meaning of reform boils down to how far Islamic education has departed from the traditions of its own curriculum and allowed modern subjects into its syllabus. This argument forms the main thrust of the International Development Department Report (Nair, 2009) on the state and madrasas in India. Modernizing the madrasa curriculum is imagined in terms of having madrasas include modern courses and Islamic education being brought within the state's regulation.

The stereotypical view of a problem-riddled Islamic education is described in terms of its curriculum's lack of modern courses. The assumption remains that the absence of modern subjects fails to provide the required skills for its graduates in the modern labor market. The second motif is Islamic education's institutional non-dependence on state. According to this view, this non-dependence produces a mentality that cuts off a sizeable population from the mainstream of society. Finally, the third motif is the dubious independence possessed by a madrasa whose source of funds is not channeled through the state.

Analyzing these motifs of a problem-riddled madrasa is possible in terms of at least two supportive myths. The first myth refers to the fact that a student brought up on the curriculum of modern subjects is eventually absorbed into the ranks of the supposedly universal class (i.e., the middle class) and supported by industrial-bureaucratic institutions. Contrary to this stereotypical expectation, neither the middle classes nor the modern education system have the property of universalism. The stereotypical view of Islamic education flows from the classical Pygmalion[1]

[1] This analogy is based on George Bernard Shaw's play *Pygmalion*, filmed as *My Fair Lady*, a story of a language professor who undertakes to reform the speech of a flower selling girl who, when dressed suitably, can pass for a cultured member of high society.

syndrome: the mind-set of a professor of linguistics convinced of their ability to teach people with poor dialect to talk like ladies and gentlemen. The principle of *Pygmalion* transposed on modern scholarship gives birth to an observer who expects a school in Islamic education to conform to the template of a modern institution. According to this expectation, Islamic education should deal with modern subjects, impart computer literacy, and allow for programs to be watched from satellite TV.

According to the myth, if madrasa graduates are unable to find a place in the modern job market, it is because they have done *fiqh* instead of physics. Those familiar with developing economies would know that the nature of teaching subjects on their own does not always create jobs in the market. A state policy on reforming madrasas should be informed of their varied ethnographic contexts to avoid painting a madrasa with a single brush. Talib (2018) is seen to have furthered the line of this argument. Islamic education equips its students' lives with symbolic reserves for coping with life crises and organizing their collective lives through religious services and ceremonies. Madrasa education needs to be part of the division of labor between the sacred and secular spheres of a community. Ammar's anthropological account of growing up in an Egyptian village describes admission to the madrasa as a rite of passage in a peasant society (1966).

One must also be critical about the idea that reforming Islamic education through modern curriculum, as it may not always have the magical outcomes as imagined in policy. Science can be taught through rote learning (e.g., memorizing the periodic table by heart). Such a science becomes even more irrelevant in informing learner's experiences or creating skills for employment. Thus, the repeated reference to science subjects is usually not with awareness of the history of the modernization of traditional societies, where imitation rather than creative learning is what had dominated their teaching.

The second myth seems to say that Islamic education instills intolerance among its students because its traditional curriculum fails to produce the universal public sphere that respects democracy and secularism. On this point, taking the example of a typical madrasa as a category of thought seems to have been included in the latest version of Orientalist thought. In the popular discourse, Islamic education distinguishes the international "us and them" (i.e., the societies of the global powers contrasted with the communities in the Muslim world and deserving to be reformed).

The negative stereotyping of madrasas in policy discourse is neither as recent as 9/11 nor the end of the Cold War. Rather, it has a long prehistory, perhaps as old as the history of colonialism in the Muslim societies in Asia, Africa, and the Middle East when madrasas were questioned over the criteria of their utility of knowledge. For purposes of illustration, I will share one example from South Asia.

In 1824, the champion of the notion of useful learning, James Mill, termed learning in an Islamic seminary to be "frivolous" (as cited in Zaman, 2002, p. 64). The 1835 policy of English education under William Bentinck in British India snapped the relationship that had existed between Islamic education and jobs in the public services. This established at least two elements of the stereotype on madrasas, that they were neither producing scientific rationality nor generating employable skills for entry into the modern market.

The notion of utility comes handy in dismissing the traditional Islamic education. But rarely is utility as a cultural category recognized as not necessarily confined to its extrinsic merit alone. Utility has deeply intrinsic merits that require journeying into the madrasa narrative with its own terms. The notion of *al- ilm al-nafi* [useful knowledge] (Zaman, 2002, p. 65) figures in the discourses of medieval scholars, who among other things referred to knowledge that supports virtuous acts. Mufti Jamil Ahmad Thanawi, who hailed from the prominent madrasa in Lahore, Jamia Ashrafiyya, listed 30 useful purposes madrasas fulfill in society. According to Thanawi, useful knowledge is only religious knowledge to a madrasa (Zaman, 2002, p. 81).

For researchers who consider the institution's own perceptions on Islamic education to be vital, probing into internal conversations among its stakeholders is important. One observer on the well-known historic Madrasa Darul Uloom Deoband in North India, Maulana Manazir Ahsan Gilani (1943, p. 275) commented on how one of the founders of the institution, Maulana Qasim Nanotawi, had spoken about the issue of acquiring basic skills in modern subjects while continuing to study religious sciences. One worry was about borrowing modern sciences as if it were a *pewand* [patch] over the *manqulat* [revealed Islamic sciences] and *ma'qulat* [rational sciences] in the madrasa curriculum. Adding books on modern sciences to the madrasa curriculum is not without its own problems. Rather than changing the madrasa curriculum, another way was suggested for allowing students to pursue modern sciences after completing their madrasa degree. Maulana Nanotwi considered different

combinations of religious and modern subjects, side by side and consecutively. He clarified that the exercise must not assume the 'ulama to be devoid of reason. Assessing the debate, Gilani indicated the issue of reform to be able to be resolved by keeping in view the knowledge outcomes expected of a curriculum. One may later investigate obstacles that prevent the achievement of the chosen goal. Reform must not be likened to someone talking about a person's *kurta* [loose collarless shirt] made of coarse cotton and proposing to replace it with silk while forgetting that the purpose of wearing kurta was to cover the body. Therefore, while blending the religious sciences with the secular studies, one must not lose sight of the Islamic seminaries' wider purposes of imparting the valued knowledge.

The narrative of the Islamic education in its own terms recognizes its institutional site to be imparting sacred knowledge while also engaging in self-interpretation of its practices and communicating them to its relevant community. For instance, a madrasa graduate taking up a job in a village mosque is routinely consulted in various matters specific to everyday life and its breakdowns. The cosmology madrasas produce extend into the social logic of living in a community.

The discourse on reforming Islamic education that steers through the proponents of modernization subsists on who has the privilege to diagnose the problem in the existing curriculum. Neither the community fostering an institution of Islamic education nor the state modernizing it should be privileged over the other. In most Muslim societies by and large, the community-based Islamic education and those under state recognition are currently separated by asymmetrical relations of power. A lasting condition for curricular reform lies in a democratic relationship between the community and the state. While the community should be able to disseminate its valued knowledge, the state's policy should enable madrasas to educationally develop organically in continuity with its tradition and with respect to what the wider society expects of it within a democratic framework.

The Future of Islamic Education: The Relevance of Its Past

In thinking about the future of Islamic education in continuity with its past, the present analysis selects one modernist critique of Islamic education, the critique that its graduates have grim prospects of employability

in the modern market. Here, modern jobs refer to the professions and occupations that are vital to the world of work, market, and trade. In the following sections, this paper argues the Islamic educational tradition to groom its graduates into an ethical self-fashioning that ensures a moral continuity between learning and work, and the construction of a wider community of common belonging. The contemporary reformist discourse proposes to inject instrumental sciences into the curriculum of Islamic education so that an individual competes with others in disaggregated tasks. In contrast, the tradition of Islamic education sought to create the necessary symbolic-moral competence in their schools or seminaries that was vital to the material basis of shared existence. In modern parlance, such a belonging is equivalent to citizenship. This moral competence formed the backbone for an individual to be useful, virtuous, and responsible toward the needs of collective living.

The universalist urges of Islamic education addressed the particularity of a given context where ethical self, moral conduct, the social role of learning, and work were seen in a continuum. This is opposite to the top-down policy universals where Islamic education is considered homogenized while remaining indifferent to the specificities of a particular context. The world-making impulse of Islamic education evokes parallels in the emerging modern critique of alternative education. The tradition of alternative education addresses the deep moral crisis of the instrumentalist and individualistic modes of modern schooling and the transmission of knowledge. Among the notable references in the wider field of education, one may invoke Georg Kerschensteiner for stating how learning and work are viewed as a source of self-fulfillment, character formation, self-discovery, and spiritual enlightenment as well as community building (Refer Winch, 2006, pp. 381–396).

In conceptualizing the universe of Islamic education, one clarification is in order: the institutional producers and disseminators of Islamic education are imagined in a maximalist sense, where maximalist refers to the entire field of religious education both formal and informal as well as explicit and implicit. Each of these sites produce a world-view where the bearers and consumers of Islamic education are connected through the chain of symbolic value in the making of civilization. This consists of Islamic education within or beyond the madrasa tradition, Sufi orders, and related sites of market (craft guilds) and civil society that draw upon the valued and sacred knowledge which the tradition of Islamic education produces within the common symbolic ecosystem. For understanding the

efficacy of the product of religious education, this paper employs examples of moral conduct on the site of learning or in the context of their use in the wider world. This section gathers together evidentiary fragments from various parts of the Muslim world, from India, some countries in Africa, and Ottoman Turkey to suggest that Islamic education not only schooled its learners in the tradition of valued knowledge but also instilled moral virtue and an ability to engage in sacred cosmology as active members. This allowed the acquired scholarly knowledge, skills and dispositions to have a positive bearing on trade and commerce, symbolic world-making, and the work ethos of the artisanal craft as well as civil and military services. In the imagining exists an inter-relationship between sacred knowledge and the performance of vocation, trade, artisans, and crafts. The vital presence of Islamic knowledge and moral virtues is evidently supportive of various productive roles. In the context of a waning religious tradition, its various segments belong to the scattered milieus, making it difficult to connect these into some semblance of an integrated world. The symbolic resources of faith and sacred knowledge were variedly produced not only within the fold of Islamic education but outside of it as well in a range of kindred institutions. These belonged to the division of labor in a common social order.

The graduates groomed in Islamic education in the general universe of madrasa education, embody the religious cosmology and codes of conduct that are consummated in various contexts of collective living. Wherever the graduates fill productive roles in trade, artisanal workplaces, or craftsmanship in the making of objects of aesthetic and practical use, there is evidence of the religious orientations and attitudes toward productive roles. This helps dispel the myth implicit in the policy initiatives that the curriculum of Islamic education needs to be modernized for greater relevance to the modern world of market and statecraft. The presupposition in the modernization of Islamic education is that its excessive emphasis on revelatory sciences at the expense of instrumental and scientific subjects disjoints it from the scientific ethos of the modern world. The modernization argument holds that Islamic education has little demonstrable potential for building the modern world. In contrast, the historical evidence regarding Islam and the arts of the Ottoman empire clarifies how Islamic art was not merely about mosques, religious texts, and artefacts but to also have extended prominently into secular arts produced for the states, rulers, and dynasties that followed the Islamic faith. Islamic art includes many media, materials, and functions such as

the art in worship, in trade and commerce, in historical, scientific and government documents, in items of personal adornment, and in metal arts, ceramics, woven textiles, and carpets (Asian Art Museum Education, 2020).

What follows is an attempt to survey selected literature from the history of the Islamic education and to understand how its spiritual resources and related intellectual reserves had helped build diverse fields in the production, distribution, and exchange over long distances of material goods. The disparate sites of the vital engagements that employ religious conceptions offer ample testimony that ethical and spiritual resources remain vital in the making of the secular world. The role the institutions of Islamic education have in the supply of the religious conceptions and cosmologies attendant upon the making of the material goods and services in the surrounding world is currently available in scattered sites. These may be gathered together in scholarly representations to retrieve the interconnections that may be inferred either in the presence of a salient religious orientation in places of production or in the existence of the institutions of Islamic education and Sufi lodges as part of the common ecology in the domain of religious and cultural reproduction or sites of civilizational creation. This just as much requires a close-up exploration to identify the sources of the continuous supply of religious conceptions in various productive institutional settings beyond the framework of Islamic education. The modernist discourse proposes that, with an injection of modern secular sciences, a curricular reform should enhance the employability of graduates of Islamic education in the contemporary market. This paper inverses the curricular reform argument to say that the symbolic resources of Islamic education have been vital in the making of the material civilization. This is akin to saying that the material world has always subsisted on the symbolic resources of Islamic education and that its reform for modernization can scarcely afford to discard the traditions it seeks to reorganize.

In taking account the scattered milieus working with the blends of Islamic values and productive ventures, the present analysis critically distances itself from the mega-narrative of the modernity-tradition hierarchy wherein the tradition plays a subordinate role in explaining the emergence of the modern world. The attendant policy perceptions view religious traditions to be either playing second fiddle or simply receding into their socially privatized spheres. The possibility of critically distancing from the grand narratives of the modern-tradition dichotomy lies in

viewing Islamic education to be integral to the production of the secular world and far removed from being merely an insular site of the transaction and inculcation of valued knowledge.

The institutions of Islamic education are viewed to be a part of the assembly of kindred fields whose product of internal goods of knowledge, moral virtue, and cosmological imagination have helped build the wider world. Islamic education is not about some knowledge-packed curriculum as modern reform initiatives believe. The salient emphasis of the institutionalized form of personal transmission of valued knowledge between the teacher and learner has made the embodiment of knowledge possible. Wan Mohd Nor Wan Daud elaborated upon this view through the Javanese Islamic scholar Syed Muhammad Naquib al-Attas (2009). Al-Attas' dwelled on the notion of *Ta 'dib* [discipline] to be the foundation that has made the personalized transmission of knowledge possible between teachers (*mu'addib*) and students. The author claimed *Ta'dib* to have enabled the making of distinguished professionals and authority figures in various walks of collective life in history from the Umayyads to the Ottomans. The term *ta'dib*, enabling the development of senses, intellect and morals, expands pure knowledge into the persona of a learner. Its success as part of learning outcomes includes an indelible mark of spirituality in the students' personality alongside knowledge and wisdom.

Here a distinction needs to be drawn between internal and external goods (MacIntyre, 2007) that an institution and its implementations produce. This distinction is drawn from philosophy to say that Islamic education and spirituality formed the cornerstones for framing various institutions of state, civil society, and market to cohere into a common moral order. The upshot of this distinction is that the internally produced culture was vital for maintaining the standards of excellence and cooperation among actors in the production of civilization goods and the related world. The element of virtue and spiritual disposition a person acquires in Islamic education are believed to produce the values of courage, justice, and honesty: courage when facing risk and loss in performing one's role, justice in being both accurate and fair when performing one's productive role, and honesty when transferring the learned skills and aptitudes to the designated outcomes and products. West (2018, p. 29) examined MacIntyre's conception of these virtues and their bearing on business ethics. To be virtuous and spiritual (i.e., being a craftsman or an artist) means to ensure the quality and standards in the practice of one's vocation. Virtue

is about the internal good that wards off the corruptions of power and commerce and the temptations of profiteering.

The ethnographies from Africa show how the spread of Islam had enabled artisans to labor together in work communities and combine patterns in producing and performing their ethnic and religious lore. Trimingham (as cited in Dilley, 1987, p. 247) described how the performance of craft involved the transmission of hereditary lore, where the belief in supernatural powers was reinforced and the ritual participation combined the spiritual and mystical understanding through the occupations being practiced and the material being handled (1959, p. 137). Dilley's ethnography shows how Islam had expanded through the variety of Muslim artisans plying their skills as ironworkers, goldsmiths, and weavers quite broadly throughout West Africa had a veneer of religious faith. This is further reiterated in an illustration from *Bilad al-Sudan* (Loimeier, 2013, pp. 103–104) where the Qur'anic schools were not limited to memorizing the sacred text but also provided skills and social knowledge that could be meaningfully translated into social competence.

The artisanal culture in the Muslim world appeared to have blended artisanal skills with spiritual resources for maintaining craftsmen's high motivation to pursue their craft with diligence and attentiveness. Accounts of artisans and craftsmen support the view how engaging with the sacred text of the Islamic tradition (e.g., reciting the Qur'an) was linked to gaining focus and mental poise in the hand–eye coordination needed to produce material artifacts to perfection. At the same time, the spiritual dimension also took care of the contingency and periodic collapse of the familiar meanings and life supports. Thus, a semblance of mental fortitude was routinely fostered for dealing with the conditions that made the world of craft possible.

For this, one needs to unpack the component of *adab*, the paramount skill whose context of deployment doesn't distinguish between the so-called secular or religious domains.

Ahmad Shalaby (1954) wrote on the importance the early period of Islam laid on understanding at least a given selection of verses from the Qur'an. Having students learn 10 verses until they knew their meaning and implemented what the verses enjoined became customary. Quoting Ahmad ibn Hanbal's al-Musnad, Shalaby (pp. 19–20) wrote how Ibn 'Umar had spent eight years learning Surah al-Baqarah and that the Companions had said, "The man who was able to read *al-Baqrarah* and al-Imran seemed a great man amongst us." Furthermore, Shalaby

observed how learning the Qur'an preceded everything, and religious instruction came next. Shalaby quoted from Al-Jahiz's (Vol. II, p. 92) *al-Bayan* that the curriculum drawn up by 'Umar ibn Khattab had an instructive suggestion for people in various parts of the Muslim world:

> Teach your children swimming, horsemanship, famous proverbs, and good poetry. The main subject taught in children' schools was Adab so that the schools of children were called Majalis al-Adabs. During the time of the Umayyad's era, those who had to be schooled to join the state offices travelled to Bedouins' encampments where they lived for a specified duration for learning reading, writing, religion, the art of war, and athletics. The objectives of such education were to produce what was called at that time the "Well-Rounded Man. (Semaan, 1966, p. 194)

The development of a spiritual economy based on arts and crafts in Kashmir is vividly described in the accounts of fourteenth-century Sufi saint Mir Syed Ali Hamadani (Rafiabadi, 2005, pp. 251–266). The salience of the religious-spiritual ethos in the making of artisanal products and crafts demonstrates how spirituality, religious knowledge, and artistic expression were correlated in the material craft. Unlike the prevailing practice of religious people who subsisted upon the favors of landowning communities, Shah-i-Hamdan (as the Sufi sheikh was titled) demonstrated the example of self-employment through cap making. His Sufi order of the *Kubrawi Silsilah* were able to organize Sufi *khanqah*s [sufi lodges], mosques, and artisanal communities in the common framework of worship, religious knowledge, and artisanal workshops. Mir Syed Ali Hamadani had disciples as handicraftsmen and artisans who worked with wool textiles of a fleecy soft texture and delicate embroidery worked into silk and wool hand-woven carpets bearing delicate warps and wefts. The disciples also exhibited paintings and designs on papier-mache goods, wood carving, and metal work conforming to the high standards of both aesthetics and utility. Under the influence of the *khanqah*s, the artisanal communities developed a strong culture for earning their subsistence through lawful means and regarded engaging in artisanal work as a form of prayer. As a Sufi sheikh who fostered communities of artisans and other handicraftsmen, he combined the act of worship and productive work, the *karkhana* [workplace] and *khanqah* (Malik, 2021, p. 7). This reiterates the view how the transmission of religious faith and knowledge and the production of civilizational world coexisted on a common plane.

In outlining from historical and field-based observations, the argument is being developed for showing how the narrative on modernizing tradition has privileged modernity to view placing religion into the making of modern civilization with skepticism. What continues to challenge social science scholarship is how the importance of self-accountability was established through the medium of faith so as to be vital in the quality standards of material artefacts as well as in maintaining working people's communities over the course of history and society. The modernist argument that reduces the components of revelatory sciences in favor of instrumental and scientific subjects is rather flawed when viewed in isolation. What the modernist reformers of education need to acknowledge is how to embody the resources of faith, its knowledge, and attendant ethics into communities of professionals and various employees in production as well as how to organize it into the affairs of state and society.

Following from the Peircean pedagogy of religious education (Falcone, 2016, p. 381) is the argument that the instructions in Islamic education produced ethical-moral conduct among the learners. Subsequently, as bearers of their faith and imagination in the real world, they would perform the role of their ancestral or acquired vocation vital to the running of state and society. Thus, institutions of Islamic education and the wider world formed part of the common division of labor. One may draw upon Ekmeleddin Ihsanoglu (2004, p. 4), who described how the Ottomans had inherited the madrasa tradition from the Seljuk Turks and developed it to provide "the necessary religious, scientific and educational services for the society and the state as well as for training administrative and legal personnel for the state administration. The madrasa graduates were both knowledgeable in Islamic jurisprudence as well as customary practice." Ihsanoglu further elaborated on the relative autonomy the madrasa tradition enjoyed that had allowed the appointed teachers to work independently of their own initiative within the framework of the *waqf* (foundation) regulating the instruction given to students.

Ihsanoglu (2004, p. 6) drew upon illustrations that suggest how important institutions of learning that don't strictly fit the category of religious studies also came to flourish alongside Seljuk madrasas. Ihsanoglu indicated how various sciences such as astronomical observations and medicine grew alongside the main curriculum of the Anatolian Seljuk madrasas. One would need further evidence of the microprocesses to assess how the extracurricular activities in an Islamic seminary had developed into an organized interest in philosophy, mathematics, and the

natural sciences. Here, the probe is directed toward the contribution of faith-based spiritual resources and their bearing on the pursuits of rational sciences. In the wider perception behind the current emphasis on curricular reform in a madrasa, the relationship between the religious and rational sciences is conceptualized as two distinct domains that show discontinuity followed by continuity. As a historical illustration, Ihsanoglu (p. 8) described how Mehmed the Conqueror transformed several Byzantine buildings into mosques, madrasas, and dervish lodges after taking over Istanbul. The madrasas in the Fatih Mosque Complex and the Samaniye madrasas were imagined together in a single totality of educational and pastoral provisions: hospital, library, and a soup kitchen to provide for food, drink, shelter, and medical dispensation.

The relevance of Islamic education even lent itself to the training of elite corps under the Ottomans in the fifteenth and sixteenth centuries (Necipoglu, 1991). The Palace school for pages, called *dar al-ilm* [house of learning] was a modern equivalent to the academy for schooling civil and administrative servants. The Palace school of Topakapi complemented the madrassas of Mehmed II's mosque complex in Istanbul, which trained the ulama for the state. The trained pages were admired for their prudence as well as other virtues. Kritovoulos (as cited in Necipoglu, 1991, p. 111) noted their distinguishing talents in terms of their nobility, talent of soul, and outstanding manners and morals. According to the chronicler Menavino, a page himself observed how the training produced service men who excelled in letters and speech with "profound courtesy and honest morals." Another page in the seventeenthcentury, Bobovi highlighted the characteristic feature of the palace school to be one of religious indoctrination and instruction in court etiquette, liberal arts, sports, and crafts rather than training of mere scholars. The dominant expectation from the trained servants was their respect for books, especially the Qur'an. Turkish books were found devoted to Islamic faith and law as well as Persian authors of literary classics such as Saadi Shirazi and Hafez. The training included curriculum where learning of text, discipline of its reception, etiquettes of fellowship, initiation into becoming a *parsa* [one who excels in purity and abstinence], and practicing silence and solitude were vital inputs in pages' complex education. The broad setting of mosques and madrasas remained part of the schooling of service men (Necipoglu, 1991, p. 112). After all, statesmanship and state services subsist on the self-regulatory power of the outstanding manners and morals for their long-term survival and protection against corruption.

