EDUCATION 4.0, INNOVATIVE PRACTICES IN HIGHER EDUCATION AND COVID-19

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Nadya Velinova-Sokolova. EDUCATION 4.0, INNOVATIVE PRACTICES IN HIGHER EDUCATION AND COVID-19

The fourth industrial revolution (Industry 4.0) triggered by the development of information and communications technologies (ICT) provides a baseline for smart automation, using decentralized control and smart connectivity (e.g., Internet of Things). The impacts and importance of Industry 4.0 are reflected in all aspects of our lives. A lack of digital culture, training, knowledge, and language are also challenges faced by Industry 4.0 while implementing its operations. Education 4.0 is a desired approach to learning that aligns itself with the emerging fourth industrial revolution. For universities to continue to produce successful graduates, they must prepare their students for a world where these cyber-physical systems are prevalent across all industries. The innovative activity of the educational process is specific and quite complicated, requires specific knowledge, skills, abilities. The purpose of this article is to present the connection between Education 4.0 and innovative practice in teaching, and the impact of coronavirus on higher education.

Key words: financial education, innovative education method, the distance education, COVID-19.
INTRODUCTION

Educational psychologist Jerome Bruner’s (1966, 1973, 1977, 1986) structuralist views on knowledge and education provide a practical corollary. He contends that a person actively constructs knowledge by relating new information to a previously acquired frame of reference, called the coding system. Knowledge is an active process that requires learners to code information into storage systems for future retrieval and use. Bruner asserts that the problem with memory is not storage space, but retrieval. The best coding systems for efficient retrieval are expressed in terms familiar to the learner. As the learner master’s domains of knowledge through discovery, she re-codes the storage system to make it more generic and thus more useful.

To find successful examples of alternative pedagogies, one has only to look to graduate business education where these teaching methods dominate. Instruction is often rooted in authentic, real-world situations making use of rich and complex interdisciplinary cases and/or consulting work. Graduate students have the opportunity to work in groups and engage in meaningful functional tasks. The textured nature of real cases demonstrates to graduate learners the importance of multiple perspectives and considering all sides to every problem. The small group format is often used to give graduate students the opportunity to reflect on their projects and then to talk to the professor in shared learning environments. Professors model the skills to be taught by sharing expert thinking with students and by coaching them which entails more collaboration than evaluation.

The educational system development must be based on the modern advanced concepts, implementation of the new pedagogical technologies, scientific and methodical achievements inside the teaching and educational process, creation of the new system of educational information support. The qualitative result of this process can be achieved through the usage of actual methods, tools and techniques of the scientific knowledge array acquirement. In such context, the innovative methods provide the educational unconventional character, as they lead to the efficiency improvements of the educational process.

Nowadays, under the conditions of intellectual society