Islamic Education for Making Sense of the Modern World

The Islamic education of tomorrow must develop conceptual tools and modules to know the wider world in a participatory manner. Literature is found to support the view that Islamic education is firmly situated in a tradition where resources of faith have contributed to the organization of artisanal skills, statesmanship, and its attendant civil and administrative services. Here, the artisan is not passively engaged in the practice of the craft. Rather, the practice of artisanal and professional skills is woven into the vocation in a way in which the artisan connects to the Creator through the craft. An Islamic education graduate needs to be refreshed on how to be groomed into becoming an active citizen and enter the mainstream of employment, artisanship, and modern professions with both submission and critical consciousness. Pierce's suggestion for the Christian tradition (Falcone, 2016) of creative education may be shared for enriching the pedagogy of Islamic education in its effort to create active citizens for facing the globalized world. To revisit one's religious tradition is to "understand humans as both created and creating: weavers of words, images, stories, and plans of action, co-participants in God's own plans for the world" (p. 394). Here the emphasis is laid on learners' active self during their initiation into religious education. This echoes the recent '*Adab* Symposium in Pre-school Education (Yaygın Eğitim ve Kültü Derneği [YEKDER], April 3, 2021), which has the potential to develop a perspective on learners as active receptors of the oral and textual narratives in Islamic tradition, which are the pedagogic strategies for developing the metaphysical imagination to relate to the Creator and creation as well as to the authority of the knowledge tradition. Such an educational transaction of sacred knowledge fixes the future of those who bear the Islamic tradition in the heart of the secular world as an active stakeholder of the religious and secular components of the shared civilizational framework.

The broad motifs of the learning outcomes of Islamic education are fearlessness in critiquing authority, defensiveness of the sovereignty of one's country, and worry about how to include the socially excluded into the mainstream of society's opportunity structures. The students trained in Islamic education on how to deal with the wider society are able to gather ample resources of faith and knowledge to respond to

the context of the breaking points in established meaning with self-confidence and a strong motivation to transmit the chosen ideas and practices from the sacred tradition that are to be imparted to the next generation. An individual suffers hopelessness in the face of layoffs and failures, powerlessness before economic recession, and meaninglessness consequent to an ill-conceived policy failure. The spiritual resources from religious education equips an individual to remedy these breaking points in established meaning to something that transcends the given experience and to remedy the issue in "something beyond the empirical" (O'Dea, 1966, pp. 4–5).

A person of faith knows the distinction between the transcendental reference of a creator and its worldly isomorphs, the self-fashioned look-alikes as gods in this world. From this vantage point, a person groomed in religious education can approach the productive role in society with *adab* [sincerity and focus]. Such a person can defend and critique institutions and their secular heads from behaving as if they are gods in relation to their employees. Therefore, no reference to a future can be entertained if the spiritual skills in the training in Islamic sciences are not recognized to be of vital consequence to modern professions. A competent engineer, doctor, developmental policy maker, or overseer of welfare programs requires a strong base of ethics and the spiritual orientation necessary for both the specialized task at hand as well as for building human-to-human relations for a collective living within a wider cosmological order. This makes Islamic education also relevant for the future of the community as part of the national framework.

This material on the relation Islamic education has with the secular world is intended to inspire a debate between the realm of the religious and public (secular) spheres. Drawing upon Jurgen Habermas' (2006, pp. 1–25) exposition of the dialogue between the religious and public spheres in Europe, one can surmise for the present argument that the dividing line between the religious and secular positions is about their differing self-understandings and claims of existence. The actors and institutions in both spheres require attitudes with complementary learning processes. The limitations of learning processes remain where the secular state must not enforce its claims and policy visions on religious institutions through laws or politics. The constitutional freedom of religion is based on the secular character of the state, which makes religious pluralism possible. The secular state can ensure positive and negative liberties among the secular and religious contestants: the positive liberty to

practice one's own religion and the negative liberty to remain spared from the religious practices of others.

One important component of the curriculum of Islamic education is the imperative to know one's basis in a wider framework by studying different educational institutions in varied and specific contexts. This is to develop awareness about the institutions of Islamic education in terms of how their producers and consumers of symbolic units define their purposes and outcomes. One would also like to know how such a unit is understood in terms of both extrinsic and intrinsic rewards. These two rewards must not be equated, especially during research or while making a policy decision. Equally important is inquiry into the interfaces of the institutions of Islamic education with secular society and state. This interface should highlight the complex of exchanges and relations that have taken place within the tradition of faith in various regions. Having research study their continuities and changes in the contemporary post-colonial world is important.

This article has attempted to prepare a conceptual space to allow for either a secular translation of a religious logic or religious language to demonstrate how the Islamic faith contributes to the flourishing of the material civilization and strengthening of the public sphere. The anthropology of the faith tradition in the moment of reproducing itself through education has the capacity to vitalize the spheres of production and trade and to maintain the corporate existence of believing individuals. The educational reform of religious pedagogy and curriculum must be imagined in terms of how to promote citizens within Islamic tradition and institutions to have a conceptual basis for participating in secular society. In the absence of a consciousness recognizing the synergy between religion and secular society, the latter is likely to get cut off from the key resources, both material and symbolic, that are produced out of faith-based meaning and identity.

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Conceptions of Society and Education Paradigm in the Twenty-First Century

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The main expectation from today's education systems is to have students who are prepared for their future professions. However, during the concurrent rapid changes in labor markets, especially with the effect of information technologies, what kind of a future and profession should education systems prepare young people for? If the education a student receives loses its competence for the profession they will perform when they graduate, has the education system fulfilled its mission of preparing youths for the future? The overall unemployment rate in Turkey is estimated to be 10.8%, with a youth unemployment rate of 24.6%. Meanwhile, the Organization for Economic Co-operation and Development (OECD) shows that the average unemployment rate is 5.9%, with an average youth unemployment rate of 4.4% (OECD, 2021a). On the other hand, the OECD average of higher education graduates among unemployed people over the age of 25 is 3.8%, while this figure reaches 10.7% in Turkey (OECD, 2021b). This dramatically portrays the need to focus on the relationship between education and job markets. Moreover, talent

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shortages are growing every day, which adds doubt as to whether higher education can provide the workforce needed by the country or not. The difficulty of filling job positions with employees possessing the necessary capabilities remains a problem affecting 54% worldwide (Manpower Group, 2018). Of course, the rate of talent shortages is closely related to the developmental level of labor markets. However, higher education does not appear to have sufficient equipment for training a labor force with the capabilities required by existing job positions. In this case, the mission of education systems in training qualified workers is put on the table and the question of how able education systems respond to contemporary needs comes to the fore.

The idea that today's education systems are unable to prepare children for the future is mostly based on the view that education systems have been shaped to meet the political and economic needs of nineteenth-century industrial societies. Nation-states programmed their education systems to provide public education for the purposes of nation-building, industrial development, and economic development. Public education is likened to a gigantic machine built for preparing the adult workforce needed by the industry. Schools are institutions that put children under a collective discipline on a time schedule arranged like the factory bell instead of a solar cycle. Toffler (1971, p. 398) stated students in public education to correspond to raw materials in the industry, teachers to workers, and schools to factories. In addition, nineteenth-century nation-states shaped their education systems as ideological tools that homogenize society for nation-building. In line with this purpose, the process of the nation-state is completed with an integrated society motivated in line with the developmental goals of the state by providing education in a common language, culture, history, and religion (Alesina & Reich, 2015). Public education has been an important element for ensuring the continuity of industrial society with the necessary yet limited education by transforming millions of people into an army of disciplined workers capable of endlessly repetitive jobs.

Saying that the most influential sociological view of the educational paradigm of industrial society belongs to Émile Durkheim (1858–1917) would be no exaggeration. Durkheim defined education within the framework of the political and economic conditions of nineteenth-century Europe and conveyed his views on its function, purpose, and content. Durkheim (2016, pp. 50–65) primarily defined education as "the influence of adult generations on the individuals who are immature for the

social life." He emphasized the purpose of education to not be altering individuals and communities but preserving and transferring the common naturally occurring thoughts, feelings, and practices in every society to future generations. On the other hand, education becomes important as an element of collective life when religious symbols lose their socially homogenizing impact, as in modern industrial societies. In addition, homogenizing a society on the basis of collective values encourages the differentiation and specialization of children according to their professional skills. Meanwhile, education gains a social character that cannot be left to individuals due to the vital function it has assumed in the context of societal existence and continuity. The state keeps education under control by programming it on behalf of society. While Durkheim's view on education highlighting central governmental programs was at work in shaping the educational system of European countries such as France and England (Carlson et al., 2018; de Gaudemar et al., 1993), it also shaped the education systems of non-Western societies such as Turkey, which became a nation-state at a later date. Ziya Gökalp (1876–1924), whose views on education played an important role in disseminating Durkheim's sociological framework in Turkey, interpreted his views by adapting them to Turkey's educational needs.[1]

The education paradigm can be said to have not changed from being static, linear, and standardized in structure or from being ignorant of student differences in the twentieth century. Education, formerly a privilege of a limited number of people in the nineteenth century, had become accessible to the masses thanks to nineteenth-century developments in individual freedoms and rights. At the same time, all students had the right to an equal education regardless of their social origins. Thus, once built to meet the needs of the industrial revolution, public education reached its goal of massification in the twentieth century. The massification of education and widespread use of schooling around the world also triggered theoretical expansions in educational sociology. Structural functionalists attribute public access to modern education to the increased need for a highly skilled workforce and industrial development (Collins, 1971). Education systems prepare students by choosing them for their

[1] For Durkheim's influence of Ziya Gökalp's sociology, see Bulut (2015), Kabakcı (2011), and Smith et al., (2019). For Ziya Gökalp's views on education, see Celkan (1990).

future status in accordance with their abilities and assuming a democratic role, especially as these systems enable disadvantaged social groups to attain professional status according to their abilities (Parsons, 1959). On the contrary, the conflict perspective argues schools to strengthen existing power relations and social hierarchies by serving the ideological and economic interests of the power holders (Collins, 1971). Focusing on schools' organizational ties, Meyer and Rowan (1977) associated the massification of education with the political and ideological meaning attributed to education. The democratic belief that education is a condition for empowering civil society became widespread; this was related to the canalization of the masses toward education. In this context, schools can be said to have undertaken the mission of legitimizing modern values in terms of individual-society relations rather than being effective in preparing students for their future professional status. The spread of the school system worldwide implies the globalization of modern values as represented by schools. The mass education system should be seen as a dimension of international democratization and globalization patterns (Meyer, 1977; Meyer & Bromley, 2014).

The mass public education systems of the twentieth century were developed primarily to meet the needs of the Industrial Revolution in the nineteenth century and reflected the principles of industrial production in various ways. In non-Western societies with a late industrialization experience such as Turkey, however, the motivation behind the development and massification of the educational system in the twentieth century was to create an educated mass in order to accelerate industrialization rather than train the manpower needs of the industry (Erdoğan, 2016). Another strong motivation of the education system is that education assumed a political mission in constructing national identities in the late nation-state building process. The fact that education is nationalist, secular, modern, and democratic helped determine the ideological orientation of formal education apart from its economic motivation (Sakaoğlu, 1992, p. 34).

The twentieth century was short lived; The first half is remembered through the crises of industrial societies affected by world wars, which reflected the structural problems of the nineteenth century. The second half includes the transition toward a new social model with the development of communication and information technologies. During this transition, the new paradigmatic suggestions can be said to not have been fully apparent while discussing the invalidity of the education paradigm of the old century. The linear and uniform educational paradigm is argued

to have been unable to meet the twenty-first-century needs of societies or prepare youths for the non-linear, differentiated societies of the future (Robinson, 2011, pp. 9–10). In this case, determining the direction of the twenty-first-century society, what kind of education system this society needs, and what can be done for today's education systems have importance.

Education Systems in the Twenty-First Century

The new types of automation that occurred in production mechanisms in the last quarter of the twentieth century being reflected on the consumption materials that could change daily life fueled debates on industrial change and were attributed a revolutionary character. Signifying humanity to be going through a new industrial revolution process, these discussions regarded technological development as the main factor of change. The fact that technological development had started to affect all areas of life from production to consumption, financial systems, entertainment, working conditions, and education highlights the determinist explanations that see technology as the main factor of social change. Associating the enormous change in educational technologies with the paradigmatic change in the field of education can be considered in the context of technological determinist explanations. For this reason, both the use of educational technologies while carrying out educational activities and the mission of raising a workforce that will take part in the production stages of new technologies relate the education field to the new Industrial Revolution. Industrial change should be understood, and education requirements should be determined due to the widespread belief that education is unable to keep up with the rapid changes in economic and technologically developmental fields in the first quarter of the twenty-first century.

The modern school-based education system emerged as a requirement of industrialization and nationalization in industrial societies. The transformation phases of industrial society not only revealed new social models but also pointed to the cycle of the education system and its paradigm. Accordingly, three industrial revolutions have taken place in the last two centuries, and education systems have transformed within their scope. We are transforming again in the twenty-first century with the effect of the fourth industrial revolution.

Industry 1.0 was shaped through the production of steam power instead of muscle energy. In the eighteenth century, the first step in automation was taken with James Watt's steam engine. The age of mechanical technology and machines lasted until the mid-nineteenth century when electricity was effective in production. When the structural characteristics of the agricultural society were still in place and industrial development started, educational activities took shape as knowledge transfer. The aim was to teach basic concepts through the one-way transfer of information (i.e., from teacher to student).

Industry 2.0 was shaped by the use of electrical energy. The invention of the electric motor and the enormous changes in electrical engineering in the second half of the nineteenth century started a new era. The electric age is characterized by the revolutionary changes that occurred through mass production. As discussed above, education at that time focused on meeting industry's workforce needs. Educational content was shaped to support technological development, and schools were organized in a factory-like hierarchical order. With the mission of producing a workforce and knowledge of industrial production, education became a field where science and technology became conditions of one another. At the end of this process, a big increase occurred in the global rate of schooling, and this increase has continued exponentially. In 1870, the average number of years enrolled in education was 3.7 in the USA and 2.37 in Germany, whereas in 1960 these countries' values had respectively become 8.9 and 7.53 years. These rates increased to 13.40 and 14.10 years in 2017 (Our World in Data, n.d.).

Industry 3.0 took shape with computers being introduced to the market in the 1960s. This caused information and communication technologies to become the center of industrial production. Because computers are able to process data sets quickly and flawlessly, this new process at the end of the twentieth century was called the information age. As the socialization of the Internet increased global communications, transaction speeds, and volume, this age is also called the communication age. A revolutionary change has started since the developments in information and communication technologies globally affected the business methods and relationship patterns established in all fields (e.g., politics, economy, daily life, education, entertainment, and sports). This new societal model of society is seen to have been referred to and described by various concepts such as Daniel Bell's post-industrial society, Peter

F. Drucker's post-capitalist society, Y. Masuda's information society, and Manuel Castells' network society.

Masuda (1990, pp. 44–45) summarized the transformations in the education system in the information society where computer technology dominates social functioning in five items: (i) The restrictions of official schools will come to an end. When open education replaces face-to-face education, an "information network" will form. Thus, inequalities between urban–rural or developed-underdeveloped regions will be overcome. (ii) Personalized learning methods can be applied in accordance with each individual's abilities. Thus, the system that is organized according to individual abilities and preferences will replace the uniform system of traditional mass education. (iii) While self-learning will become the basis of the education system thanks to computerized education, teachers will play a role in education as advisors or guides. (iv) A change will occur toward information creation in education. Education in the industrial society aimed to fill students' brains with the maximum amount of information and technical education. In the information society, meanwhile, a change will occur toward a society that creates information that has value. (v) The understanding of lifelong education will prevail. While the current education system consists of compulsory education at an early age, the information society has educational opportunities that will enable adults and even older people to adapt to change in society by improving their skills.

Information society can be defined by highlighting different qualities through its technological, economic, professional, spatial, and cultural dimensions. These five dimensions are noteworthily also the areas in which education interacts with the paradigmatic transformations of the information society.

Technological Impact

The development of information and communication technologies is claimed to have brought about change. While on one hand a determinist approach is displayed where technology drives all change in this claim, on the other hand, technology's social effect is emphasized with the interactions of technological production processes with social, political, and economic fields placed in the background. However, the technology and production stages obviously cannot be independent from the social sphere. Political, economic, social, and cultural factors in each of the

processes affect what is produced, how it is produced, and how it is used (Webster, 2006, p. 12). Although technology has been shown to have highly transformative social consequences that arise through its societal interactions, evaluating it by not taking into account the social sphere can lead to an incomplete analysis, such as the expectation that education technologies can solve all the problems faced by contemporary education systems.

The use of educational technologies these days such as electronic whiteboards and digital course content in classrooms is unquestionably accepted. In Turkey, all schools have been provided with electronic whiteboards. A national digital platform was implemented for all students and teachers to access where all course content and supplementary materials are available. Secondary education programs that offer full-time online courses have been implemented in the USA. Conducting educational activities in a company with new technologies is assumed to have certain advantages. All students will be expected to have in-depth learning thanks to educational technologies. Student differences being taken into consideration and the learning process being planned according to each students' abilities are assumed. In addition, students are thought to be able to have equal educational opportunities regardless of their social origin. An educational environment where a student-centered educational activity can be carried out with educational technologies and where the teacher will show the students the way to learn instead of transferring knowledge is expected to be created. Thus, students will be able to learn how to learn on their own and develop self-confidence and lifelong learning ability.

However, different opinions are found opposed to the optimistic views that educational technologies will improve education. Although the quantity and quality of current research is insufficient to provide a general norm regarding the extent to which educational technologies can meet the expectations of teaching, studies should be mentioned to exist showing the exact opposite of the claims the educational technologies will provide student-centered teaching in education and teachers will change their teaching methods. While educational technologies are a neutral element in the classroom environment according to these studies, the factors that enable education to improve are still very diverse (Herold, 2015; Mueller & Oppenheimer, 2014; Selwyn, 2011; Wang, 2001). For this reason, critics have pointed at the deep gap between the promises of educational technology and the improvements it creates (Cuban, 2004).

In addition, some opinions are found to suggest the transformation of educational technologies into teaching tools will transform the socio-cultural makeup as well as the social structure people are accustomed to in the long run as a result (e.g., Bowers, 1988).

Education and training activities have been reshaped with the effects of the COVID-19 epidemic that broke out at the end of 2019 and has continued to affect the whole world. Under these pandemic conditions, countries are known to have attempted to transforming their education systems to provide online education. Systems that have become available to the masses with the cheaper and more widespread use of educational technologies can be predicted to lean more toward digitalization after the epidemic.

Economic Impact

The economic dimension of the information society is primarily related to the structural transformation of the labor force. The decrease in the rate of blue-collar workers through automation in factories caused the sociological meaning of industrial workers to transform and expert technicians to become the dominant class in the workforce. In the information society, the economy is based on service labor, rather than labor based on muscle power. Hence, interpersonal relationships and knowledge become important components of the economic pattern. The person at the center of the network is a professional who has acquired the skills required by the information society through their education and training. For this reason, the factor that determines social status in the information society is suggested to not be material wealth but knowledge and education level (Bell, 1999).

The information society inherited the mass education system of the industrial society. The expansion in higher education, especially after World War II, resulted in a great increase in the rate of education of the world population. In this process, being educated meant improved living conditions and vertical social mobility. However, as more and more people have vocational qualifications through education, the value of vocational qualifications and diplomas in the labor market has decreased. As the supply of qualified people in the market increases, more education and more professional competence are required for a given job, while the role of education in promoting the social status and promoting upward social mobility is weakened. Therefore, the fact that many more people

in the information society have equal educational opportunities does not mean that these people have more earnings and status, as Bilton et al. (2009, p. 290) claimed. In the new society model, although education continues to be a necessary condition for a prosperous life, it ceases being a sufficient condition. A person is understood to need to have various types of competence apart from education for vertical social mobility (Castells, 2013, p. 178). The capitalist character of the industrial society maintains its continuity despite the democratic aspect of education in the information society. Economic and political privileges continue to be decisive in the social hierarchy (Yaylagül, 2018). Unlike the industrial society, an ambiguous "global capital network," not a capitalist class, has new privileges, affects all world societies, and dominates financial flows in the information society (Castells, 2013, p. 627).

Spatial Impact

Information and communication technologies and the Internet have become determinants of social organization in the information society. As Castells (2013) identified, organizational forms in the "network society" can be more determinant in shaping social relations compared to the industrial society as they gain more flexibility and adaptability. Information and communication technologies have a great impact on the organization of time and space and play a role in the relationships of distant locations and times. As a part of the global network, anyone with an Internet connection in the world can relatively move away from the constraints of time and space. The walls of the school and the hierarchy arranged by age lose meaning as information becomes available from anywhere and at any time. Distance and open education are advocated with the argument that they provide better education while reducing its cost (Atik, 2008), which becomes more and more attractive every day.

The free movement of information in the global communication network enables the Internet to be considered as a factor facilitating democratization (Giddens, 2012, p. 904). Cyber platforms where people can freely share their ideas and connect with like-minded people strengthen democracy by affecting the expansion of the public sphere. At the same time, the free movement of educational knowledge outside school walls provides the democratization of educational knowledge by allowing students to meet with information sources beyond the textbook and teacher. However, the digitization of educational knowledge

within the school system results in the national uniformization of information resources. In Turkey, the Educational Informatics Network (EBA) implemented by the Ministry of National Education offers a national school model with a digitized primary and secondary education, course content, simulations, and teacher lectures. However, the digitization of course content has led students with different abilities and learning levels to face uniform knowledge and knowledge interpretation. In addition, the number of privately-sponsored alternative content relating to the school curriculum for meeting students' supplementary educational material needs remains scarce. This fact supports the process of standardization of knowledge. Digitalization does not provide diversification as is claimed; rather it provides uniformization (Erdoğan Coşkun, 2021). The digitization of educational content and educational technologies becoming the dominant tool of education-training activities have increased education's link with profit-oriented markets while uniformizing teaching knowledge (Williamson, 2021).

Cultural Impact

The beginning of the twenty-first century is called postmodern because the information society creates a flood of information with various media that reshapes the uniform structure of the modern world as pluralistic and multicultural. Music, literature, film, painting, fashion, design, lifestyles in contemporary culture, and everyday life now generally contain much more information. In the face of this information explosion, people encounter too much information and resign themselves to the spectator position; this multitude of information distracts them and weakens their power of creating meaning. As the amount of information increases, its meaning decreases. Accordingly, humans in the spectator position have become the criterion of the accuracy of the information one encounters; one also has to question and be suspicious in the face of the information multitude (Webster, 2006, pp. 19–21).

The postmodernist critique of modern science is an important part of the debate on plurality and authority of knowledge and has been instrumental in shaping both contemporary and future curricula. Despite this philosophical debate not being addressed here in order to not deviate from the focus of our subject, we can remember in this context that the change in education in the case of books and teachers is the source and authority of knowledge. This change is illustrated not only by the decrease

in the rate that students read books but also by books no longer being the sources students refer to when needing to research a subject. The ease of accessing a source can be considered effective in students choosing Internet sources over books as a source of information. However, digitization and student-centered education in particular can be said to have changed the teacher from being an authority providing information in the classroom to being a facilitator (Erdoğan Coşkun, 2021; Grasha, 2002).

Industry 3.0 emerged in the society model in parallel with the development of information and communication technologies. The transition from the industrial society to the information society also brought about a change in the educational paradigm. Before long, the new technological inventions that have taken place in the first quarter of the twenty-first century will bring about a new phase of social transformation that is claimed to be revolutionary. The fourth industrial revolution is claimed to have been experienced with the new automation processes and intelligent mechanization in the industry, and a new education paradigm has begun to be mentioned.

Industry 4.0 and Education

As an advanced process of digitalization, Industry 4.0 suggests a new relationship between society and industry. The German Ministry of Education and Research first voiced Industry 4.0 in 2010. It requires digital communication technologies to be integrated into industrial production stages. As a continuation of twentieth-century automation, the aim is to bring the industry together with digital culture (Mazali, 2018, p. 405). Among the basic components of Industry 4.0 are the Internet of things, Internet of services, and cyber-physical systems. Digitalization at the Industry 4.0 level enables the communication between humans and machines as well as between machines and machines. Cyber-physical systems are embedded devices that can be placed in any engineering object, thus enabling the object to communicate with other objects or people. Artificial intelligence is added to the object, thus allowing many services to be performed without the human element (Davies et al., 2017, p. 1290).

The fact that most production processes and the majority of service types will be performed by smart machines could mean a radical transformation of life, primarily on the economic sphere. According to Schwab (2016, p. 39), the process of mechanizing the many business lines

that started in the twentieth century and require manual labor will continue; job positions such as lawyers, financial analysts, doctors, journalists, accountants, insurance brokers, and librarians will also be partially or completely automated. Therefore, automation will affect not only blue-collar workers but also white-collar workers in this process. Unlike previous industrial revolutions, very little (0.5% in the USA) new jobs are emerging, and 47% of employees in the USA are at risk of unemployment.

According to the Future of Jobs Report from the World Economic Forum, while the rate of work demanding cognitive skills increases daily, the rate of work demanding physical skills decreases dramatically. While the automation of physical tasks can be fully realized, even professions that require human creativity such as writing are at risk of automation. Even now, robots can produce texts that are indistinguishable from the human text. For the foreseeable future, the low-risk jobs will be jobs that require social and creative skills in terms of automation. According to the report, those who have the ability to make decisions and develop new ideas in uncertain situations will stand out in the future world (Schwab, 2016, pp. 44–45). For this reason, an education system that prepares young people for future professions is expected to develop skills such as creativity and leadership. Thus, two poles can be mentioned regarding schools and their curricula: those that raise the creative and leadership elite in the education systems of the future and those that raise the masses who receive general education for the crafts that automation does not wield. As a matter of fact, according to a report from the International Labour Organization (2020, p. 68), higher education provides access to jobs that can be less automated, while vocational education at the high school level provides more automated jobs. Being a university graduate reduces automation risks by 8.8%, while being a vocational training graduate increases automation risks by 2.5% in OECD countries.

The near future, which is thought will be shaped by the automation of business lines, puts expectations and pressure on the students in today's education system to prepare for the requirements of the future. This expectation and pressure are based on the acceptance that acquiring twenty-first-century skills is not possible with the twentieth-century education paradigm. For this reason, education systems are undergoing a paradigmatic change. The idea is that students need to gain certain values and skills in order to be prepared for the job markets that will be shaped by the technological developments that are expected to

occur in the near future. The new trends that stand out in the literature (e.g., Öztemel, 2018; Peter, 2017) on the education of the future and that are beginning to affect today's education can be summarized as follows:

Teaching Without the Constraints of Space and Time

Students will be able to find educational opportunities in different places and times without being limited to school buildings and educational hours. With e-learning, theoretical lessons can be learned beyond the classroom, while practical lessons can be carried out face-to-face. The effects from thorough learning achieved through activities such as scientific trips outside of school have begun being subjected to research (Eshach, 2007). Also, today's schools have started to open up beyond their walls, collaborating with other schools and even international networks. In addition, scientific organizations, universities, non-governmental organizations, and technology companies are among the institutions that schools cooperate with within the framework of the new education concept. This situation can be seen as the first stage of schools and education overcoming space constraints. This development has started to make lifelong learning more effective with each day. The adequacy and necessity of the traditional school system has been discussed with the consideration that compulsory education is insufficient at providing individuals with the knowledge and skills one may need throughout their lifetime. For this reason, the aim is to provide individuals with learning opportunities throughout all stages of life starting with pre-school and to lead a learning-oriented life outside of school (Fischer, 2000).

Personalized Learning

Educational technologies will be able to adapt to students' skills and provide a learning path that suits students' personal needs. Informatics and technology are the most common tools used for personalizing learning. By personalizing the learning process, students can learn difficult tasks by pushing their limits; this ensures that students have the time and an environment where their learning can be reinforced without the strain of pressure from the classroom environment or lesson time limits. In addition, teachers will be able to more easily identify the areas in which

a student needs help in the special education environment. In a study on public schools in the USA, Pane et al. (2015) revealed that students have higher academic achievement with personalized learning.

Free-Choice Learning

In addition to educational content, the learning path can also be an area where the student is able to apply personal preference. Because students are free to use their own teaching tool, they will be able to use the tools of their choice that they've gotten used to and thus be able to adopt the teaching processes flexibly. Free choice in learning is the learning style where individuals have control over what, when, where, with whom, and with what learning occurs (Falk & Dierking, 2002). Free choice is a feature that complements lifelong learning.

Project-Based Learning

Students learn in depth and actively by researching information and discovering it on their own. Because students will need different field knowledge as required by a project's topic during research, they gain interdisciplinary knowledge-based learning experience. While gaining individual and team-work experience, project-based learning also establishes a relationship with the real-life equivalent of school knowledge. Unlike the hierarchical business organizations of the industrial society, those who have appropriate skills (i.e., flexible values and cooperation) will be successful in the twenty-first century. The education system will prepare students for a job market where different values such as teamwork and creativity are effective (Bell, 2010; Saralar Aras, 2020).

Experiential Learning

Because educational technologies will facilitate teaching the theoretical parts of the curriculum, more time can be allocated to the sections on experiential learning. There will be room for acquiring skills that require human knowledge and face-to-face interactions, skills that are reinforced by the transfer of experience. Despite the criticism that modern industrial education educates students outside of real-life experience behind school walls, students will have the opportunity of practical education with twenty-first-century education. By increasing their knowledge and

skills while experiencing learning with their students, educator enable students to develop the awareness of contributing to the society in which they live (Buehlmann & Espinoza, 2014).

Critical Thinking

The power of interpretation will become more important as computers become able to perform intellectual tasks such as creating statistical data, calculating, storing information, generating data, and even analyzing data to determine future trends. The education of the future will focus on the issue of evaluating, interpreting, and drawing conclusions from data. For this reason, education will aim to develop critical-thinking skills. Critical thinking is the "process of making reasoned judgment based on evaluation" and is accepted as a twenty-first-century skill (Susiani et al., 2018).

Measurement and Evaluation Without Exams

The complaints that exams made with multiple-choice questions do not reinforce learning and that the information learned is forgotten after the exam is a problem that today's education system has to deal with. With e-learning in the education of the future, students' knowledge can be measured while learning, and information reinforcement methods can be used. With project-based learning, the student can be tested while working, whereas standardized tests fail to measure twenty-first-century skills (Bell, 2010).

Students as Stakeholders

Students and teachers will be able to participate in the creation of the curriculum. Because students and teachers can criticize the education and training process and identify the deficiencies in teaching, their stakeholder status has importance in determining the curriculum. In addition, a curriculum understanding that can expand according to new needs will ensure that the curriculum is not static but dynamic. This will also allow the curriculum to be customized according to students' abilities.

Apart from shaping the curriculum, ensuring students' stakeholder status at every stage of education is also important in order to be organized on the basis of students' needs. The following points can be

mentioned in this framework. (a) Learning objectives can be determined clearly. These goals are shared with the students and clarified so that each can say "I can." (b) feedback can be given to students so that students can evaluate their own progress. (c) Student learning and having them be stakeholders can be supported through evidence-based practices. Students can have data over which they can do their self-assessment, self-management, and self-monitoring. Thus, students have the opportunity to accurately assess and report their performance levels and progress, as well as identify their strengths and needs regarding their goals (Chan et al., 2014).

Mentoring

In the near future and with the flexibility of education and training, students who become independent from school education will need more guidance and mentorship. In this context, teaching will gain more importance, and as they move away from the burden of theoretical teaching, they will be able to perform their guiding instructor roles with care. At the same time, lifelong education and personalized education understandings and practices will cause individuals to need guidance and supervision while making decisions in all areas of their lives (Longworth, 2003, p. 65). For this reason, mentoring will gain importance as an area of expertise and business.

Ethics and Moral Issues

The twenty-first century is the age of advanced technological innovations such as cyber-physical technology, social media, artificial intelligence, robotics, the Internet of things, and 3-D printing. These innovations also prompt questions of ethics and morality. Answering questions about ethics and morality has become increasingly important regarding areas such as the integrity of the human body, the amount and ways in which artificial intelligence can be involved in human life, instrumentalizing advanced technology into a war technology that can cause great destruction, democratizing programming processes of artificial intelligence that can make decisions instead of humans, and the use of big data in violation of personal privacy. Unless solutions are found for ethical and moral problems, decisions in these areas will be left to advanced technology manufacturers and engineers. For this reason, education systems have to

add ethical and moral propositions to their curriculum as well as teaching the knowledge and skills required to produce advanced technologies. In the near future, specialization in ethics and morality may become as important as technical specialization (Çelebi & İnal, 2019).

In order for the education of the future to meet the needs of the society of the future, changing the teaching methods alone will not suffice. As a social institution, education is under the influence of the ideas, trends, and movements that affect society. For this reason, students should also receive education in addition to technical education so as to ensure that technical developments are sustainable and humane. OECD (2018, pp. 5–6) has defined the competencies that today's youths who will be the adults of 2030 should have in the society of the future; OECD identified three types of competencies that will transform society.

i. **Creating New Value:** New growth resources are needed for sustainable development policies. Innovation can offer solutions to the social and economic contradictions and problems caused by growth. Educating today's students with the idea of innovation can mean that the society of the future will have a less contradictory and less problematic structure.
ii. **Reconciling Tensions and Dilemmas:** The political and economic structure of today's world has certain tensions and dilemmas that are considered irreconcilable and irreversible. There are many different points of view and solution suggestions regarding these facts, such as equality through economic growth, sustainability through innovation, security through freedom, and responsible citizenship through autonomy and democratic process. In the world of the future, individuals will need to balance conflicting thoughts and think more holistically. The people of the future will need to have the ability to evaluate the interdependence and conflict between problems and phenomena.
iii. **Taking Responsibility:** The orientation of taking responsibility, which has been necessary for each model of society during all eras, will become even more necessary for twenty-first-century society, because having individuals think for themself while working with others in a society experiencing innovation, rapid change, and the resulting uncertainties is of vital importance. Taking responsibility for one's own actions and taking initiative in the face of risks and problems stand out as competencies that need to be gained for

social sustainability. In addition, taking responsibility is important as it is a prerequisite for the other two competences.

The educational needs and conditions that are thought to emerge in the society of the future are seen to be based on the change in the contemporary world and to emphasize individual creativity, responsibility, and initiative. Individuals' social and cultural capital can be said to be more determinant upon their education and daily business life based on the fact that individual knowledge has gained importance. However, in world countries with large populations, how mass education will provide an equality of opportunity that equips individuals with the necessary equipment for their future jobs is a matter of curiosity. Even if one assumes that digitalization will facilitate public access to education in the long run, how digital education will educate individual traits remains uncertain. When considering the criticisms of sociologists such as Bourdieu (1986) and Bernstein (2003) regarding social inequalities in the mass education of the twentieth century, one can say the society of the future will fall behind in terms of social equality. Likewise, one can say the world is moving toward a more equitable and just society with the assumption that human potential will be revealed more.

Preparing for Industry 4.0

In the contemporary world, the literature repeatedly states technology use and technology education in schools to be effective factors in preparing societies for Industry 4.0. In this direction, countries are making innovations in the context of preparing for the future within the framework of national education policies. The US Department of Education Office of Educational Technology (2010) has set five goals within the scope of digital transformation policies in education: Strengthening students' learning abilities in and out of school using technology for measurements and evaluations, measuring and evaluating what is important for continuous improvement; supporting educators with technology that enables them to access data, content, and resources for more effective teaching; enabling all students and teachers to access comprehensive infrastructure wherever and whenever they need it; restructuring all educational processes; and utilizing technology to optimize learning outcomes and increase systemic productivity. The Republic of Turkey's Ministry of National Education set two main goals in the learning process for

digital content and skills-assisted conversion in its Education Vision 2023 (2018): establishing an ecosystem for digital content while improving skills and developing content for teacher education by making the necessary arrangements for digital materials to become the basic teaching resource and associating digital materials with printed materials.

In today's world, the results from preparing for the "Industry 4.0" society have begun to be seen. The use of technology in education and providing students with technological skills in particular are positive data shown as factors that improve students' future. For example, Piliouras et al. (2014) measured the results from the US Department of Education's digital transformation policy in a school with technological transformation and found a positive relationship between the use of technology in school and student preparedness for the workforce. In addition, the study conducted by Nafea and Kilicarslan Toplu (2020) on the technological skills and competencies of Canadian higher education students showed students' use of educational technologies in the classroom as well as their own computers and smart phones to affect the abilities of the Industry 4.0 society. Even Erdoğan Coşkun's (2021) study in Turkey indicated that high school students are able to effectively use smartphones in particular as a technology in education. As predicted in the futurist literature, this may indicate the ability of technological transformation to be holistic. However, the changes and transformations in the national education systems can be said to have triggered the industrial transformation in countries. In other words, the most important motivation of the will for change is determined by market needs.

In the countries where Industry 3.0 is still a dominant economic production model such as Turkey, the Industry 4.0 model makes the case for a model of the future when considering the low level of investment allocated to innovation, research, and development (Yazıcı & Düzkaya, 2016). Therefore, the Industry 4.0 societal model and education goals are the goals of the future for many countries. As one of the goals for transforming into an industrial society, education is expected to train the staff that will realize industrialization, and Industry 4.0 education goals are implemented not to meet industrial needs but because they are expected to trigger industrial development.

Future Type of Society: Society 5.0

While Industry 4.0, also known as the concept of the information society, refers to the advanced technological transformation pioneered by Germany, Society 5.0 was brought to the literature by Japan to express the philosophical development of the information society. With the statement made by Japanese Prime Minister Shinzo Abe in 2017 that technology should be perceived not as a threat but as an aid to people, Society 5.0 has begun to be used to express the cooperation between society and technology. Based on the contradictions between artificial intelligence and ethics, Society 5.0 evaluates artificial intelligence and robots from a sociological and ethical perspective and suggests a "super-smart society" that reevaluates the relationship between humans and machines (Saracel, 2020, p. 31). Salgues (2018, p. 1) defined Society 5.0 as "the artificial intelligence society that strongly connects the physical and cyber spaces." Guiding science and technology is essential for solving social problems while ensuring economic development. Therefore, Society 5.0 is the intention to use the technological innovations of Industry 4.0 for the benefit of humanity.

Society 5.0 comes to the fore regarding certain developments that are expected to become widespread in the near future and are subject to ethical debate. Among these developments are the scientific and biotechnological interventions in the physical and cognitive structure of human beings. The *singularity*, termed by Kurzweil (2005), refers to the human–machine civilization that will emerge when the cognitive, physical, and biological nature of human beings combine with machines to overcome weaknesses such as sickness and old age. The singularity emerging as a result of scientific and technological developments in the fields of genetics, nanotechnology, and robotics (artificial intelligence) will eliminate the distinction between human and machine as well as the limits of human biology and the brain. Human technology combines with human intelligence; the human–machine (cyborg) that is born from this combination removes all human weaknesses and reaches the power to decide when to die or defeat death (Demir, 2018, p. 99). According to transhumanism, the superior characteristics provided by the singularity will transform the human into a super-human, and this will be the solution to social problems such as global warming, terror, and poverty (Köksal, 2019, p. 149).

Transhumanism has today become the slogan of orientations that support techno-futurist claims regarding the violations of human biology. Nowadays, discussions of psychopharmacological drugs used to increase cognitive functions or parents who want to choose their children for genetic strengths are evaluated within the framework of the transhumanist trend. Its primary focus is on emerging technologies such as nanotechnology, biotechnology, artificial reproduction tools, information technologies, and cognitive sciences. Although transhumanists do not advocate the radical transformation of the human species, their demand for the use of new technologies for human development constitutes one of their common characteristics (Ranisch & Sorgner, 2014, pp. 9–13). The human type (cyborg) advocated by transhumanism can only come to life in the Society 5.0 model (see Table 1). Although the concept of human enhancement and development, which transhumanism targets, constitutes the attractive side of the trend, this concept raises ethical debates on whether invading human biology is transcendence or a transgress (Lilley, 2013).

Transhumanism is the advocacy of the techno-futurist human type that is expected to emerge in Society 5.0, where technology is integrated into daily life. As societies connected with technology, Society 5.0 is committed to providing services equally regardless of social categories such as age, gender, region, or language. The claim is that it will be a prosperous society where people can easily access the goods and services they need.

Table 1 Economy and human types according to society type

Type of society	*Types of economy*	*Types of humans*
1.0 Hunting and gathering	Hunter/gathering economy	Prosthetic human
2.0 Agrarian	Bartering economy	Civilized human
3.0 Industrial	Production economy	Rational human
4.0 Information	Digital economy	Information society human
Society 5.0	The platform unifies all previous types of economy	Augmented/improved human

Source Adapted from Salgues (2018, pp. 172–174, 230–237)

Society 5.0 and Education

Although the singularity and transhumanism focus on the benefits of technology to humanity, the techno-futurist movements of Society 5.0 cannot yet be said to have developed their ideology at the level of social action or education. For this reason, the model for education systems deemed necessary by the information society that emerged with Industry 4.0 still maintains its validity as the goal of the future for today's world. However, Keidanren [Japan Business Federation] (2016, p. 18) as the first advocate country of Society 5.0 prepared an outline on the educational understanding of this societal model. In this outline, two basic educational values foreseen for the world of the future are explained. These two values constitute the principles of the education reform to be carried out today in order to ensure the active participation of individuals in Society 5.0. Thus, students are aimed to acquire the basic values for being able to cope with the world of the future instead of preparing for a job market that is predicted to change structurally in their future.

The first of these is the arrangement to be made in education systems and content so that all citizens are people with independent thought who create new values by bringing together different elements while working with others. In this model of society where access to information is easier and does not make differentiate among individuals, knowing who the person has more importance than knowing everything. Critical thinking becomes essential for people to know how to think and solve problems. For this reason, a process-based learning model should be applied to increase students' planning skills, abilities, and habits (Duman, 2007) as opposed to a topic-or product-oriented education process.

The second principle is education that supports lifelong learning. With the opportunities provided by information technologies, individuals maintain their learning positions throughout their lives beyond formal school education. In a world where science and technology develop and expand exponentially (Kurzweil, 2005), the possibility that the knowledge learned in the contemporary world may become obsolete in the near future requires people to maintain their position as learners. For this reason, information technology literacy should be developed at primary and secondary education levels in contemporary education systems. In addition, the promotion of creativity is another necessary condition for sustainable learning. Acquiring the motivation to learn, learning to learn,

and the availability of educational resources anywhere and anytime are other conditions of lifelong learning.

Conclusion and Evaluation

The education systems of the modern world are transforming to meet the needs of the Fourth Industrial Revolution. Countries strive to have varying levels of the information society's characteristics depending on their own nation-state interests and market structures. Educational reforms carried out with the aim of adapting education systems to the conditions of the information society for industrial progress differ with respect to countries' industrial development level. Meanwhile, the overwhelming majority of the world's population is experiencing similar social change processes as consumers of new technologies. Due to Industry 4.0's advanced technological products that radically transform daily life, the entire world population has either a positive or negative perception of new technologies as a consumer, even if they do not produce them. On one hand is the negative view that focuses on the degenerating effects new technologies have on social relations, while on the other is the positive view emphasizing the level of prosperity these technologies bring. While the pessimistic view suggests that digitalization in education has completely changed the ecology of education, the optimists view that educational technologies are still a solution for all the problems of education systems, from learning difficulties to social inequality. However, when looking at contemporary education systems and the results from the reforms that have been carried out, no need can be said to exist for expecting a radical change in the near future.

In a study on what the educational sociological issues of the new society might be, Mehta and Davies (2018) showed that the issues that emerged since the second half of the twentieth century will continue to determine the education agenda. Two of these issues stand out in terms of seeing how the basic claims of the information society can take shape in the near future.

First is that *education has maintained its central position in the social policies of nation-states*. In the neoliberal era, education became part of the debate focused on social insurance and social safety nets because, in addition to being an employment-providing factor in the post-industrial period, education was considered as a factor that decreases crime rates, increases the tax base, and thus affects economic growth.

Despite these neoliberal orientations, governments continue to support education systems as a social policy that enhances the well-being of individuals and offers them the opportunity for social mobility. This situation adds uncertainty to how the assumption of the information society, which argues that the importance of formal education will decrease, will take shape in the face of democratic demands.

The second issue is how economic inequalities, which deepen daily, continue to be the factor that feeds inequalities in education despite the widespread use of information technologies. The issue of inequalities in education has been at the center of educational sociology studies since the 1970s. Within this framework, various regulations have been implemented by governments and schools to ensure equality within the scope of equal opportunity policies in education. According to Khan (2018, p. 186, 190), although the proportion of ethnic and religious groups such as African-Americans, Latinos, Asians, and Asian-Americans has increased in US universities, this change has not caused a decrease in inequalities; the elites continue to increase their share in national income and wealth. In addition, as the public schools' curricula become more and more standard, elite schools have also begun implementing their own unique programs. While public schools exclude the education of arts from their programs, elite schools provide training in unique specialties that will allow their students to stand out from the crowd. A similar situation also began to develop in Turkey. With the effect of digitalization in education in particular, the curriculum of public schools has become standard in a way that has reduced the voices of the teachers who personalize the educational content for their students in the classrooms. Meanwhile, as explained by the Ministry of National Education (MoNE, 2018), its Education Vision 2023 highlighted private education institutions' privilege of implementing different education models. While the private schooling rate was 4.7% in the 2007–2008 academic year, it increased to 14.7% in 2017–2018 (Eğitim Reformu Girişimi, 2018, p. 164). In this case, the claim that digitalization will provide very cheap access to high quality education (Kurzweil, 2005, p. 225) has become valid for the masses. However, how the privileged positions of elite schools will take shape in the near future is a matter of curiosity. Will mass education be sufficient for the highly qualified jobs of the information society? With a high degree of automation, what future will mass education offer to the masses?

Today, we can talk about the prototypes of the society that human beings will build with information technologies. Meanwhile, biotechnology is accepted as able to end inequalities in the model advocated by the singularity and transhumanism. Together with genetic inequalities, human–machine association can put an end to social inequalities. However, the possibility that biotechnology may reveal genetic classes contrary to expectations is not to be underestimated (Fukuyama, 2002). In addition, the question of how this trend will be socialized is raised by the deep contradiction among the transhumanist discourses, which are secular and dissolve human expectations from God, religious institutions, and their discourses (Klichowski, 2015; Köksal, 2019; Lipowicz, 2018). Education Vision 2023 (MoNE, 2018, p. 7) states, "Our singularity is the unity of mind and heart rather than the unity of man and machine" after referring to the singularity, possibly due to this social contradiction. Which voice will be dominant in the society of the future continues to also be a curious matter.

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New Learning, School and Teacher Considerations

Revisiting Effective Instructional Strategies for Twenty-First-Century Learners

Asil Ali Özdoğru

Humanity's future depends on current education systems. Young generations educated in current education systems will shape the world in the near and far future. How children and youth are educated has far-reaching implications. Education carries pivotal importance in humanity's desire to create a better world. Quality education will train effective problem finders and solvers who will address the challenges that life and the future present.

Twenty-First-Century Challenges

Modern humans have been populating the earth for around 200,000 years. For many years, human activity as hunter-gatherer nomads and farming settlers was in harmony with nature. During the last millennia, the rise of empires and geographic explorations has led to scientific and technological advancements. Industrial revolution in the eighteenth and nineteenth centuries and the scientific and technological revolutions of the twentieth century have paved the way for the digital

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revolution in the late twentieth century. The twenty-first-century world is a rapidly changing environment that brings a great deal of challenges for humankind.

Challenges of the twenty-first century involve environmental, economic, and social problems that humans need to solve. Pollution, deforestation, climate change, and natural disasters threaten the basic support systems of life on earth. Population growth, economic stagnation, and financial crises fuel poverty and inequality. Political instability, military conflicts, forced migration, discrimination, and disinformation present a hostile environment for human survival and flourishing. As seen in the latest case of the coronavirus disease 2019 (COVID-19) pandemic, the challenges of the twenty-first century threaten the human condition at a global scale. In order to tackle these increasingly difficult problems, education plays a key role in raising new generations of humans who can face these challenges.

Education systems around the world are not immune to the challenges of the twenty-first century. Social and economic problems reflect themselves in educational environments. Equitable access to quality education is a meager opportunity in many parts of the world. Schools and educational institutions around the world are dealing with limited resources and responding to rapidly changing demands from stakeholders. Students, teachers, administrators, parents, policymakers, businesses, and other players in the system have different and sometimes competing expectations. Rapid changes in technology and society have disrupted the traditional systems of formal education. Education systems and professionals need to face these complexities and better prepare their students for the future. The challenges of the twenty-first century will be addressed by new generations of individuals equipped with twenty-first-century skills.

Skills for Twenty-First-Century Learners

The complex problems and challenges of the twenty-first century have deemed certain skills more important for addressing these challenges. Several individuals and organizations have offered ideas on what is needed to be effective problem solvers in the new world. The common notion is that the content-based knowledge transmission of traditional education systems is no longer adequate for training the new generation of learners.

The importance of new sets of skills and abilities has been discussed for facing the problems of the rapidly changing digital world we live in.

A group of organizations including major technology firms formed the Partnership for twenty-first-Century Skills (P21) in 2002. P21 identified three core subjects and seven skills as twenty-first-century skills (Thrilling & Fadel, 2009). The core subjects are reading, writing, and math with twenty-first-century themes. The seven skills were identified as critical thinking and problem-solving, creativity and innovation, collaboration and teamwork, cross-cultural understanding, literacy in communications and media, literacy in computing and Information and Communication Technology (ICT), and self-reliance with career and learning.

Similar to P21's classification, the World Economic Forum (2015) proposed a set of 16 essential skills for a new vision in twenty-first-century education. Those skills include six foundational literacies, four competencies, and six character qualities. Foundational literacies are literacy, numeracy, scientific literacy, ICT literacy, financial literacy, and cultural/civic literacy. Competencies include critical thinking/problem-solving, creativity, communication, and collaboration. Character qualities are curiosity, persistence and grit, adaptability, leadership, and social/cultural awareness.

The Organisation for Economic Co-operation and Development (OECD) also provides a vision for the future of skills and education. In the *OECD Learning Framework 2030*, three transformative competencies are outlined as creating new value, reconciling tensions and dilemmas, and taking responsibility (OECD, 2018). Creating new value competency is related to individual's adaptability, creativity, curiosity, and open-mindedness. The competency of reconciling tensions and dilemmas involves thinking and acting in integrated, interconnected, and interrelational ways. The competency of taking responsibility is about sense of responsibility, self-regulation, self-control, self-efficacy, and problem-solving. Future learners equipped with these competencies will exercise agency in developing individual as well as societal well-being.

Skills and competencies put forward by many scholars and organizations have indicated the need for a comprehensive set of the knowledge, skills, abilities, and other characteristics (KSAOs) needed for the twenty-first century. These competencies include not only content knowledge such as basic literacies but also technical skills such as computing and ICTs, as well as personality characteristics such as self-regulation, curiosity,

and adaptability. The twenty-first century features the importance of these KSAOs as well as dynamic and flexible education systems that can effectively cultivate them.

Even though there are some criticisms of the twenty-first-century skill movement in terms of its content, discourse, and evidence base (Davies, 2018; Greenlaw, 2015; Lucas, 2019), a growing body of literature supports its basic premises (Chu et al., 2021; Griffin et al., 2012). Education systems around the world are trying to provide these skills without any common definition or strategy (Joynes et al., 2019). In order to nurture these twenty-first-century KSAOs in new generations, educational practices need to adapt evidence-based systems and strategies. The scientific literature offers guidance in terms of these effective instructional approaches and support systems.

Effective Instructional Strategies for Twenty-First Century

Twenty-first-century skills can be developed through effective educational processes. In order to support educational processes and activities, effective methods and strategies for learning and teaching must be employed. Basic theories and research in human learning and development offer ageless solutions for educational professionals. Research on and applications in the educational sciences, science of psychology, and many other related fields offer valuable strategies for educational practices.

Digital Learning

The digital revolution of the late twentieth century introduced many new technologies for education, work, and daily life. The introduction of ICTs such as personal computers, mobile phones, and the Internet have drastically changed many systems. Technology innovation and diffusion have led individuals and organizations to adopt and integrate these new tools and systems. Education systems have quickly responded to these changes by equipping their learning environments with these technologies. The basic processes and procedures of learning and teaching have been influenced by integrating technology into education. The effective use of technology is now an integral element of twenty-first-century instruction, which also includes elements of learner's attitudes and motivations, thoughtful engagement, and life/career skills in promoting twenty-first-century skills (Beers, 2011).

Digital learning is a concept used to refer to a set of technology-mediated techniques that is applied to assist student learning, tutoring, instruction, and assessment (Wheeler, 2012). Initially labeled as electronic learning (or e-learning), digital learning (i.e., d-learning) is a broad concept that covers e-learning as well as mobile learning (i.e., m-learning; Basak et al., 2018). Digital learning coalesces content, instruction, and technology by offering a variety of different learning opportunities such as distance and online education, open and distributed learning, hybrid and blended learning, adaptive and personalized learning. Digital learning is not only a supplement to face-to-face education but can also be used as an alternative means of education, seeing as it has been used as emergency remote teaching during the COVID-19 pandemic (Hodges et al., 2020).

Digital learning is a valuable form of learning and teaching that can enhance educational outcomes. Studies that have compared face-to-face learning and digital learning point out that online learning is not worse than face-to-face learning in terms of student knowledge, skills, and satisfaction (McCutcheon et al., 2015; Paul & Jefferson, 2019). Well-designed experiences of digital learning can even lead to superior outcomes for learning performances in comparison to face-to-face learning (Thai et al., 2020). Similar to traditional educational practices, the outcomes of digital-learning experiences depend on many factors related to students, teachers, and instructional design. Learners' prior KSAOs influence their attitudes, satisfaction, and performance in digital-learning environments (Islam, 2016; Kauffman, 2015; Özdoğru, 2005). Knowledge and skills of teachers in content, pedagogy, and technology are fundamental in their effective teaching using technology (Gurley, 2018; Koehler & Mishra, 2008; Shea et al., 2006). Instructional design features such as needs assessment, delivery methods, learner-content-instructor interactions, and assessment strategies are also influential in online educational outcomes (Driscoll & Carliner, 2005; McNaught et al., 2012).

Effective digital learning in online and blended learning environments can be promoted by creating collaborative experiences based on a constructivist approach. The community of inquiry (CoI) framework offers a process model for an effective digital-learning experience through three essential interrelated elements: cognitive, social, and teaching presence (Garrison, 2016). Cognitive presence is related to opportunities learners have for constructing and confirming meaningful knowledge by engaging in continuous reflection and discourse. Social

presence is about how participants feel belong to the learning community, interact in a trusted environment, and build interpersonal relationships. Teaching presence entails designing, enabling, and guiding cognitive and social processes to achieve personally valuable and educationally relevant outcomes. The CoI framework emphasizes the significance of the social-emotional nature of learning and sense of community in learning environments.

Digital and electronic learning is a multifaceted process that involves many elements of design. Khan's (2001) framework outlines eight dimensions of effective e-learning environments: institutional, pedagogical, technological, interface design, evaluation, management, resource support, and ethical dimensions. As listed below, each dimension includes many subdimensions that should be considered in the effective use of e-learning (Khan, 2015) (Fig. 1).

Another model has been offered for the critical factors for success in e-learning for developing countries. Based on the literature and opinions of ICT experts and faculty members, researchers identified a hierarchical model of six dimensions: leaners' characteristics, instructors' characteristics, institution and service quality, infrastructure and system

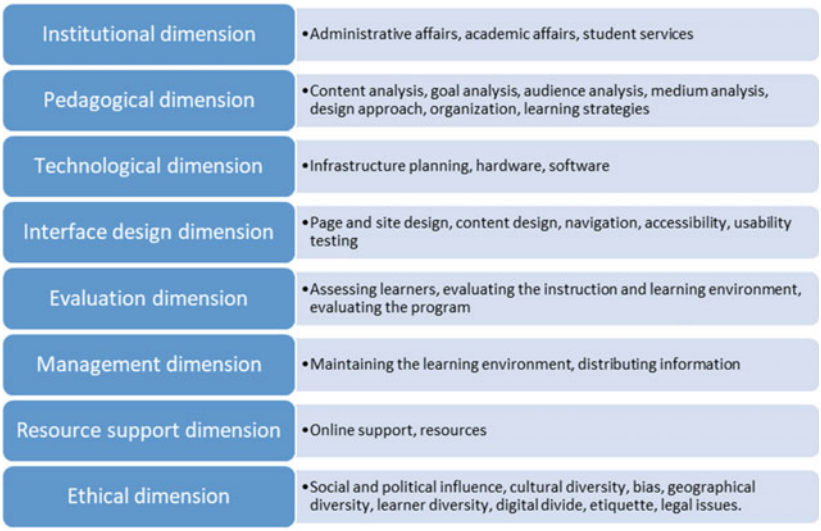

Fig. 1 Khan's (2001) eight dimensions of effective e-learning environments

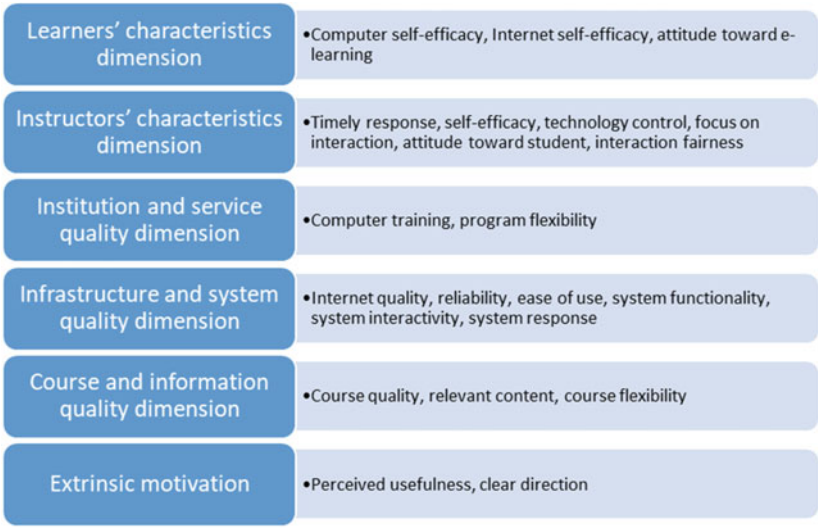

Fig. 2 Bhuasiri et al.'s (2012) critical-success factors for e-learning

quality, course and information quality, and extrinsic motivation (Bhuasiri et al., 2012). As listed below, the dimensions include a total of 22 critical-success factors in e-learning (Fig. 2).

As seen in these models and frameworks, digital learning can be designed as a valuable educational experience for supporting students' and teachers' learning and development. Digital learning experiences are not only related to technology and institutions but more importantly to individuals and relationships. In accordance with twenty-first-century skills, effective digital-learning experiences can facilitate development of technological literacy and skills as well as personality characteristics and competencies.

Inquiry-Based Learning

Human learning is an undertaking that requires active involvement and participation from the learner. When curiosity and the need for knowledge exists, learning becomes a necessity and the learner actively strives to attain it. In order to make use of these aspects of learning, inquiry-based approaches to learning have been proposed. Inquiry-based learning

is defined as "a range of teaching approaches in which learning is stimulated by a question or issue, learning is based on constructing new knowledge and understanding, teacher's role is one of a facilitator, and there is a move towards self-directed learning" (Spronken-Smith et al., 2011, p. 15). In inquiry-based learning, which is also known as guided inquiry or inquiry-guided learning, students actively participate in creating their own knowledge in a single class or during a semester instead of passively receiving and memorizing information. Inquiry-based learning is considered among the inductive teaching and learning methods, which is a family of approaches that include case-based teaching, design-based learning, discovery learning, just-in-time teaching, problem-based learning, and project-based learning (Prince & Felder, 2006).

Inquiry-based learning has various characteristics and modes. The process of inquiry contributes to learners' understanding by problematizing the situation, creating a demand for knowledge, enabling discovery and refinement, and applying their knowledge (Edelson et al., 1999). Five characteristics of inquiry-based learning include: learner engagement with a complex open-ended problem or scenario, learner management of inquiry methods and strategies, learner's use of existing knowledge to identify learning needs, curiosity stimulating tasks that lead the learner to explore and investigate, and learner's analysis and presentation of evidence to support their response to the problem (Kahn & O'Rourke, 2005). Based on the extent to which teachers provide scaffolding, three modes of inquiry-based learning can take place (Spronken-Smith & Walker, 2010). In structured inquiry, teachers provide a problem and a plan for solution. In guided inquiry, teachers offer questions stimulating inquiry and students work in self-direction to explore these questions. In open inquiry, students create questions and go through the full process themselves.

Research on the effectiveness of inquiry-based learning shows that it can support learning and development in many ways. A meta-analysis of 37 experimental and quasi-experimental research studies published between 1996 and 2006 showed a medium-size effect in favor of inquiry-based science teaching, a large effect on epistemic activities in comparison to others, and a larger effect on teacher-led inquiry compared to student-led inquiry (Furtak et al., 2012). Another meta-analysis of 19 studies from 2005 to 2015 in Turkey with a total sample of 1,521 students indicated inquiry-based learning in comparison to traditional learning to

have a large effect on students' school achievement and medium-size effect on students' process skills in science and attitudes toward science (Aktamış et al., 2016). Another meta-analysis of 72 studies that looked into the outcomes of guidance in inquiry-based learning showed guidance to have a medium-size effect on learning activities, learning outcomes, and performance success, which was moderated by the type of guidance (Lazonder & Harmsen, 2016). Effectiveness of mobile device-integrated inquiry-based learning programs was studied in another meta-analysis of 34 research studies that had a total of 2,316 participants from 2007 to 2016 (Zheng et al., 2018). The results indicated mobile device applications to have a large effect on improving student success with greater effect on cognitive outcomes for studies of medium duration (5–8 weeks) and small sample sizes (20–50) using a quasi-experimental design and quantitative analyses.

Effective application of inquiry-based learning requires appropriate design and implementation of instructional activities. Epistemic activities and a combination of conceptual, procedural, and social activities in inquiry-based learning were found to be more effective than conceptual, procedural, and social activities by themselves (Furtak et al., 2012). Epistemic inquiry-based learning activities include training on the nature of science, generating conclusions based on evidence, recording and describing data, and applied activities. Studies on inquiry-based learning have indicated the importance of teacher direction and guidance such as providing process constraints, status overviews, prompts, heuristics, scaffolds, and explanations (Lazonder & Harmsen, 2016). Effective inquiry-based learning was suggested to have five phases and nine subphases: orientation phase, conceptualization phase (questioning and hypothesis generation subphases), investigation phase (exploration, experimentation, and data interpretation subphases), discussion phase (communication and reflection subphases), and conclusion phase (Pedaste et al., 2015). When implementing inquiry-based learning programs, several aspects related to teachers, courses, and the institutional attributes listed below were suggested to be considered for effective implementation (Spronken-Smith et al., 2011) (Fig. 3).

Inquiry-based learning is especially relevant in the context of the twenty-first-century environment. Ease of access to information enables learners to be more active in their learning. Effective implementation of inquiry-based learning in traditional and digital environments will foster development of twenty-first-century competencies and skills (Chu

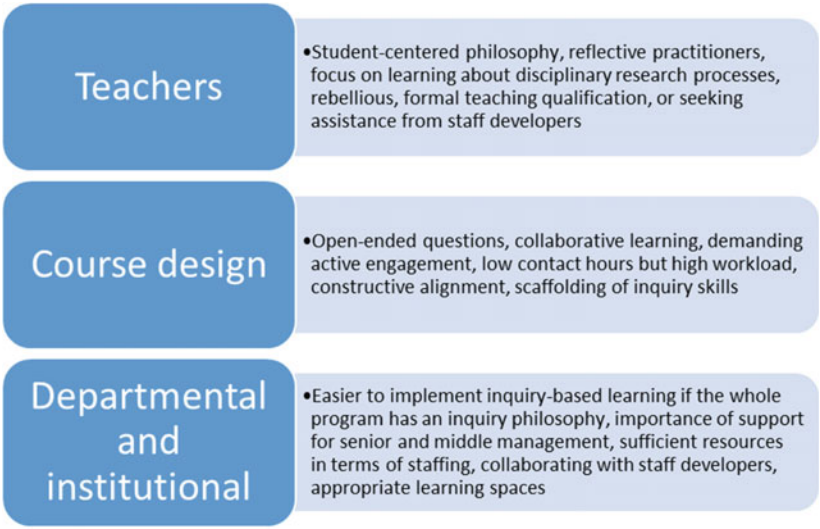

Fig. 3 Spronken-Smith et al.'s (2011) attributes for effective implementation of inquiry-based learning programs

et al., 2021). Through the use of these inductive teaching and learning methods, learners can be supported in terms of creativity, critical thinking, and problem-solving.

Cooperative and Collaborative Learning

The human mind does not work in a vacuum but interactively with other minds. The social nature of the human mind and behavior is clearly at work in the learning and teaching processes. In order to reap the power of other minds, cooperative and collaborative learning is offered as an effective means of learning and teaching. In contrast to individualistic and competitive learning, cooperative learning makes use of small groups to make the most of individual and group learning (Razzouk & Johnson, 2012). Similarly, collaborative learning is defined as a process in which learners work in pairs or small groups with the aim of seeking and recognizing abilities and the offerings of individual members (Udvari-Solner, 2012). Members in cooperative and collaborative-learning groups usually have shared authority and responsibility for group actions and

outcomes. In cooperative learning, teachers act as a central authority in the class and provide more closed-ended group tasks. In contrast, collaborative-learning group members work interdependently on open-ended and complex tasks to discuss and create a joint problem space in which they co-elaborate their personal meaning and knowledge (Baker, 2015).

Cooperative and collaborative learning have various characteristics and elements. Johnson and Johnson (1999) outlined five elements and distinguished three types of cooperative learning. The five essential elements of cooperative learning include positive interdependence, individual accountability, promotive interaction, social skills, and group processing. Students in informal cooperative learning groups work on joint-learning goals in a temporary fashion, from a few minutes up to one class hour. In formal cooperative learning, students work on specific tasks and assignments with shared learning goals, from one class hour up to several weeks. Cooperative base groups consist of heterogeneous members supporting each other academically and socially for one or more years. Tinzmann et al. (1990) described four characteristics of collaborative-learning environments and several roles the teachers and students have in these environments. The four characteristics are stated as: shared knowledge among teachers and students, shared authority among teachers and students, teachers as mediators, and heterogeneous groupings of students. Teachers' roles include facilitating, modeling, and coaching, whereas students' roles include setting goals, designing learning tasks, monitoring group members, and assessing group work.

Several studies report positive outcomes of cooperative and collaborative-learning activities. A meta-analysis on 65 research studies published from 1995 to 2011 on face-to-face cooperative learning in elementary school through university settings found it to have a large effect on achievement, a smaller effect on attitudes, and no effect on perceptions (Kyndt et al., 2013). The same study also showed a moderating effect to exist for study domain, students' age, and culture on the outcomes. Similarly, another meta-analysis on 31 graduate theses in Turkey found that, while cooperative learning has a large effect on student achievement, it has a medium effect on attitudes and no effect on psychomotor outcomes (Alacapınar & Uysal, 2020). Another meta-analysis that investigated the effectiveness of computer-supported collaborative learning (CSCL) in science, technology, engineering, and math (STEM) education based on 143 studies published between 2005

and 2014 found STEM CSCL to have an overall moderate effect, with the effect being greatest on process outcomes (e.g., individuals' time on task and argumentation sequences), followed by cognitive outcomes (e.g., factual and applied knowledge, skill, and grade), and affective outcomes (e.g., satisfaction, motivation, efficacy, and attitude; Jeong et al., 2019). In the same study, the effects were found to be moderated by the types of technology and pedagogy, educational levels of learners, and domains of learning.

Cooperative and collaborative learning can be used as an effective instructional approach in both the traditional and digital-learning environments. As seen in the literature, the effect of cooperative and collaborative-learning applications depends on many factors such as learners' age, subject domains, technology, pedagogy, and culture. Effective applications take these factors into consideration in the design of developmentally and culturally appropriate instructional practices. Traditional cooperative learning methods include student team-achievement divisions, team-games and tournaments, team-assisted individualization or team-accelerated instruction, cooperative integrated reading and composition, jigsaw, learning together, group investigation, and constructive controversy (Kyndt et al., 2013). Collaborative learning is suggested to be designed based on five elements of goals and incentives, tasks, groups, collaboration processes, and assessment (Cho, 2015). Using Johnson and Johnson's (1999) five components of cooperative learning, an observation tool was developed to measure the 10 characteristics of learning groups listed below (Kern et al., 2007) (Fig. 4).

Cooperative and collaborative learning is essential for developing twenty-first-century skills. The complex problems of the twenty-first century require individuals to learn and work together. Well-designed cooperative and collaborative learning strategies in traditional and digital learning environments will enable the development of communication, collaboration, teamwork, and leadership competencies.

Social and Emotional Learning

Academic success and cognitive development have been the primary outcomes of educational systems for many years. In 1990s, the interest in social-emotional development was reinvigorated with the publishing of Daniel Goleman's (1995) book *Emotional Intelligence* and the establishment of the Collaborative for Academic, Social, and Emotional Learning

Fig. 4 Kern et al.'s (2007) characteristics of cooperative learning groups

(CASEL). CASEL is a nonprofit organization that consists of educators, researchers, and advocates in the United States promoting evidence-based social and emotional learning processes in K-12 educational settings. Since then scientists and practitioners have been working on the design and evaluation of social and emotional learning programs and interventions.

Social and emotional learning (SEL) is defined as the "(a) mastery and appropriate use of interpersonal and small-group skills (e.g., recognizing, managing, and appropriately expressing one's emotions), and (b) internalization of prosocial attitudes and values needed to achieve goals, solve problems, become emotionally involved in learning and work, and succeed in school and throughout life" (Johnson & Johnson, 2004, p. 40). SEL is further described with the two important competencies of interpersonal effectiveness and self-actualization and the three essential conditions of cooperative community, constructive conflict resolution, and civic values. CASEL provides a model for systematic SEL in educational settings with the five competence domains of self-awareness, self-management, social awareness, relationship skills, and responsible decision making (Weissberg et al., 2015). The model outlines a systemic

SEL programming with classroom-, school-, family-, and community-level partnerships and multiple levels of support in promoting short- and long-term attitudinal and behavioral outcomes in students.

Research on social and emotional learning programs show important benefits in participating students. A meta-analysis of 213 research studies with more than 270 thousand K-12 students showed that students in universal school-based SEL programs had better outcomes in academic performance, social and emotional skills, attitudes toward self and others, positive social behavior, conduct problems, and emotional distress in comparison to control groups (Durlak et al., 2011). Another meta-analysis of 82 interventions that had more than 97 thousand K-12 students) in multiple countries showed positive effects of SEL interventions that were detected up to 18 years after the programs ended (Taylor et al., 2017). In comparison to the control group, participating students of all races, socioeconomic statuses, and location groups had better long-term outcomes in academic and social-emotional outcomes, including higher graduation safe sexual behavior rates and lower rates of drug use.

The impact of SEL programs depends on the elements of design and application. The use of certain practices in SEL programs have been found to moderate these programs' outcomes. Programs that are sequenced, active, focused, and explicit (SAFE) were more effective in promoting positive academic and social-emotional development (Durlak et al., 2011). SAFE programs use a sequenced step-by-step teaching approach that makes use of active learning strategies, focuses on skill development with sufficient time, and employs explicit learning objectives and goals. Effective SEL programs are staffed with adults who possess personal and professional capabilities in order to implement and expand evidence-based practices, produce an inclusive culture that nurtures caring relationships and self-determination in youth, and enable collaborative school-family-community partnerships to support students' development (Mahoney et al., 2020). From an ecological perspective, effective programming needs to consider interactive processes among the nested settings of classrooms, schools, families, communities, cities, regions, and countries.

Twenty-first-century skills include not only foundational literacies and competencies but also personality characteristics. Social and emotional learning activities and programs are well-suited strategies for fostering learner's characteristics such as adaptability, persistence, grit, sense of responsibility, self-regulation, self-control, self-efficacy, leadership, and

social/cultural awareness. High quality social and emotional learning programs in digital- and non-digital learning environments are essential for developing and supporting twenty-first-century learners.

Systems and Supports for Twenty-First-Century Learners

Effective evidence-based instructional strategies are needed to cultivate twenty-first-century skills of the current and future learners. In addition to the previously summarized strategies, systems and supports should be designed to enable the desired outcomes. Supportive environments and systems of support should be put together for educating the whole child through their academic, cognitive, ethical, physical, psychological, and socio-emotional development. Based on an ecological perspective and framework of developmental systems, Linda Darling-Hammond et al. (2020) outlined implications from the science of learning and development for educational practices. Their implications are summarized in four areas: productive instructional strategies, social and emotional development, supportive environment, and system of supports.

Productive instructional strategies and social/emotional developmental practices have been in part previously summarized. These instructional strategies are designed to offer learner-centered instruction that fosters conceptual understanding and motivation to learn as well as learning how to learn. Learner-centered instruction utilizes prior knowledge and experience, teaches readiness, and offers personalized and collaborative-learning experiences with cognitive supports. Conceptual understanding can be encouraged by mapping the concepts of the learning domain and by providing explicit instruction and inquiry-based learning. Learners' motivation can be promoted with challenging tasks, appropriate scaffolding, and interest-driven learning activities. Learning how to learn can be supported through metacognitive awareness and skills, formative feedback, and mastery-oriented performance assessment. Social and emotional learning is important for developing intra- and interpersonal skills, a growth mindset, mindfulness, self-efficacy, self-regulation, and a sense of community.

Supportive learning environments include elements from effective child-care structures, learning communities, and family-staff connections. Smaller class and school sizes, longer grade spans (e.g., K-8 or 6–12), looping or continuity of care, block scheduling, and teaching

teams and advisory systems are needed for child-care structures. Effective classroom and school learning communities can be created through consistent routines, identity-safe environments, intentional community-building exercises, and cultural competence. Family-staff connections can be improved through relational trust, staff collaboration, authentic family engagement, parent conferences, and home visits.

Because learning and development take place in more than classrooms and schools, a well-designed system of supports is crucial for educating "the whole child within a whole school and a whole community context" (Darling-Hammond et al., 2020, p. 99). A multi-tiered system of support provides universal design for student learning and develops knowledge of child development in the first tier, while the second tier focuses on diagnostic services, and intensive interventions are implemented in the third tier. Coordinated and integrated inclusive health, mental health, and social services should be constructed through family and community partnerships. Lastly, extended learning opportunities such as out-of-school activities and summer programs need to be utilized.

Conclusion

The complex problems and challenges of the twenty-first century make effective strategies on learning and teaching necessary for educating new generations with the necessary knowledge, skills, and characteristics. Using effective instructional practices as in digital learning, inquiry-based learning, cooperative and collaborative learning, and social and emotional learning would be helpful in this pursuit. twenty-first-century learners need to be supported in and outside the classroom with appropriate systems and supports. Supportive learning environments and support systems should be constructed around the learners and their families and communities. Individuals and societies need to come together and act united in this collective endeavor in order to build, implement, and sustain quality education for all.

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Current Trends in School Management: School Leadership in Education 4.0

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Education is a dynamic and innovative process. Throughout history, it has been affected by various social and scientific developments and has been exposed to change and innovation, which have resulted in its present form. The importance of preparing a training plan for increasing the effectiveness of educational institutions and of determining the necessary strategies for being able to apply those plans is increasing daily. The prepared education plans are expected to contribute to the sustainability of school development. Managing, changing, and improving organizational conditions; participating in decision making; and learning and teaching strategies by appropriately evaluating organizational culture are necessary in this context. Here, the biggest role falls upon school leaders. Developing vision and mission, preparing and implementing school development plans and strategies, improving organizational climate, creating

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communities that feel a sense of belonging to the institution, keeping communication channels open, increasing and ensuring coordination, developing critical thinking skills, being innovative, and managing change most of all can be considered as the competencies expected from school leaders of the twenty-first century. In today's world where change happens quickly, leaders prefer online methods that will facilitate the institution's adaptation to the environment more quickly for meeting the changing needs of society. In this direction, the features of Education 4.0, which has emerged as the current education paradigm, will bring education systems closer to the center of life. This center is expected to have school culture and values that include change in a way that can adapt to society. Education 4.0 can be stated to have a structure that supports coordinated work by replacing the competitive cultural understanding with the collaborative cultural understanding. Having leaders contribute to the organization's adaptation to the use of technology in managerial processes by responding to global needs is important.

Historical Process of the Management Concept

As old as human history, the concept of management (Mandell et al., 1981) emerged with changing perspectives, beliefs, and goals in different civilizations and different fields (education, public, organization). The concept of management, having succeeded in making a name for itself by recognizing the Industrial Revolution, spread rapidly toward the end of the eighteenth century, especially in Europe. When examining the developmental process of management theories, they are seen to be discussed under three headings (Etzioni, 1964): the classical management approach, the human relations approach, and the structuralist approach. While putting forward the scientific management theory based on organizational efficiency, Taylor (1919) shared his belief that supervision activities should be maintained at a high level. Targeting the maximum production capacity, Taylor stated that workforce losses might be able to be minimized by following scientific methods. In this respect, the classical management approach ignores the social and psychological dimensions of the organization (Bursalıoğlu, 2010). Therefore, the educational administrator of today can be stated to have moved away from classical educational theories, to be sensitive to the social and psychological dimensions of the school, and to have roles and responsibilities that

enable and direct the development of culture in communication with their environment.

Traditional management approaches can be stated to emphasize functionality rather than social perspective. Functional hierarchical management has been expressed as the basic management paradigm for nearly 200 years (Jamali, 2005). The classical management system can meet needs when markets, products, and technologies change slowly (Turner & Keegan, 1999). Rapid globalization has been one of the most striking aspects of the new century, especially since the rapid development of information technology in the last two decades (Brown, 1999). The weaknesses and limitations of the system have gradually emerged with globalization and technological innovations. The management paradigm an administrator adopts is effective in overcoming those limitations. In cases where administrators adopt the modern management paradigm, the difficulties and limitations related to adapting to innovations are considered to be overcome more easily.

Establishing and developing relationships based on rationality are important for managing change effectively. The new perspective on management in the twenty-first century is based on the ability to cope with constant change, not stability, and is built upon work networks, changing partnerships, alliances, and technological advantages rather than hierarchies (Carnall, 2003). The new management paradigm comes together around teamwork, participation and learning, communication, integration, cooperation and collaboration with stakeholders and suppliers through close interaction; it adopts guiding principles that foster a new understanding with evolving elements such as value creation, quality, sensitivity, agility, innovation, integration, and team building (Jamali, 2005). New organizations consist of complex networks based on virtual rather than vertical integration, interdependence instead of independence, and mass privatization rather than mass production (Greenwald, 2001). Effectively and efficiently managing those networks is possible in organizations that are constantly changing and opposed to traditional education and management paradigms.

Management of Change in Schools

The rapidly changing technological, sociological, and economic environment creates new challenges for structuring and managing organizations

(Jamali, 2005). Those changes can be considered as numerous manifestations of a paradigm shift currently occurring in management and leadership approaches (Luksha & Kinsner, 2020). In this context, institutions operating in the knowledge economy should benefit from increasing knowledge, technology, and engineering developments as well as new skills and dynamic competencies (Liyanage & Poon, 2002). As one of those institutions, schools are open social systems that develop under the influence of changes in most areas as being the communities of practice that implement the innovations (Liyanage & Poon, 2002).

When faced with new problems and new scientific models that force them to produce solutions, communities of practice need a paradigm shift (Kuhn, 2012). While the first of the rational or political strategies to manage schools before the 1990s had assumed that schools would change as a result of exposing educators to new programs or new teaching methods, the second assumed that teachers and administrators were either unable or unwilling to initiate change (Kowalski, 2000). This is thought to be the reason why previous innovations had been unable to radically change education, despite schools being open systems importing new inputs from other systems for survival (Rodney, 2020). In this case, the proposed changes are often rejected when they conflict with the traditional role expectations of educators who resist innovation (Sarason, 1996). When innovations are not adopted by practitioners, the planned transformation is unrealizable. To prevent this, policies are needed for explaining innovations to stakeholders and helping them adopt the innovations.

The process of managing school change today is quite complex. School leaders play an important role as they are responsible for the management and implementation of this complex process. Because managing change consists of target-setting plans aimed at improving pre-determined standards, research on education system reforms is stated to have been focused on short-term planning in the last two decades. However, short-term planning needs to be incorporated into a longer-term planning framework that supports the strategic development of a school, say a period of 3–5 years (Davies & Ellison, 2003). When considering the goal to be achieving school development, educational planning seems to focus on establishing organizational structures that sustain change in education, particularly for improving student learning outcomes while at the same time contributing to a school's capacity to manage change (Hoque

et al., 2011). Planning and structuring education in the context of innovations is expected to be more effective as long as those focal points are considered.

Current thinking about the structuring of innovations is based on the judgment that schools are complex social institutions and that the restructuring of schools requires a social systems perspective (Chance, 2000). By adopting new inputs, the educational institution makes innovation a part of itself (Tyack & Tobin, 1994). Educational communities work to develop an open climate with policies and structures that support the participation of community members, educators, students, families, and wider community members (Wang & Degol, 2016). Similarly, making modular technology types that enable all stakeholders to access learning will be possible if education policies allow such innovations (Rodney, 2020). In this context, if schools and the environment are to be improved, they should be considered as complex entities consisting of interrelated and interacting parts. This point of view reveals the fallacy of blaming the lack of education on a single factor. More importantly, reforming education by manipulating only one or two elements of the system has been demonstrated to be futile (Kowalski, 2000). Reforms might not be possible to be successful until they start to be consistent with policy arrangements, and social, technological, and economic realities (Rodney, 2020). In this respect, it might be stated that the successful realization of reforms depends on the coherence between policies and realities. Realizing reforms seems more applicable in contemporary management paradigms that are open to innovation compared to traditional management paradigms.

Current Paradigms in Management and School Leadership

The idea that dominates the traditional paradigm involves increasing institutional productivity and managing available resources in a static and stable technological environment (Khalil, 2000). This mechanical orientation has dominated most institutions in the past and is still common, especially in developing countries (Jamali, 2005). However, while the traditional paradigm accepts labor as a concept to be bought, consumed, and discarded when appropriate, the innovative management approach requires empowerment, focus on teamwork, careful support for and effective management of human resources (Jamali, 2005). The last

decade has witnessed an important evolution of management paradigms and approaches all over the world, and a transition has been stated to occur from a centralized, hierarchy-oriented management paradigm to a local, distributed, and network-oriented management paradigm (Luksha & Kinsner, 2020). In this context, school management is concerned with maintaining school activities, while school leadership also includes concerns about individual development, shaping of their attitudes and behaviors, and improving school performance (Bush & Glover, 2004). Pont et al. (2008) summarized school leaders' duties as follows:

1. Defining learning goals and evaluating student performance by setting school goals in accordance with national and international standards, using data to measure progress, and making necessary interventions to help students reach their potential.
2. Using resources strategically and harmonizing all activities in the school to achieve the goal of excellence in teaching and learning.
3. Interacting with other stakeholders and communities outside of school such as policy makers, universities, communities, and social institutions to create value through mutual support.

School leadership is one of the areas of study addressed in the context of current paradigms in educational administration. New paradigms and approaches are stated to support organizational structures with less management layers compared to rigid, multi-layered, and vertical hierarchical organizations (Benveniste, 1994). In the age of Industry 4.0 in particular, changing global conditions such as productivity requirements, urgent need for continuous learning and advanced digital technologies require new approaches to educational leadership (Lappalainen, 2015). Although the need for effective school leadership is widely accepted within the scope of Education 4.0, which is the reflection of Industry 4.0 on education, uncertainties exist about which leadership behaviors are likely to produce positive results. In order to eliminate those uncertainties, the necessary leadership competencies should be determined first (Kin & Kareem, 2019). In this context, determining school leadership competencies is considered important in terms of how schools adapt to the age of Education 4.0.

Leadership development research in recent years has been proceeding toward determining the leadership competencies for achieving organizational goals (Shet et al., 2017). In the most general sense, school leadership can be stated to be related to strategic leadership in the context of Education 4.0. The concepts of change and innovation are emphasized in strategic leadership, and those key concepts are used to ensure the sustainability of corporate development. The leaders who will provide the conditions for strengthening communication networks, using technology effectively, and ensuring knowledge management efficiently are needed within the context of change and innovation in the field of education management in Education 4.0.

New Industry (Industry 4.0) and Education 4.0

Transformations and innovations in various fields from past to present have also directed the changes in different fields. Industry 4.0 is also considered one of the transformations currently taking place. It focuses on developing systems that are compatible with the needs of people and production through smart technologies based on individualization, flexibility, localization, resource efficiency, automation, digitalization, and networking (Lasi et al., 2014). Industry 4.0, which creates a global difference, brings some difficulties with it. Considering that difficulties such as digital culture, lack of training, lack of support from other administrators, undetermined economic benefits of investments in digital technologies, and high financial investment requirements (Slusarczyk, 2018) affect all areas of life, those should be carefully examined in terms of the future of education and training.

One of the paradigms shaping the future of education is the concept of Education 4.0, which includes the use of technology in the teaching and learning process and is inspired by Industry 4.0 (Anggraeni, 2018). When examining the transformations in industry and education, the period up to the present can be seen to have been handled through four different paradigms (Demartini & Benussi, 2017). The Education 1.0 paradigm provides a traditionally explanatory model in which measurement was mainly based on written and verbal evaluations. The Education 2.0 paradigm reveals the importance of projects developed with open-source software technologies in the context of institutions and classrooms. In Education 3.0, social networks play a key role in creating a more open environment where students' creativity and participation are encouraged

outside of course and institutional boundaries. Finally, Education 4.0 is presented as a rising paradigm and structure in which learning models are adapted and customized according to learner profiles. In this context, the Internet of Things (IoT), virtual reality (VR), augmented reality (AR), and artificial intelligence (AI) are emphasized as the tools that provide Education 4.0 (Popenici & Kerr, 2017). Among those tools, IoT is one of the tools through which developing Internet technologies are reflected onto education in many ways.

The rapid spread of the Internet in the modern age has enabled the structures and objects around individuals to use the Internet effectively. One cannot deny IoT's functionality in individuals' lives as it is used as one of the most important resources of the Industry 4.0 era. Technology integration in education has opened the doors of Education 4.0, and Education 4.0 offers some models for how to use IoT. Bagheri and Movahed (2017) stated that IoT usage in an education-oriented context will improve students' health status, classroom access, and teaching-learning processes. As a result, Education 4.0 as offered by Industry 4.0 ensures that education is maintained in a more open-to-communication, efficient, and student-centered context.

In this context, the advantages of Education 4.0 can be defined as follows (Kassim & Teng, 2018):

- *Education anytime and anywhere*: Students can have interactive learning environments and tools.
- *Personalized learning*: Learning autonomously will improve students' individual learning process.
- *Project-based learning*: As most employment focuses on applied areas, students are offered learning activities based on projects and case studies.
- *Mentoring*: Even though the education system is in a virtual environment, the mentor is expected to facilitate the process. Mentoring helps students adapt to the system.
- *Learner autonomy*: Students are responsible for learning processes.

Those advantages facilitate the understanding of school leadership functions in Education 4.0 and shape school leadership practices. School leadership in Education 4.0 includes the different knowledge, skills, and practices based on the characteristics of Education 4.0. When considering

knowledge, skills, and practices together, the competencies that school leaders are expected to have become evident.

School Leadership in Education 4.0

Pedagogy in Education 4.0 has been developed to respond to the demands of Industry 4.0 and has given new impetus to the transformations in education in terms of content, curriculum, and education management (Kin & Kareem, 2019). This dramatic change has caused changes in the future of education (Kassim & Teng, 2018). Managing change involves the competence school leaders have to encourage change, to enable and support others to change, and to make change sustainable (Kin & Kareem, 2018). In the context of Education 4.0, school leadership is regarded as a process that takes place within the framework of technology, communication, cooperation, problem-solving, innovation, professional development, and school leaders' competencies.

The change that first took place with Education 4.0 included directing education in non-traditional ways with technology-based tools and resources instead of traditional teaching materials (Tang et al., 2015). As an example of this, technology leadership competencies and performance evaluations are able to be done with technology tools (Banoğlu et al., 2016). In this context, technology is regarded as one of the keywords emphasized in Education 4.0.

One of the biggest advantages of Education 4.0 is the ability to realize effective and fast communication. Communication refers to how school leaders can effectively advance their vision and beliefs through direction, words, and actions to achieve school goals (Smith & Riley, 2012). Traditional management is based on theories from Fayol, Taylor, and Weber, which are based on stability and therefore tend to determine central decision-making processes and hierarchical communication channels (Jamali, 2005). Considering the need to implement quality processes and improvement in schools, relationships and communication can be thought of as the basic features in institutions (Jefferson & Anderson, 2017). Communication is also important in making decisions that facilitate transformation in schools because decision-making processes have become more and more interactive (Smoliar & Sprague, 2003). In this context, four of the conditions that leaders must provide in order to develop a school environment that facilitates transformations are based

on interpersonal relationships. Those conditions are listed as commitment to collaborative planning, student and community involvement in school policies and decisions, creation of effective coordination strategies, and professional development (Ainscow et al., 2000). Accordingly, communication can be stated to play a key role in today's educational paradigms. Keeping the communication channels open and managing the communication process transparently facilitate cooperation in education management and problem-solving.

Transforming the education system from a system based on facts and procedures to a system based on cooperation and active problem-solving is the main feature of Education 4.0 (Kin & Kareem, 2019). Education 4.0 sets a different future level for today's generation of students. Technology is changing the production system in human nature. Working in the virtual environment while collaborating on productivity and developing new skills are trends in the emerging technological change in the new era (Kassim & Teng, 2018). School administrators must respond to those needs with sufficient competencies to be effective leaders who can bring schools to the frontier of transformation. The task of a school leader includes setting up systems that increase capacities and forming collaborations to achieve teaching goals (Ng & Chan, 2014). Meanwhile, those collaborative structures support a school enriched in terms of learning by affecting performance positively (Fullan, 2010). The new educational approach provides a school environment where innovations are encouraged, and students are located at the center of this process.

Education 4.0 is believed to empower students in terms of innovations; thus, increasing their success levels and learning outcomes. In addition, as teachers and other professional staff are at the center of the educational community, support and professional development for teachers is crucial in any school development process (Díez et al., 2020). In order to meet the increasing demands for excellence in education, school administrators can become effective leaders by systematically and continuously gaining new knowledge, skills, and abilities through effective professional development programs or interventions (Kin & Kareem, 2019). Having leaders who steer innovation adopt approaches that will keep school stakeholders and themselves open to continuous improvement is important.

Certain competencies exist that school leaders are expected to have in order to achieve school leadership in the context of Education 4.0. Kin and Kareem (2019) summarized those competencies as follows:

- *Communication*: Communication is the social issue in which realizing differences in understanding among parties is the primary priority (Kin & Kareem, 2019). Communication is one of the basic building blocks of educational administration in the new paradigm.
- *Collaboration*: In the contemporary paradigm, education leaders assume school development and effectiveness to be more of a collective initiative than an individual initiative (Kin & Kareem, 2019). In the context of Education 4.0, the school leader is expected to move away from being the sole decision maker and to involve others in the decision-making process in a way that increases the effectiveness of the school (Slater, 2005).
- *Critical thinking*: Critical thinking is a necessary component of school change because school leaders who are powerful critical thinkers can see events from different perspectives (Kin & Kareem, 2019). School leaders who are critical thinkers are needed in the new paradigm.
- *Creativity and innovation*: Creativity is the ability to think differently and design new ideas, methods, materials, products, and actions; innovation involves the creation of new combinations of new knowledge or old insights in order to make a concrete and useful contribution to increasing the effectiveness of the school (Mainemelis et al., 2015). In the new paradigm, school leaders have to be creative and innovative.
- *Decision making*: In the new paradigm, talented school leaders are defined as individuals who can optimize their beliefs, responsibilities, and obligations in order to make the right decisions to minimize negative consequences (Kin & Kareem, 2018).
- *Problem solving*: Since the school leaders are the individuals who spend a lot of time to solve instructional problems at school and whose performance in solving those problems has a visible effect on the academic success of students, leaders are assumed to need the skills to use certain procedures to help achieve those goals (Kin & Kareem, 2018).
- *Entrepreneurship*: Having school leaders be equipped with the competence of entrepreneurship is said to be important as it helps them be sensitive to contextual problems (Kin & Kareem, 2018).
- *Technology*: Although the age of Education 4.0 is all about integrating digital technology, the main task of school leaders with high

Table 1 The features of Education 4.0 and school leadership

The features of education 4.0	*School leadership*
• Emphasis on a collaborative and problem-solving education system	• Creating channels of communication and interaction with school stakeholders
• Focus on innovation in developing of the education system	• Developing the capacity to change in schools
• Benefiting from digital technologies	• Effective use of technology in school management
• Efficiency and continuous learning	• Creating and developing effective education communities
• Less bureaucratic processes	• Strengthening school capacity
• Flexibility, education independent from time and space	• Creating rich and interactive learning environments
• Focus on mentoring	• Developing an effective mentoring system in schools
• Personalized education	• Promoting learner autonomy
• Collective management	• Ensuring participation in decision making in schools
• Digital literacy	• Creating a digitalized schoo culture in a managerial and pedagogical context

levels of digital literacy is how to increase the meaningful use of technology pedagogically (Kin & Kareem, 2018).

Based on those explanations, the features of Education 4.0 and the equivalence of those features in school leadership are summarized in Table 1.

Use of Internet-of-Things in Education Management

In the context of digitalization, changing traditional interaction models is among the main topics of education (Frolova et al., 2020). The Internet of Things (IoT) technology provides new opportunities and perspectives to education in all aspects. In this context, modern education based on digital technologies is a process in which not only knowledge and skills but also self-awareness and personal values are produced (McLay & Renshaw, 2020). IoT technology shows a radical break in educational understanding from our past.

IoT technology challenges the universal success models and reveals new problems and solutions in the field of education as much as it sets the background for the information technologies and communication revolutions of the late twentieth century. IoT can provide meaningful information about how and when students and school staff can access the school (Rodney, 2020). This customized learning process enables students to monitor their performance analytically (Kassim & Teng, 2018). IoT can also monitor students' illnesses, sleep, and general well-being for school attendance and demonstrate proactive approaches that can support parents and school staff (Rodney, 2020). Bagheri and Movahed (2017) stated that IoT technology plays an important role in the following issues: monitoring the learning ecosystem through wearable technologies students use; ensuring school security using classroom registration systems and digital ID cards; monitoring students' health status with smart wristbands or watches; contributing to the creation of the most appropriate physical conditions for learning in the classroom with the help of sensors and reducing training costs by conserving energy; increasing comfort in the education process by creating appropriate physical conditions in learning environments; individualized teaching and learning; increasing student collaboration with mobile devices and virtual learning environments. IoT is thought to change three basic features in the current education system: the reduction of control-based hierarchies, the replacement of financing and standardization-based homeostasis through efficiency, and the more tightly linking educational purpose with student learning (Rodney, 2020). The realization of that change can ensure a quick and effective continuation of the managerial process, emphasize individual assessment, and structure a student-oriented education system.

IoT as a concept works in harmony with various technological structures. Those structures contribute to academic and social planning in addition to monitoring processes. Technological structures are seen to have importance in different fields such as data security, information storage, provision of virtual learning environments, support for individual learning, creation of new pedagogical paradigms, and rearrangement of financial strategies. Various examples are found on the use IoT in educational administration and teaching. Quick Response (QR) codes are one of the most common examples of IoT usage areas. QR codes which are known as a two-dimensional barcodes, are the most frequent and affordable of identification technologies in the world and can store up to 7,089 characters of information (Budak et al., 2018). Those codes are also useful

in associating any resource with an online resource. On the other hand, its weak data security, degradation caused by harsh environments, and read-only capability are the main weaknesses of this technology (Budak et al., 2018). Students can receive academic and social feedback by scanning QR codes with their smartphones (Mershad & Wakim, 2018). Radio frequency identification (RFID) technology is another widely used area in IoT. Unlike barcodes that need to be directed toward a scanner to read, RFID tags can store a larger amount of data that can be quickly transmitted, rewritten, and encrypted many times in addition to being readable without line-of-sight requirements as long as they are within the range of the reader (Budak et al., 2018). Shan et al. (2016) emphasized RFID technology to have become widespread through mobile technologies and to contribute to the individualization of learning, based on students' position. Virtual reality (VR) is one of the technologies whose usage rate has increased in today's educational environments. IoT-supported VR applications enable lesson simulations and the creation of interactive learning environments (Mershad & Wakim, 2018). Artificial intelligence (AI) is the field of computer science that focuses on the creation of intelligent machines that work and react like humans. AI can be applied to support and improve learning in the creation of smart classrooms that take advantage of IoT (Timms, 2016). AI also has the abilities to learn the aspects and types of interactions as well as pedagogically relate them to relevant contexts, to help teachers more clearly, understand students' ways of thinking and to be able to easily direct learning, and to share all the data it collects with relevant stakeholders (i.e., students, teachers, administrators) so that metacognitive approaches and possible areas that need to be improved can be deliberated. On the other hand, blockchain technology is one of the prominent structures with current educational uses. Blockchain technology is associated with many stakeholders in the field of education such as students, teachers, employers, and administrators. Tapscott and Tapscott (2017) stated that educational institutions can benefit from blockchain technology in the following areas: (1) *ID and student records* through secure management of all data belonging to a student enrolled in a training program; (2) *new pedagogy* by managing enrollments and saving data on courses chosen by students and their learning interactions in order to identify learning patterns, improve teaching, and reveal new learning models; (3) *fees and rewards* for planning financial strategies and rewarding students for their achievements; and (4) *upper education institution model* to restructure the

educational institution by bringing together the expectations of students and employers on a common ground. As seen in the relevant examples, the concept of IoT is used in various ways in educational institutions at different levels. Integrating technology into education leads to paradigm shifts in learning and education management. Those changes can be stated to be effective at improving the education and training process.

Conclusion

This chapter which examines current educational management and cultural trends addresses the competencies of twenty-first-century educational leaders, the role educational leaders have in cultural orientations, the differences between traditional management understanding and current management paradigms, the use of technology and leaders' managerial processes in educational administration, and IoT usage that directly and indirectly affect the cultural structure all in the context of Education 4.0. The focal points of the modern management paradigm are improving academic performance, adopting a networked management approach, and designing and adopting innovations and sustainability. The belief in the traditional management paradigm, which is based on school productivity and the stable and static use of resources, has been replaced by microscale development, and school leaders' emphasis on individual development and local needs in this context. Considering that schools are complex social structures, school administrators with traditional roles can be stated to have difficulty adapting to global conditions. In this context, initiating change and reducing resistance to change are within the scope of the roles and responsibilities of school leaders. The formation of a school culture that can adapt to new inputs and the development of this cultural structure are also the responsibilities expected from school leaders. Education 4.0 can also be said to strengthen the specified innovations and make management processes more efficient.

One of the innovations Education 4.0 brings is to adapt IoT to the educational context. IoT technology can provide instant and multidimensional information flow to students, teachers, parents, and administrators. While targets are achieved more quickly and effectively in this context, the use of resources in a school can also be ensured to be kept to a minimum. IoT usage and communications between stakeholders can also be said to be more transparent and quicker. Effectively managing

communication processes through the use of IoT, which has become one of the tools of change, will also contribute to sustainable change.

IoT seems important in adapting developing technology to education. IoT's contributions to the management processes and academic success should not be ignored. IoT is emphasized to contribute to the decrease in the hierarchical structure in the education system, to increase financial efficiency, and to increase students' acquisitions. IoT, which provides educational leaders with new roles and responsibilities, can also be said will speed up information processing and communication processes. This situation gives new perspectives to leaders and stakeholders and clearly contributes to the production of values and the development of culture. Suggestions for schools to be able to support new managerial and cultural trends and adapt more easily to those trends are stated as follows:

- When examining the relevant research, ensuring participation in decision-making in the initiation phase of change is believed to increase all stakeholders' belief in change and their level of adaptability to change.
- Considering that change occurs as a result of cultural development needs, the change in organizational structure should be handled together with the cultural change process. For this reason, having cultural development be at the center of the change process can be considered as a natural result.
- In order for schools to cope with the ever-changing realities and adapt to the era, it seems important that leaders ensure their personal development and keep their knowledge and skills up to date.
- Including adaptation to change, leadership competencies and skills, and cultural change processes in the strategic plans prepared in schools are important in terms of ensuring program integrity.

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New School Designs and Sustainable Development

Beatriz Amann

The United Nations has made societies' commitment to the sustainable development of our planet its main objective, marking 2030 with a total of 17 Goals for Sustainable Development (United Nations, 2015). However, the concept of sustainable development was already defined and valued more than 30 years ago.

In the first place, the initial proposal from the *Teoría del Desarrollo a Escala Humana* (Max Neef, 2006; Max Neef et al., 1986) affirmed a person's fundamental needs to be invariable and finite at all times and places. This theory lists four ontological needs (i.e., living, being, having, and doing) and nine more axiological needs (protection, affection, understanding, participation, leisure, creation, identity, freedom, and subsistence) as the potential needs for improving humans' living conditions. What varies over time and in different cultural, political, and economic systems is how these are satisfied: the means of satisfaction. Thus, social and economic evolution is proposed based on people's needs.

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A year later under the auspices of the United Nations, the Brundtland Commission Report (1987) described the concept of sustainable development as that which meets the needs of the present generation without compromising the capacity of future generations to meet their own needs. Thus, this report added sustainable development to the concept of fundamental need, which described in four dimensions: society, culture, economy, and environment. As Morin (1980) stated, these systems are not independent of each other but rather have an eco-organization of synergies among them.

In this way, sustainability is a necessary characteristic of environmental, economic, and social balance in pursuit of globally improving the quality of life. In this sense, the concept of sustainability refers to environmental quality, social justice, and equitable economy (Aznar & Ulls, 2009). Sustainable development also refers to the processes for achieving this objective. In this way, sustainable development extends the values of human-scale development from present to future generations in such a way that it combines the needs of the human species with the needs for the conservation of biodiversity.

Currently, the possibility of achieving sustainable development is linked to the fourth industrial revolution, also known as the Green New Deal (Rifkin, 2019).

Education for Sustainable Development

In 2002, the United Nations General Assembly promulgated Resolution No. 57/254 under the title "United Nations Decade of Education for Sustainable Development," inspired by the Earth Charter (2002) among others. It presents the role of education as fundamental for achieving the values of sustainability in present and future societies. During the decade between 2005–2014, UNESCO aimed to implement the resolution to achieve its objectives: a globalized education for sustainable development (ESD).[1] This educational proposal seeks to train people in the principal cognitive, methodological, and attitudinal competencies for being able to internalize sustainability values and epistemological principles. In this way, the proposal attempts to incorporate the criteria of commitment and awareness into the school and university curricula with issues such as

[1] In 2012, UNESCO published an evaluation report on the ESD and its implementation.

climate change, biodiversity, or sustainable consumption (Aznar & Ulls, 2009). At the same time, ESD promotes participatory pedagogical models that encourage student motivation and the acquisition of critical thinking. These objectives were once again reinforced in the new roadmap drawn up by UNESCO in 2014 at the end of the decade under "UNESCO Education Strategy 2014–2021" to give continuity to the achievements and promote actions that reinforce creativity and responsible citizenship among students (UNESCO, 2014). In 2015, all United Nations Member States approved the 17 Goals for Sustainable Development as part of the 2030 Agenda (UN, 2015), which establishes a plan to achieve these Goals within 15 years. Goal 4 focuses on ensuring inclusive, equitable, and quality education and on promoting lifelong learning opportunities for all. Sub-Goal 4.7 mentions the need for ESD and Sub-Goal 4.a mentions the need to build and adapt educational facilities that take into account the needs of children and people with disabilities and gender differences and offer safe, non-violent, inclusive, and effective learning environments for all (UN, 2015).

Goal 4 is about improving the quality of teaching and respecting diversity,[2] through pedagogical and curricular innovation on one hand and through the renovation of educational systems that reinforce teachers in the use of interactive methodologies and capacity development on the other. Therefore, the need to promote pedagogies that respect individual capacities and potential is underlined by attending to people's different cognitive and emotional needs and abilities. It requires a mostly extended integral transformation of the current traditional education system[3] (Larrañaga, 2012). Revisions also involve adapting schools and their spatial quality (a question on which this chapter focuses) to allow the described practical innovation; to be respectful of diversity; and to facilitate new communication possibilities, learning, and sharing the knowledge that ICTs provide. All this comes to define the New School, and its relationship with sustainable development as is understood in this chapter.

[2] The new 2030 Agenda approved by the United Nations on September 25, 2015, renews these objectives to guarantee inclusive, equitable, and quality education (UN, 2015).

[3] Traditional education is defined as the teacher-centered delivery of instruction to classes of students who are the receivers of information (one-direction). It focuses academic learning in the subjects of math, language, science, and social areas. This research takes the concept of the traditional school as described in Table 1 of the article *Finding the Contemporary in the Traditional* (Ludwig & LeCompte, 2015).

The New School

This chapter introduces and describes the main features of the New School and the modes of learning from the Education for Sustainable Development. This chapter does not question, analyze, or compare them. It creates a framework for subsequent research that will attempt to objectify the consideration of spatial design as a facilitator of dynamics. That is why building the didactic profile of the New School is necessary from its most representative characteristics.

The twenty-first century has revealed the need to train people for a different purpose. Traditional teaching educates students in technical knowledge. The transformation that our planet is undergoing (Rifkin, 2019) has the relevant consequence of educating students in other competencies called soft skills (Schulz, 2008). Soft skills prepare people for real transformation scenarios in which they will have to face new problems and needs, for which sustainable development is essential. New pedagogical dynamics as project-based learning accompanies this new focus (Dewey, 2000).

One precursor of this new focus is the NGO Design for Change, which develops a pedagogical framework that provides tools for facing challenges to change the world (Ashoka, n.d.). In addition, different pedagogical proposals at various latitudes (Brown, 2009; Gray, 2015; Hernando, n.d.; High Tech High, n.d.; Immordino-Yang, 2015; OWP/P Architects, VS Furtniture, Bruce Mau Design, 2010; Secretaría de Innovación y Calidad Educativa, 2017; The LEGO Foundation, 2017; Wilson et al., 2013) have developed the following characteristics that can be qualified as coincident to the learning modes that the New School proposes: learning through projects, student autonomy, learning through competences, diversity in dynamics and activities (group and individual), collaborative processes, promoting creativity, play and motivation as learning resources, and the need to activate all senses.

Space Considerations in Education

Attending, again, to the human-scale development theory (Max Neef, 2006; Max Neef et al., 1986), the architecture participates as a satisfactory means of attaining certain fundamental individual needs. In this theory, dwellings satisfy the combined condition for protection and living; meeting spaces achieve part of the combined need of affection and being;

public recreational spaces, environments, and landscapes achieve the leisure-living duo; and the areas of formative interaction such as schools, colleges, and universities fulfill the combined goal for understanding and being.

This statement requires considering architectural space in social processes as something fundamental. The sociology of space as developed in the urban sphere (Gehl, 2011; Leal, 1997; Sennett, 1996) establishes that any social restructuring entails a revision of spatial qualities.

The sociology of spatial attributes (Leal, 1997) assumes space to organize our perceptions of social phenomena and to have a structuring character. However, despite the different nuances that various authors have developed in this field (Castells, 1996, 2009; Giddens, 1991; Gottdiener, 1994; Harvey, 1989; Kern, 1983; Leal, 1997; Lefebvre, 1976; Sennett, 1996; Simmel, 1908), space from the perspective of sociology is not conceived as something physical. It is a relational conception of social interactions. In other words, space is not accepted as an absolute reality but rather in its relationship with the temporal dimension.

Perkins (1957) observed that the architect who plans a school center would not have to think about future users of the building. He would have to think about the work that the building should help undertake with the full development of each students' potential at the center. Designers may be able to contribute to achieving educators' objectives by creating an educational environment as a tool for the teacher and an expression of the school's educational approach. They may be able to develop a state of mind that helps the student in each learning task and may be able to make the school a place the student wants to enter, an exciting and inspiring setting.

Recent studies on neuroeducation (Mora, 2013) that assume a holistic approach on the psychology of space (Moles & Rohmer, 1998) have established a direct relationship between the spatial qualities (topological, functional, material, and morphological) and learning. The designed space can be considered as a physical reality able to facilitate ESD. From the point of view of spatial quality, this premise elevates the relationships among educational space, school space, and pedagogical action. Thus, the research tries to qualify the sociological approaches of spatial attributes and the psychology of space to detect the design criteria for school space that can accompany the development of ESD. In other words, the main

objective of this chapter is to identify criteria for designing reactive spaces and to facilitate a pedagogical model that promotes ESD.[4]

Methodology

The presented research uses an inductive methodology that works with a specific analysis tool: the Mirregan-Todorov Method for Architectural Criticism (Miranda, 1999). This work uses the fourth stage of this method, which has already been proven and recognized (Amann, 2015, 2016), to set the evaluation criteria of the sample. This phase is known as poetic criticism and carries with it the previous stages of description, analysis, and interpretation.

A complex of large systems makes up a designed spatial object. Five stand out among these that are necessary or sufficient: topology or geometry, program or function, material or construction, morphology or shape, and context or conditions. This study also includes the educational context subsystem. These systems are not autonomous but interactive. These synergies and frictions between systems are what determine the character of a designed spatial object (Amann, 2015), in this case a school.

Poetic criticism delves into these interactions by extrapolating binary comparisons between systems and then returns to the complex vision of the totality.

This methodology has already been applied to the same objective with representative results. The present research takes that as a basis (Amann, 2016) for enabling a comparison. This comparison qualifies the process of the spatial evolution of educational spaces that have been attempted in ESDs over the last decade.

Selecting Interactions and Evaluation Criteria

A complete poetic criticism would lead to 30 interactions resulting from the combination of the aforementioned spatial systems with one another. This study develops only the systems that respond to the research objectives; these are taken as evaluation criteria of the research sample.

[4] For these purposes, see Morawietz's (2014) review of ESD objectives as a pedagogical model.

Topology System

This system studies the space dimensions (i.e., number of students, movement possibilities, flexibility of the space, isolation possibilities, and versatility to engage different environments), the arrangement of its elements (i.e., how many elements it has, how they are positioned, are the elements fixed/mobile, can they be transformed, are they manipulable, do they have axes [relationship between the position of the teacher and students, relationship of students' position to one another, position of the door related to the elements]), and their scale.

Function System

This system studies the uses of space (i.e., is it used for unidirectional, bidirectional, or multidirectional communication; is it participatory, collaborative, individual, or group oriented; does it promote autonomous learning; does it use ICT), the functional flows (i.e., are they dynamic or static, is the space versatile, do the circulations respond to routine schemes), the available furniture elements (i.e., tables, chairs, cabinets, recreational elements, corners, and sports elements), and how they work (i.e., are they static/fixed, dynamic/malleable; do they allow evolution; are they manipulable in terms of age, do they open, and are they adaptable).

Material System

This system studies lighting (i.e., is it natural/artificial, what is its intensity/color/arrangement), environmental health conditions (i.e., humidity/temperature conditions, natural/artificial ventilation), and the finishing materials (i.e., textures, warmth, substance, and recycled/recyclable).

Morphology System

This system studies the space's shape (i.e., does it have angles or curves, is it open/closed, regular/irregular), color (i.e., monochrome/polychrome, is the color white predominant, does it have a thematic range), and aesthetic quality.

Context System

This system studies the educational model (i.e., educational context subsystems); its cultural, social, and economic conditions; and boundary conditions.

Research Sample

In order to identify the criteria for the spatial design of New School educational centers that promote ESD development, this research selects three international schools representing these education models (i.e., participatory and interactive pedagogies that promote individual motivation, autonomy, critical thinking, creativity, responsible citizenship, respect for diversity, emotional abilities, and cognitive potential; the inclusion of sustainability values; and the use of ICT) as the sample. These schools were built during the 2010–2020 decade, which is within the framework of the objectives of UNESCO and the UN on developing ESD (UN, 2002, 2015; UNESCO, 2014).

The case selection follows three criteria that favor the methodology: (a) schools at different educational levels; (b) schools at different latitudes and from different cultures; and (c) schools that attempt pedagogical models following the New School and the values of ESD.

Additionally, the study works on specific and updated sources (Casqueiro, 2014; Dillon et al., 2016; Dudek, 2007; Dwight et al., 2016; Nair, 2014; Nedved & Zámečníková, 2014; Perkins & Kliment, 2001; School Buildings and Design Unit, 2003; Verstegen, 2008; Wright & Beard, 2006). The sample cases are as follows.[5]

Vittra School Brotorp[6]

Location: Brotorp, Sweden. Founded: 2012. Educational stage: Elementary School and Middle School. Pedagogical model: Swedish Educational System. Designer: Rosan Bosch.

[5] The tables identify the following selected cases: Case A—Vittra School Brotorp; Case B—Ramat Chen Arts & Science Elementary School; Case C—West Academy of Beijing.

[6] Architectural space reference: Rosan Bosch Studio: http://www.rosanbosch.com/.

Ramat Chen Arts & Science Elementary School[7]

Location: Ramat Gan, Israel. Founded: 2014. Educational stage: Elementary School. Pedagogical model: Ramat Gan Educational System. Designer: Sarit Shani Hay.

West Academy of Beijing (WAB)[8]

Location: Beijing, China. Founded: 2019. Educational stage: Secondary and High School. Pedagogical model: FLoW21 (WAB, n.d.). Designer: Rosan Bosch.

Results

The results from applying poetic criticism to the studied sample are presented in a total of six subsections taking into account the axes of interaction between the previously established systems. The interpretation of the results allows each case to advance the design criteria for a reactive space of the pedagogical model (EDS).

Design Criteria for a Reactive Space in the Pedagogical Model (EDS)

Design Criteria from Studying the Interactions Between the Educational Context-Topology Systems (see Table 1)

All spaces are potential spaces for learning. In this sense, spaces are also projected. Spatial structures are as flexible as possible because the entire space is considered space for pedagogy. Learning does not just happen in the classroom. This fact appears strongly in the circulation spaces that become an extension of the class, as referenced when talking about learning streets (Hertzberger, 2008).

The scale of the elements is with respect to the scale of the student. Changes are perceived in the design linked to the EDS pedagogical models. The interior design, very inclusive, suits the proportions of the space to the age of the users. It also adapts the scale and ergonomics of the furniture.

[7] Architectural space reference: Sarit Shani Hay Studio: http://shanihay.com/.

[8] Architectural space reference: Rosan Bosch Studio: http://www.rosanbosch.com/.

Table 1 Sample of the results from the interaction between the educational context-topology systems

Educational context-topology interaction			
	Flexibility of the spatial structure	*Scale relationship spatial elements-users*	*Learning space development surface*
Case A	• Circulation spaces as an extension of the classroom space • Organization of spatial structures in circulation spaces to promote participatory pedagogical activity	• Ergonomic adaptation of elements to the age of the users • Scale of furniture by zones	• Combination of transition corners between classrooms and communal space: individual learning spaces • Multiplication of spatial typology as the classroom space coexists with the new proposed spaces (in circulations) • Different types and dimensions of classrooms according to activity: individual or participatory
Case B	• Appropriation of communal space (access) for pedagogical and participatory activity	• Ergonomic adaptation of elements to the age of the users	• Access to the center is a large-area social and creative play space organized into four activities: – Large magnetic whiteboard – Psychomotor – Auditory – Reading
Case C	• Circulation spaces as an extension of the classroom space • Appropriation of the communal space for pedagogical and participatory activity • Circulation develops moments of learning	–	• Different types and dimensions of classrooms according to the activity sought: individual-participatory or exploratory-reflection • Large classrooms that allow movement and diversity of activity

Meanwhile, the dimensions and heights of the windows, doors, sinks, mirrors, shelves, and switches enhance students' initiative, participation, and autonomy.

The need for a larger development surface that allows movement. The promotion of learning through creative play, social interaction, and natural expression requires a large space that allows movement. It is about fostering a broader catalog of places and corners, some for collective activities and others in which concentration and individual learning are possible. Educational models consistent with ESD promote collaborative work in both large and small groups for cognitive development. Therefore, the need exists to design spaces that can accommodate activities such as dialogue and criticism, negotiation, approachability, and problem-solving. In this way, designers increase the dimension of the classroom and the fluidity of the communal spaces. The traditional one-chair-and-table-for-each model is replaced by the flexible learning environment that allows diversity, movement, and opportunities with the aim of developing twenty-first-century skills.

Design Criteria from Studying the Interactions Between the Educational Context-Function Systems (see Table 2)

Adapting the spatial program to the educational model and specific contextual needs. The internal usage structure is where the interaction between a specific pedagogical system and the spatial quality of the designed space is detected. In the case studies analyzed, spatial diversity refers to complex educational uses that work on different forms of learning. In this sense, the interaction between the educational context and function is essential. Designers develop spaces that enable a specific form of the learning experience. The traditional teaching model supports its passive way of learning using a space designed with a rigid and orderly structure, while the educational model of the New School relies on a flexible environment at the programmatic level for its development. This flexibility does not refer to an open-space plan but to a collective space where teachers and students choose where, when, and how they learn. A rigid space does not limit pedagogy anymore. The appearance of a series of *landscapes for learning* or new uses can be defined that respond to the educational needs of ESD:

Table 2 Sample of the results from the interactions between the educational context-function systems

Educational context-function interactions	
	Usage adaptation
Case A	Programmatic adaptation occurs through spatial diversity: • Collaborative space • Individual learning space • Cluster space • Debate space • Space for project development • Multipurpose space
Case B	Spatial proposal adapted to Learning by Playing and the character of the center focused on five areas: • Visual Arts • Theater • Music • Dancing • Science
Case C	Spatial proposal adapted to the FLoW21 pedagogical model that requires flexible, diverse, and variable spaces in order to be achieved: • Learning-focused • Development of self-directed learners • Concept-based curriculum • Inquiry-driven learning • Academic and intellectual thinking • Preparing for volatility, uncertainty, complexity, ambiguity (VUCA) • Vertically phased, essential competencies • Competency-based progression • Transdisciplinary, interdisciplinary, and multidisciplinary learning • Co-constructed & personally relevant curriculum • Real-world, connected, practical learning • Individualized schedules/timetables • Individualized instruction and teaching • Vertically and horizontally flexible & variable learner groups • Continuous personalized feedback and reporting • Collaborative teacher planning • Collegial coaching and mentoring • Team teaching • Adaptive support network for all learners

Landscape for oratory. The spatial design allows a student or teacher to address a group and share their ideas.
Landscape for introspection. The spatial design allows individual concentration and reflection.

Landscape for the collaborative process. The spatial design allows work in small groups to develop a collaborative exploration.
Landscape for the unexpected. The spatial design allows the succession of unexpected and variable activities that inspire and motivate the learning moment.
Landscape for movement. The spatial design integrates movement as a principal factor in the learning activity.

Design Criteria from Studying the Interactions Between the Educational Context-Material Systems (see Table 3)

The physical characteristics of the materials as an element of stimulation. Space design can combine light, color, textures, sound, smell, and temperature to achieve a microclimate conducive to learning, one that is stimulating, surprising, comfortable, and familiar. The environment that arises from a school's central-space design can be added as a pedagogical tool, adapting both to the pedagogical model and to each teaching figure. The New School seeks to stimulate the five senses (The LEGO Foundation, 2017). Traditional learning uses only the senses of sight and hearing. However, putting the rest of the senses at the service of education gets the whole brain working. The better a student can synchronize their senses on a moment of attention, the better they learn. In this way, students move through space using all their senses, because a changing environment invites them at the level of stimuli to move differently and activates the senses. Thus, using natural light whenever possible is mandatory. Additionally, changes in lighting can indicate spaces that have different activities. Meanwhile, designers use sound-absorbing materials to minimize or help adapt to the impact of noise. According to the psychology of color and sensory activation, the use of chromatics is fundamental. Lastly, the tactility of the materials invites the student to interact in a variety of ways (some textures are suitable for rest and reflection while others activate movement).

Using the physical characteristics of materials as an element of action. Educational models that represent ESD values and criteria operate with multiple forms of exploration and representation. These pedagogies integrate visual arts as an instrument for cognitive, linguistic, and social development. To enable this active form of learning, space (i.e., its furniture and equipment) must be capable of hosting activities such

Table 3 Sample of results from the interaction between the educational context-material systems

Educational context-material interactions			
	Material as a stimulus	*Material as action*	*Technological development*
Case A	• Good natural lighting in classrooms • Symbolic use of color: use of color in the spatial elements proposed in the circulation • Proposal of different textures for various activities: projects, reading, games (from wood to textiles)	• These elements are combined for usage diversification: – Wood (natural or lacquered in color): furniture for projects and debates – Textile-carpet: in living areas (steps) – Textile-upholstery: in individual study spaces – Artificial topography in circulation spaces: ramps to encourage movement	• Use of ICT: – Widespread use of tablets and laptops, also outside the classroom (personal research spaces)
Case B	• The materialization encourages the stimulation of the senses and the feeling of belonging • The symbolic use of color as a sign; the use of color psychology (black-white grid floor that invites physical movement, or reading corners in green for a relaxing effect) • Diversity of elements depending on the proposed activity (reading and socializing corners that combine tables, shelves, and drawers) • Well-lit space: dynamic space • Use of sound-absorbing elements to enable a diversity of uses	• A single space uses different materials and colors to characterize diverse activities: – Grid surface for movement in front of interactive screen – Reading and socializing corners that combine wooden structure and the comfort of textile in the seats – The dimension of the space creates intimacy and favors socialization – Audiovisual corner with sound-absorbing material – Magnetic cloth for collective wall decoration	• Use of ICT: – Large format, interactive screen – Audio corner (large screen equipped with audiovisual technology that allows interactive play, auditory play, and movie viewing)

(continued)

Table 3 (continued)

Educational context-material interactions			
	Material as a stimulus	*Material as action*	*Technological development*
Case C	• Symbolic use of color with a large color palette that characterizes the activity spaces (math classroom - chess grid) • Use of textiles as sound-absorbing elements to enable the diversity of uses and environments (library, introspection booths, steps, and floor for presentation and debate) • Use of natural light with a focal lighting design that supports a specific activity • Diversity of furniture elements depending on the proposed activity	• For the diversification of uses these elements are combined: – Natural wood: provides comfort to the environment at specific moments – Lettering laminate surface-work surfaces that work as whiteboards – Textile-carpet: in living areas that require good acoustics (public speaking steps) – Textile-upholstery: in spaces where good acoustics and focused attention are required – Lacquered metal: flexible and exploratory furniture elements	• Use of ICT: – Widespread use of laptops in all areas of the school, except in the exploration area – Screens for audiovisual projection in circulation spaces

as theater, music, painting, construction, and sports. This conditioning factor also directly affects the need to design environments with versatile and specialized surfaces.

Linking design strategies to technological development and sustainability. Learning incorporates ICT naturally. The design of the space integrates technology usage as a context and learning resource from a humanistic perspective. As a result of the COVID-19 pandemic, this

condition acquires increasing importance due to education incorporating the mixed face-to-face, virtual online formats at high speed.

Linking design strategies to environmental sustainability. The research was unable to prove this condition, instead of adding it as an inherent duty to ESD. Design strategies of the New School must promote the use of materials with a sustainable path, both in the manufacturing and assembly process as well as in their useful life and versatility. The sustainable development of the planet will thus be integrated not only in students' education but also in the space developed for it.

Design Criteria from Studying the Interactions Between the Educational Context-Morphology Systems (see Table 4)

The morphology of the interior design of the school becomes a landscape for learning. As already mentioned, pedagogies following the New

Table 4 Sample of the results from the interactions between the educational context-morphology systems

Educational context-morphology interaction	
	Morphology as a learning landscape
Case A	• The interior circulation space is a landscape of diverse topology not only in the material but in its volumetrics, ramps, and perspectives
Case B	• Interior circulation of space is a landscape of diverse topology not only in the material but in its volumetrics, ramps, and perspectives: – Reading corner: wagon-style wooden cubicles – Audiovisual corner: cylindrical cubicle that visually represents a drum – Theater corner: stage – Physical activity: well-defined flat surface on the ground
Case C	• The interior space creates differentiated landscapes based on well-defined morphologies: – Reflection corners: individual work-places, capsule-like swings – Small group workspace: two-level structure of open cabs – Oratorial space: steps – Exploration space: mathematical classroom with moving objects for improvising scenes – Collaborative thinking-space: flexible furniture-space for producing collaborative activities

Table 5 Sample of results from the interactions between the topology-function systems

Topology-function interaction	
	New spatial uses
Case A	• Use of circulation space as a space for relationships or Learning-street: space for learning and collective/individual work • Generously sized circulation space • Design of specific elements for the circulation space: new topologies (steps, special furniture) • Converting the linear element of circulation into a path of activity and interaction
Case B	• Access ceases to be an institutional and representative space, becoming a recreational and collective learning space
Case C	• Transforming the linear element of circulation into an active route suitable for movement, exchange, and educational activity at different levels (individual, group, free, and guided) • Use of circulation space as a space for learning outside the classroom • Generously sized circulation space that invites free movement • Design of specific elements adapted to the organic structure of the circulation space • Minimization of topological compartmentalization: elements help to organize space and flexible/versatile usage

School and the EDS model require new learning spaces that the traditional educational model does not contemplate. The new, more advanced models seek to create a total-learning space. In order to achieve this, both the layout and content of the school space become protagonists of this change. School architecture can be a learning landscape. In this space, each element formalizes a pedagogical stimulus, and the interior and exterior of the classrooms create strong connections. Sometimes even the limits between the class and the circulation area disappear or become transitional spaces that host other activities (See the series of **Landscape** sub-headings and the *Design Criteria from Studying the Interactions Between the Educational Context-Function Systems* section previously in this chapter).

Design Criteria from Studying the Interactions Between the Topology-Function Systems (see Table 5)

New ways of learning lead to modified usage of certain spaces and elements. The circulation space or corridor becomes a space for relationships (i.e., a learning street; Hertzberger, 2008) and a space for both collective and individual work. In this way, learning continues outside the classroom. To enable this action, the design of the communal circulation space has great importance in design projects for school spaces that develop a pedagogical model following the values and criteria of the New School and ESD. However, these spaces acquire more dimension. Meanwhile, designers plan topology in detail; they no longer have to design a linear structure but can develop more stimulating, more organic geometries. In addition, the projects include both materials and furniture that promote the activities proposed in each case. However, learning streets are not the only spatial structure that modifies its use. Sometimes precisely interrupting the continuity of the relationship space, steps are secondly found to be a transition space, as opposed to stairs that join separate floors of the building. This topological element is not new, but its function is. Recent school architectures use these slopes as a meeting place for equals to encourage children to understand this space as an element of rest and not just as a circulation structure. The design uses generous dimensions, diverse geometries, and warm materials such as wood or textiles that help create an environment of comfort. Designers propose these spaces for activities such as public speaking, the development of free work, or social exchange.

Design Criteria from Studying the Interactions Between the Context-Function Systems

Understanding schools as a sociocultural facility. This criterion is closely related to the sociocultural and economic contexts, which is essential to include in this list due to its correspondence with the development of ESD values and criteria. This criterion proposes the school center as a facility that provides service not only to the students but also to the community. Incorporating cultural facilities for the neighborhood can stimulate the integration, inclusion, and respect for diversity that ESD promulgates in addition to the capacities and values of its specific use. In this sense, this design criterion is presented as a desirable condition.

General Design Criteria from a Complex View

In the previous points, the research listed possible criteria for designing reactive school spaces in educational models related to the values of the New School and ESD. These criteria are inferred from the study of synergies between pairs of systems that make up a school architecture. Next, the research will return to the complex vision of the totality to highlight two essential criteria.

Multifunctional spaces structure the school center. The space for the New School and EDS is versatile in its dimensions and proportions; in other words, they are suitable for adaptation. To achieve this, the plan is designed flexibly and openly, and designers use multipurpose material for its construction, cladding, and surfaces, as well as furniture elements. Thus, the spaces are organized with light structures that allow mobility and transformation in different situations and ways of learning. In addition to this ephemeral condition of the spatial organization, the design adds adaptive lighting and acoustic conditions linked to the criteria of sustainability and energy saving.

Designing spatial conditions of the school to attract attention and be an active element of the learning process. As Hertzberger (2008) stated, space design can set spatial units of appropriate dimensions to accommodate proper types of relationships among users. In this sense, how space is articulated is a decisive design factor. For example, this condition determines whether the created space will be suitable for the activity of a single large group or if it will be suitable for use by several different and smaller groups, or even individually. The more articulated the space, the smaller the spatial unit. And the more focal points there are, the more activities can be exercised simultaneously by different groups of users. Several elements allow the construction of an articulated and balanced space: the ramps and steps, the focal points, doubled heights, and crossed views, the control of light and acoustics, or the arrangement of materials. These all influence the use of space.

Applying poetic criticism to the design of school centers has led to the following general conclusions. A correlation exists between the educational model and the school space that hosts it, and the interaction between the educational context and spatial design occurs bidirectionally. Thus, the development of a specific educational model requires an

accordant school space, and its construction results in promoting diverse stimuli for learning. This implies that establishing reactive design criteria of the corresponding pedagogical model for a designed space appears possible. When applied to the case of the New School, a series of qualities can be indicated for the reality of the school space that, by themselves, will positively accompany the development of pedagogies following the values and criteria of the New School and ESD.

Discussion

The results provided by this research establish that a careful interaction between education and the design of spaces leads to the development of school centers that strengthen the pedagogical proposals of contemporary, innovative, and advanced educational models that reflect the title of the New School. Space designs follow an ESD in which the main conditions stimulate students' creativity, critical thinking, autonomy, and cognitive and emotional capacities, as well as participatory and collective actions in balance with the moments of individual reflection and education in sustainable developmental values.

A correlation can be established in the relationship between the pedagogical model and the spatial quality of the educational space. In this sense, the research achieves the objective of identifying design criteria for a designed space that activates pedagogical models related to ESD.

Learning spaces/landscapes can be indicated as being able to activate the occurrence of learning. The design of these spaces is principal in each student's learning experience. That is also why these spatial landscapes must be dynamic and flexible with respect to the diverse and specific needs of each student and learning stage.

This research confirms that learning spaces can become active promoters of the educational journey as part of the ecosystem of the educational model, leaving behind the traditional structures of one-way pedagogy. Physical spaces can be designed and adapted to support a contemporary pedagogy, focusing above all on the development of skills.

Limitations of the Study

The strength of these conclusions in turn becomes the limitations of the work. Thus, the point of the discussion appears. The values and criteria of ESD speak of sustainability, creativity, diversity, interactivity, and participation. These are values that, according to the results obtained in this work, are directly translated into flexible, versatile, and multifunctional design spaces. Nonetheless, normative conditions can be specified for New School designs. The design criteria are necessarily open and flexible precisely because the educational model with which it seeks correspondence is also open and flexible. The design criteria do not condition the space when they don't establish a space without preconditions in the sense of avoiding any structure that stiffens it. The possibility of establishing a series of design criteria for the construction of educational spaces seems to set a correlation between the physical reality of a place and its specific educational function. This work indicates that a spatial design is an element that activates a response in the user. Space requires the user to be activated and thus needs to be perceived. Therefore, its role is to be a reactive element that consciously influences users' perceptions.

Conclusions

The obtained results show that, in the New School context, both students and teachers understand the space from new potentialities that look for innovative interactions. Learning does not occur linearly. Therefore, the educational place considers complexity and richness to support learning experience and understanding. School and its spatial design become a place for experimentation, perception, exploration, and non-hierarchical relationships. The spatial environment induces functions that facilitate movement and promote the efficient execution of tasks.

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Twenty-First-Century Teacher Competencies and Trends in Teacher Training

Arife Gümüş

Many studies have expressed the central position teachers have in successful education. Teachers' personal and professional characteristics are critical for students' learning, harmonious communication skills, and adaptation to the requirements of the age in which one lives, starting with self-adaptation. With digitalization accelerating and technology having become an important part of daily life these days, significant and rapid changes are experienced on social and global scales. Efforts to improve education systems and transform them with radical reforms in order to healthily respond to technology-centered rapid changes constitute the agendas of many countries from different economic levels. The organization of teacher education is a central issue in efforts to improve and strengthen education systems. Considering the importance education has both in ensuring society's adaptation to the changing conditions and in countries' efforts to reach local strategic goals, many studies are found on teachers' responsibilities and the skills they should have in order to fulfill these responsibilities.

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Expectations about teacher competencies have been important in every period of world history. The proficiency criteria created with different motivations have also been determinant regarding teachers' social status, responsibilities, and areas of authority. Societies' values, priorities, goals, and economic structure have been among the determining factors in perspectives on teachers and what is expected from education in every period of history. However, because digitalization these days has impacted these determinants, the issue of education in general and teachers in particular has to be addressed under new dimensions. Repositioning all individuals and institutions involved in the organization of education to take and reviewing educations' basic concepts and theories have become essential. As an important issue of the period when this study was written, the COVID-19 pandemic has been a period when all studies have analyzed digitalization in the field of education and the new functions education should have. Changes in many areas such as new forms of communication, the transformations in the classroom and the school, the diversity of educational resources, the flexibility of curricula, management styles, learner profiles, and parent profiles have led to discussions on how to develop and update teachers' skills. What makes a good teacher? What makes learning meaningful and relevant? Which learning methods and principles are critical for an employable generation to achieve the economic level wanted by society? What constitutes the main motivation for today's teacher competencies? What knowledge and skills teachers have and should have and in which educational atmosphere will they use their knowledge and skills are fundamental questions. Therefore, teachers can be said to be faced with an unusual proficiency scale, both for the healthy functioning of education and for the ability to manage the skills students are expected to have in the future.

While the new forms of relationships established in the twenty-first century have completely reconstructed education, teachers are also evaluated according to the competency standards formulated as twenty-first-century skills. The Organisation for Economic Co-operation and Development (OECD) views twenty-first-century skills as critical for keeping up with the new forms in the knowledge-based society and ensuring employability in the new economic order (OECD, 2009). Reform studies in education have become inevitable for responding to the new social and economic needs of society.

Overcoming the Challenges of the Digital Revolution in Education Systems

The way the digital world presents information, particularly with the great impact artificial intelligence (AI) technologies have on all informational processes, has created a new learning environment. This learning environment, which points to a certain spatiality in the current education literature, has gained a new dimension in the digital world. This world represents unlimited, multilingual, multicultural truths defined with different motivations and has created new areas of discussion not only about the learning environment but also on critical issues such as the nature, sources, and truth of knowledge. While online learning processes have been vital for the continuation of education during the COVID-19 process and are an important practice for the future of learning environments, they are also a test process that has revealed new areas of discussion. By containing important clues about the physical conditions of tomorrow's school and classroom, this experience obviously will also be a pioneer in matters such as how to create and present education curricula.

The relationship information technologies establish with education is actually a reflection of the entire society on education. When dealing with education, today's learners prefer the new learning style known as digital learning. Therefore, knowledge management and the ability to problem-solve using computers have become mandatory for today's learners (OECD, 2016). New technologies have students residing in an area constructed with an unlimited variety of learning tools where they keep everything at their fingertips and are able to easily access different cultures, beliefs, and information. Students' ability to easily access unlimited information resources can be both an advantage and a disadvantage. It has the potential to turn into an area where students can increase their desire to learn and facilitate their learning or, when not managed properly, can be an area that exposes them to harmful content and causes them to fail at managing their time. Contrary to expectations, Internet addiction, having become a significant issue for adults, may adversely affect the opportunities of digital learning because, while some studies show families expect the Internet to increase their children's academic success and future job opportunities (Ortiz et al., 2011), other findings show youths to use technology for entertainment rather than school responsibilities (Becker, 2000). Teenagers use the Internet for games, chatting, and social networks; a significant increase in technology use has occurred

among young children as old as 8 (Schleicher, 2019). Among the subjects studied is the effect technology use has on students' imagination and learning skills. In particular, some studies have shown handwriting to be more effective in the development and productivity of the human brain than typing with a keyboard (Beringer, 2009; Bounds, 2010). As a result, the type of technology and its use can be said to determine its effects (Bavelier et al., 2010).

Social media accounts as the entertainment centers of technology are among the new learner profile's areas of difficulty. Spending more time on social media accounts can negatively affect students' social life, health, and academic success. Opposite these disadvantages are also found advantages such as encouraging independent learning, making learning fun, enabling students to plan their life by providing access to education without going to school, preparing students for the future, facilitating and encouraging learning together, and saving time accessing information (Aggarwal, 2000; Bhakta & Dutta, 2016). This process has turned into a challenge for students and made having teachers balance students use of technology inevitable as their primary goal.

The distance between theory and practice is seen to have narrowed in the learning process through new technologies. The theoretical structure of curricula will become open to practical areas by taking advantage of technology's opportunities. People and institutions will be able to transfer concepts and theories to the classroom with more accessible evidence beyond books and other written sources. Abstract topics that are difficult to grasp will become easier to understand and learning will become more enjoyable. Both national and international sharing will become possible. As new learning styles for students, these changes will also become sources of new teaching styles for teachers. These changes require teachers to be more prepared and more versatile than ever and will force them to plan their lessons on a national and international scale by collaborating more with students and colleagues in the learning-teaching process.

Social media is a powerful communication tool of the digital world and has significantly changes society in many ways. In particular, changes in language, culture, values, and lifestyle are areas of change that can be observed with the naked eye. Profiles with multiple followers, known as influencers in social media, can present themselves as role models offering identities, fashions, and lifestyles for young people and even adults (Alpaydın, 2018). For this reason, having representations of information, people, ideas, values, and facts on social media that the education

system wants to place in the world of students for raising awareness has become inevitable (Alpaydın, 2018). Teachers will need support in order to attract the attention of their students who listen to fun, lively, and colorful speakers through social media channels and to produce materials in a style and content appropriate to the students' jargon (Fullan & Langworthy, 2014).

Saying the knowledge-intensive economy is the main motivation for the education system reforms of the twenty-first century would not be wrong because education is an important investment tool in human capital. When considering the great importance human capital has for a society, the process we are in is one in which we have to meticulously analyze the type of educational understanding in which the future workforce should be trained. The educational policies designed today are critically important for sustainable and strong economic growth. In this respect, the general perspective in Turkey focuses on providing in-demand vocational skills and quality to this vocational training to prepare people for the labor market. Turkey's educational policies are seen to be shaped according to this perspective, and the demands from families develop in this direction (Taşdemir et al., 2019). The workforce of the future being an important determinant in education planning is inevitable. However, robots with artificial intelligence will obviously have a greater place in production in a knowledge-intensive economy. The process we are going through requires preparing for future professions that do not exist yet and also reveals that some existing professions will become useless over time. Taşdemir et al. (2019) stated that people will have difficulty working in the same sector or doing the same job for a long time in a period where creatively destructive processes and sectoral shifts will be experienced much more frequently. Therefore, raising a society with the skills and equipment is essential for ensuring its adaptation to these structural changes. Here, the main responsibility is generally given to education systems, particularly to teachers. Bozgeyikli (2019) stated that teachers should aim to provide their students with the ability to learn any skill quickly and effectively rather than specific professional knowledge.

Based on the studies conducted after individually discussing the basic motivations of twenty-first-century skills (Applied Education Systems [AES], 2019; Partnership for twenty-first-Century Learning [P21], 2015; Trilling & Fadel, 2009; Wagner, 2008), learners' twenty-first-century skills can be listed as follows (Fig. 1).

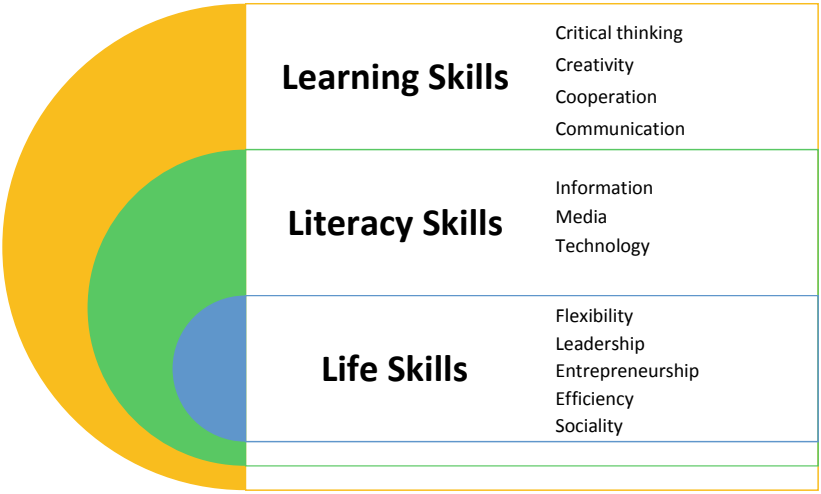

Fig. 1 Twenty-first-century learner skills

As an opportunity of new technology, easy access to information can cause an information overload for learners who access too much information at once. The need obviously exists for new skills in accessing, evaluating, and organizing information in the digital environment. In order for learners to survive information overload, they must develop the capacity to make correct inferences, strong analyses, and accurate evaluations. Critical thinking skills are essential for this, allowing one to be able to evaluate issues from different perspectives and gain interdisciplinary learning ability (P21, 2015). While creativity expresses thinking outside the box and being open to innovations (Brookhart, 2010), collaboration means effectively working with others in harmony by creating a common goal and working harmoniously toward that goal (AES, 2019). Communication as a learning skill refers to speaking with others about ideas, solutions, questions, and problems clearly and understandably. Both OECD' 2030 Learning Compass and the Council of Europe's Recommendation CM/REC (2018) highlight learning and higher level thinking, socio-emotional skills, and creativeness. The OECD 2030 Learning Compass identifies these competencies as key to meeting the hardships of a unsteady, uncertain, and complicated world that uses

digital mediums and artificial intelligence (Council of Europe, 2013; OECD, 2018).

Information, media, and technological literacy are critical for students' to be able to distinguish reality from fiction, access correct information, and reach necessary and useful information.

Life skills are important for students' academic development, social life, and personality development and include flexibility in adapting to changing conditions; not making change an obstacle; setting goals, establishing a team in line with these goals, and collaborating with the team; being entrepreneurial in making projects, strategies, and plans on one's own; being efficient in completing work on time; meeting with others around common goals or benefits; and forming networks (AES, 2019).

Schools are central in learners acquiring twenty-first-century skills. Both families and students need school support regarding adapting to change, efficiently and effectively using technology, and preparing for the future because families' technological literacy and ability to receive and organize information may be insufficient. However, the fact that access to technology still requires a certain level of welfare is another limitation. When schools cannot provide sufficient support in this sense, the inequality gap in the society may widen. In general, school and teacher performance will be effective in reducing inequalities and highlighting the advantages of technology use (Gottschalk, 2019).

Twenty-First-Century Teacher Qualifications

Concepts such as information processing, reasoning, questioning, critical thinking, and problem solving in relation to twenty-first-century skills include some familiar skills that have been at the center of school learning for many years while the basic framework of teacher competencies is determined by the characteristics of qualified teachers and what competencies they need (European Commission, 2013). Changes in social life, economy, and educational environments are compelling motivations for what qualifications teachers should have.

Many studies are found to specifically have tried limiting the competencies twenty-first-century teachers should have (Darling-Hammond, 2006; Landmann, 2013). Importantly, many of these studies have confirmed the point of convergence between teacher education and the needs of schools to often lay in teachers' competences (Day, 2002; Landmann, 2013). The global reality fraught with social and technological changes forces one to

rethink schools' role in the future and which skills twenty-first-century teachers should possess.

The impact of information and communication technologies is remarkable in terms of twenty-first-century skills. When teachers have better problem-solving skills in environments with good technological opportunities, students also have better problem-solving skills and performance in math (OECD, 2019a). The focus has always been on the powerful effects teachers' competencies have on student achievement. The effects from teachers explain 75% of the effect school has on student achievement (Rivkin et al., 2005). Therefore, teachers' effective use of new technology in the classroom will also effect both students' skill development and turn disadvantage into advantage by producing alternatives for students with longer more challenging learning processes.

Being a good learner is among the most basic needs a teacher should have. This is the prerequisite for students' learning, creativeness, and openness to development and change. Having teachers strengthen their teaching practices, monitor innovations in their field, and share these effectively with their students is critical in terms of having students adapt to areas of change such as the above-mentioned changing social life, new student profile, changing educational environment, and new economic order.

Various studies have been carried out globally by institutions and countries' ministries of education on twenty-first-century teacher skills. The European Commission (2005) stated within the framework of European Qualifications in its report "Common European Principles for Teacher Competences and Qualifications" that education and training contribute to the economic and cultural aspects of the information society and therefore should be seen within their social contexts. According to the report, teachers should be able to (Table 1).

The European Commission draws attention to the fact that pre-service training will not be sufficient for teachers to gain the qualifications stated here and that teachers must acquire a professional lifelong learning habit aimed at professional development. In this direction, the European Commission shared the following recommendations with policy makers and practitioners:

Table 1 "Common European Principles for Teacher Competences and Qualifications" that education and training contribute to the economic and cultural aspects of the information society

Work with other people	They work in a profession that must be based on social inclusion values and nurture the potential of every student. They need to be knowledgeable about people's growth and development and show self-confidence while relating to other people. They should be able to work with students as individuals and encourage them in becoming wholly engaged and active constituents of society. They must also be able to work in ways that increase the collective intelligence of students and collaborate with colleagues to improve their own learning and teaching
Work with technology	Teachers should be able to manage various types of knowledge. Their training and vocational development should qualify them for accessing, analyzing, verifying, reflecting on, and communicating information as well as for using technology effectively where appropriate. Their pedagogical skills should allow them to create and manage learning environments and maintain the intellectual freedom of choice in the education process. Their confidence in applying information and communication technologies (ICT) should enable them to incorporate it efficaciously into learning and teaching. They need to be able to mentor and assist students in networks where knowledge can be discovered and created. They should have a good understanding of subject knowledge and view learning as a lifelong journey. Their practical and academic skills should also enable them to understand from their own experience and match a large variety of teaching and learning strategies with students' necessities
Work with society	Teachers should facilitate the integration of students into the communities in which they live and encourage students to take responsibility globally as EU citizens. Teachers should encourage them to respect different cultures, be open to cooperation, and observing common values. For this, it is important for teachers to understand the reasons for social adaptation and exclusion. Teachers are expected to have a strong collaborative tendency in order for social harmony and education with all its elements to work efficiently. Their experience and mastery should also enable them to provide quality assurance systems

Source European Commission (2005)

1. The teacher must be equipped.
    - It is important that teachers have graduated from a higher education institution or equivalent. It is critical that those who become teachers in the field of basic vocational education are qualified and have the necessary teaching skills.
    - To secure their place in the European higher education arena and to increase opportunities for career advancement and mobility within the profession, teacher education programs should be offered in all three cycles of higher education.
    - Practices based on evidence and research should be encouraged for the development of new knowledge about education and training.
2. The teaching profession should be viewed as a process that includes initial teacher education, starting in a job position, and maintaining professional development.
    - Aiming to ensure the continuous development of teachers, subject-based and pedagogical education-oriented activities for lifelong learning should be planned. The content of initial and continuing professional development programs should reflect the importance of interdisciplinary and collaborative approaches to learning.
3. Mobility in the teaching profession should be encouraged.
    - Mobility projects for teachers are an integral part of initial and continuing professional development programs. Mobility should be facilitated and encouraged for all teachers.
    - It is important that initial and continuing professional development programs are supported by European cooperation knowledge and experience so that teachers can respect and value cultural diversity and train their students to be EU citizens and responsible for all humanity.
    - Opportunities to study European languages, including the use of specialist vocabulary, should be available and encouraged during initial teacher education and in continuing professional development programs.

- It should increase trust and transparency in teacher qualifications in order to increase the possibility of mutual recognition and mobility in Europe.

4. Teachers should work in partnership with other stakeholders.

    - Cooperation between institutions where teachers will be employed and higher education institutions that train teachers should be increased. In order for the education process to be carried out effectively and efficiently, the development of innovation networks on a global and local scale should be encouraged.

Teacher competencies indicated in research on measuring and teaching twenty-first-century skills that twenty-first-century teachers should have are shared in four groups:

1. Ways of Thinking

    - Creativity and innovation
    - Critical thinking, problem solving, decision making
    - Learning to learn

2. Working Tools

    - Information literacy
    - Information and communication technologies literacy

3. Ways of Working

    - Contact
    - Collaboration/teamwork

4. Life in the World

    - Local and global citizenship
    - Life and career
    - Personal and social responsibilities

Teachers' thinking skills, relationship with knowledge, problem-solving skills, and innovative attitude are seen as necessary competencies for teachers to be able to develop strategies in accordance with students'

situations and learning environment and for meaningful learning to take place. Since teaching is characterized by ambiguity, teachers need adaptable mastery, such as the capability to adapt their plans and practices to fulfill students' learning requirements (Hatano & Oura, 2003; Vogt & Rogalla, 2009). Using information literacy and information communication technologies correctly within the scope of working tools is important for accessing and organizing information as well as distinguishing the right information and being a producer of information in the unlimited world that information communication technologies provide in accessing information.

Communication skills form an important part of teachers' skill sets, and their being inclined toward cooperation/teamwork is critical for them to be able to perform the requirements of the profession. Strong awareness of the impact the stakeholders in the learning field have on meaningful learning emphasizes the importance of gaining the habit of working collaboratively in proportion to a teacher's communication skills. The ability of the learning atmosphere to offer safe, flexible, innovative, and rich content is closely related to how good a team leader a teacher is. Therefore, having teachers cover all roles by fully understanding and distributing the potential of the whole team starting with themself is important (Caena, 2017).

Having teachers maintain their professional development is very important both for increasing educational performance and effectiveness as well as for increasing teachers' commitment, identity, and job satisfaction. Teachers also need to be able to keep up with scientific, pedagogical, and technological developments in their world; to closely follow the needs of a society in constant change; to seek the best for their world; and to view serving society as a responsibility.

Studies on twenty-first-century teacher competencies (Darling-Hammond & Bransford, 2005; Feiman-Nemser, 2001, 2008; Geijsel et al., 2009; González & Wagenaar, 2005; Hagger & McIntyre, 2006; Hatano & Oura, 2003; Kelly & Grenfell, 2004; Krauss et al., 2008; Mishra & Koehler, 2006; Williamson McDiarmid & Clevenger-Bright, 2008) have shown the main motivation of competencies to be increasing people's employability in the twenty-first-century economic structure. These studies show promoting technology-supported learning in a knowledge-intensive economic structure to be a priority for teachers.

International measurement tools (e.g., Programme for International Student Assessment [PISA], Teaching and Learning International Survey

[TALIS]) and studies such as the Bologna Process and the European Higher Education Area, as well as societies being more demanding about education, encourage policy makers and practitioners all over the world to improve the quality of education. In particular, the establishment of international competence frameworks by institutions such as the European Commission and OECD, and the emphasis on the critical role teachers have in educational success have brought teacher education reforms to the agenda.

The Effects of Twenty-First-Century Teacher Competencies on Teacher Education

Increasing employability in competitive economic structures that can adapt to the changing world, equipping countries' workforces with global competitiveness, and the foreseen requirements of future professions have forced countries to reform teacher education. The literature on various models of teacher education in different parts of the world provides content on the reforms and policies being pursued in the field of teacher education. Examples of policies are found in the literature such as teacher recruitment, recruitment procedures, and school-university cooperation (Akiba, 2013; Bruno-Jofré & Johnston, 2014; Darling-Hammond & Lieberman, 2012; Darling-Hammond & Rothman, 2015; Livingston & Flores, 2017; O'Donoghue & Whitehead, 2008).

Current debates on education have brought significant changes to the nature of the teaching profession. Technological pedagogical knowledge has also been added to discussions on content knowledge and pedagogical knowledge (Baumert et al., 2010; Shulman, 1987). The framework of technological pedagogical content knowledge (TPCK) argues effective technology integration for teaching specific content or topics to require understanding and negotiating the relationships among technology, pedagogy, and content (American Association of Colleges for Teacher Education, 2010).

The influence of international organizations and publications has been significant in the discussions on updating teacher training. Organizations draw attention to the problems experienced in world education systems through annual reports and also publish policy reports on how to deal with these problems. As one of these institutions, OECD (2019a) proposed an education model in a report on teacher education. The document shared information on the steps and content suggestions for

pre-service and in-service teacher trainings and presented suggestions on the structure and functioning of the institutions. OECD proposed organizing teacher training on two main axes (i.e., pre-service and in-service training processes). The steps of pre-service education consist of initially selecting teacher education, development through initial teacher education, and introduction to teaching. OECD recommended making the profession attractive to candidates when they initially select teaching as an education and choosing the most suitable candidates among those selecting the profession. After the pre-service teacher is included in the process, preparatory programs must be presented in a high-quality manner so as to equip them with the things they need to know and do during the initial teacher education. The third step of the pre-service training is the certification and recruitment of new teachers during the introduction to teaching. OECD emphasized the need for higher education reform to support new teachers in the first years of their profession as one of the two important steps of in-service training. The second important step is professional development.

Today, OECD's teacher education model shares common features with the models drawn up by many countries for teacher education strategy documents and has been adapted to the teacher education systems of Australia, Japan, Netherlands, Korea, Norway, and United States (OECD, 2019b).

Another study (European Commission/EACEA/Eurydice, 2021) showed the current situation of teachers in Europe handled within the framework of twenty-first-century skills. The report focused on teacher preparation, continuing professional development, and analyzing the current situation in Europe.

Requirements such as teachers' content knowledge, pedagogical knowledge, communication skills, information organization, and leadership in line with twenty-first-century teacher skills classifications mean teachers must have a high level of education. In the 2008 Report on Teacher Education in Europe, the European Trade Union Committee for Education (ETUCE) believed today's teachers should receive a master's degree in order to fulfill what is expected of them. After the 1970s in Finland, teachers' having a master's degree was adopted among teacher requirements except for preschool due to the understanding of teachers focusing on research, critical thinking, and scientific skills in teacher employment as a requirement for university-based education; preschool and kindergarten teachers are required to have a bachelor's degree

(Shalberg, 2010). Finnish teacher education is in line with the European Higher Education Area (2009) framework, which has been built under the continuous Bologna Process. Currently, Finnish universities offer a two-cycle degree program. The three-year compulsory undergraduate program is followed by the two-year graduate program. These two degrees are presented in multidisciplinary programs comprising of studies in at least two subjects. Studies are counted by credit units within the framework of the European Credit Transfer and Accumulation System (ECTS), which is used in 46 European countries. ECTS is built on the assumption that 60 credits measure the amount of work of a full-time student during an academic year, and each ECTS credit corresponds to approximately 25–30 study hours. Teacher training standards are 180 ECTS credits for a bachelor's degree, followed by 120 ECTS credits for a master's degree. Successful completion of a master's degree in teaching (including a bachelor's degree) usually follows five to seven-and-a-half years. Finnish teachers with master's degrees are entitled to engage in postgraduate studies to support their professional development. Many teachers make use of the occasion to pursue doctoral studies in education, often while at the same time teaching at school (European Commission, 2013).

A qualified teacher education requires theoretical and practical vocational education in addition to academic subjects. According to TALIS 2018 results, around 70% of all teachers in the EU reported having received training in all three basic elements (subject content, general and subject-related pedagogy, and classroom practice). Nevertheless, this rate was below 60% in Spain, France, and Italy. The new generation of teachers (under 35 years old) seem to benefit more from extensive teacher training in comparison with the general teacher population. In the EU, 75% of young teachers have completed formal education or training including all three basic elements (European Commission/EACEA/Eurydice, 2021). The teaching practice has been recognized as an integral part of the teacher education curriculum for preparing teachers based on the major reform initiatives to strengthen teacher education in China. The plan is to have pre-service teachers practice teaching for at least 18 weeks (equivalent to one semester) under the supervision of teachers selected for their strong understanding of duty and rich experience. Turkey has always given importance to practical experience in teacher education. In

Turkey, teacher candidates can go to schools as interns, make observations, and teach under the supervision of an experienced teacher for the sake of school experience, usually from 2nd grade onward.

Pre-service teacher education has similar characteristics around the world. Pre-service teachers learn the relevant discipline and follow courses in educational sciences and vocational education (Robinson & Mogliacci, 2019). The impact twenty-first-century skills have on teacher education can be traced in general terms through a country's policies. In particular, information and communication technologies are central in almost all countries. Policy makers and teachers are aware that education systems cannot keep up with or cope with the changes brought about by the digital revolution.

Strengthening teachers' digital skills through in-service training is available in almost every country's education strategy documents. TALIS 2018 revealed 93% of secondary-school teachers in EU countries to have participated in at least one type of professional development activity in the 12 months preceding the survey. Before COVID-19, teachers often followed a course/seminar in person, read professional literature, or attended an educational conference (European Commission/EACEA/Eurydice, 2021). When examining the three proficiency areas of the general teaching profession prepared by Turkey's Ministry of National Education (MoNE), they can be said to be largely compatible with international standards. Although no direct expression of competence for digital skills is found, MoNE has conducted an interdisciplinary project for teachers of mathematics, science, physics, chemistry, biology, Turkish, social sciences, and geography courses in the 2023 Education Vision Document that was shared with the public in October 2018. This document stated that face-to-face workshop training will be given in areas such as 3D design and smart devices (MoNE, 2018a). Developing content for improving digital skills and providing teacher training to increase teachers' digital skills are among the 2023 Education Vision targets. MoNE aims to use digital materials as the main teaching material, to associate digital materials with printed materials, and to provide support materials to teachers regarding their effective use. According to the 2023 Education Vision Document, leading teachers to develop digital learning materials will be supported and encouraged (MoNE, 2018a). The development of teachers' language and technology skills are found among the common goals of the last five years in MoNE's (2018b) in-service training programs. China pursues policies that rotate teachers

between urban and rural schools to overcome problems of quality disparities in teaching power. In order to ensure the quality of teaching, the practice of assigning assistant teacher educators at schools was designed (Li et al., 2019). China plans financial incentives to encourage the teaching profession, especially for rural people to be able to access quality education. In China, the state tries to correct the imbalance by taking measures to improve the quality of teachers in rural areas. The most striking of the large-scale in-service teacher training projects China has initiated is the National Education Project for Secondary and Primary School Teachers implemented in 2010 with significant funding from the central government. Two sub-projects were carried out within the scope of the project: one for training reform and innovation examples and the other for producing teachers equipped for rural schools. In total, 18 institutions and educational institutions have signed contracts to offer training courses ranging from 10 to 15 days for 27,000 school teachers in different status such as branch teachers and classroom supervisors. New Zealand organizes in-service programs focusing on core competencies in teacher education (European Commission, 2013).

Mobility is recognized as an important requirement in teacher training. According to a report from the European commission (European Commission/EACEA/Eurydice, 2021):

- In 2018, a minority of teachers (40.9%) in the EU went abroad at least one time in the course of their career, either as students, as teachers, or both.
- From 2013 to 2018, more teachers were able to experience transnational mobility. According to the available data, teacher mobility between European countries/regions increased by 16%.
- Compared to Reading, Social Studies, Science, and Mathematics teachers, foreign language teachers are the most active. However, approximately 30% of the foreign language teachers who participated in the survey have never gone abroad for professional purposes.
- Being mobile during study years is related to being mobile later on as a teacher. In all European countries included in the analysis, it was observed that teachers who were active during their initial teacher education tended to remain mobile later on.
- EU programs are an important source of funding for teachers' transnational mobility.

- Few countries, such as Western and Northern European countries, are able to implement national funding programs that support teachers to spend time abroad for professional development. It has been observed that participation in transnational mobility is higher in countries that organize programs that encourage teachers to go abroad for their professional development.
- Although there is a consensus that transnational mobility contributes to teachers' development of various competences and therefore should be encouraged, only a small proportion of teachers in Europe have gone abroad for professional purposes. In 2018, only 40.9% of teachers in the EU were mobilized at least once as a student, teacher, or as both student and teacher. In the Northern and Baltic countries of Czechia, Cyprus, Spain, the Netherlands, and Slovenia, teacher mobility is above the EU level. From 2013 to 2018, teacher transnational mobility increased in all 17 European countries for which data were available.

Within the scope of measures to increase teacher qualifications, the European Commission (2013) report mentions the filter system among the policies implemented by countries to increase teacher qualifications:

- Teacher candidates are subjected to national exams in countries such as Croatia and Slovenia.
- Interviews happen in Malta; orientation and/or consultancy practices occur in Austria.
- In the Netherlands, selective national accreditation processes ensure the competence and quality of new teachers.
- Belgium has two competence frameworks in teacher education: one for careers for experienced teachers and one for core competences for beginners. The main purpose of these qualifications frameworks is to provide a guide for professional development, improve quality, create a common language, and promote teachers' awareness of their responsibilities and professional self-development.
- In a teacher qualifications study in Turkey (MoNE, 2017), field knowledge and field education competencies were added to the general competencies instead of specifying a separate field competency for each teaching field, thus creating a single holistic text that includes the competencies for each teacher in their field. The general

competencies of the teaching profession were updated in this context and consist of three interrelated and complementary competency areas: professional knowledge, professional skills, and attitudes and values. These three areas cover 11 competencies and 64 indicators related to these competencies. Turkey has attempted many different applications in teacher education and has started implementing the interview system in the recruitment processes alongside the national selection exam. In the process of starting the job, candidates perform teaching practices.

– Teacher competencies in China are determined by 61 indicators listed under three dimensions: teacher ethics, content knowledge, and professional competence (Lo et al., 2013, p. 246).

Finland has two stages in the process of choosing a primary school teacher. In the first place, a group of nominees is selected according to the results of the proficiency test, the high school diploma awarded by the school, and the record of their extracurricular achievements. Secondly:

1. Nominees take an essay test from the Pedagogy books given to them.
2. Nominees participate in an observed clinical activity that mimics school scenarios where social interaction and communication skills play a role.
3. The best nominees are interviewed and asked to explain why they choose to be a teacher. These highly talented nominees complete a thorough teacher education program with sponsorship from the government (Shalberg, 2010). Strategies for collaborative and problem-based learning, reflective practice, and computer-assisted education are common to all Finnish universities.

Results

This study deals with twenty-first-century teacher education and skills and has shown changes in contacting knowledge has changed teachers' positions and what is expected of them. The rapid access to unlimited information resources as an important benefit of digitalization and the changes in social life have impacted all societies. The people and institutions involved in organizing education have also been significantly affected by this change. Learning environments, schools, classrooms, student profiles, parent profiles, and school management have all been

affected by this change. As such, education systems reforms have focused on adapting technical facilities to education. Important responsibilities have befallen schools, in particular teachers, for adapting learners' profiles to the changing world and their employability in new business structures. In countries like Turkey where families have low access to technology and are limited in its use, schools and teachers should obviously also take on the responsibility for combating this inequality.

Teachers are expected to set time aside both for their own learning as well as for their students' learning by encouraging the effective use of technology with the aim of improving students' individual learning speeds. Not perceiving the relationship between education and technology to be limited to information exchange and acting by paying attention to the importance of safe and beneficial technology uses are among the important responsibilities teachers have in character development.

Having teachers take new learning environments into account is imperative when they organize and prepare their lessons. The new learning environment expresses one that is diverse in many aspects (i.e., multinational, multicultural, multi-component, multifaceted, and nourished by different value judgments) and no longer considers anything with a single function to be remarkable. In such an environment, the teacher should be aware of sharing the role of teaching with the digital world.

Considering teacher education from a realistic perspective is important in order to be able to reach the desired goal regarding teachers' changing position and the skills they should have. When examining the relevant literature, twenty-first-century skills appear as a guide in teacher education in almost all countries. Although saying that clear syllabuses exist in practice is difficult, the strategy documents are seen to have been created with a strong perspective on twenty-first-century skills. Information and communication technologies in particular have been the focus of these studies. The common feature in teacher education reform studies is a focus on any of the processes involving pre-service teaching, starting a job position, or in-service teaching. However, the teacher training system includes all pre-service, recruitment, and in-service processes. Having policy makers and practitioners consider the issue from this perspective is important. Determining qualification standards without a strong implementation should be noted as being meaningless, and having institutions act collaboratively both in determining teachers' skills and in organizing teacher training should be considered essential.

When training a qualified teacher, having teacher educators obtain at least a master's degree or doctorate, have experience in the field, have national and international mobility opportunities, and have positive salaries and work conditions is important. Attention has been drawn to issues such as providing continuous professional development opportunities for teachers who have started their profession, improving work conditions, and ensuring social acceptance of the importance of their profession. However, supporting new teachers in matters such as lightening their curriculum, participating in guidance programs, facilitating their access to necessary support resources, providing the opportunity to systematically link theory and practice, and consulting with their colleagues while providing that their wages are preserved is important. In teacher trainings, having mentors who are qualified and experienced specialist teachers should be encouraged both in pre-service and in in-service training.

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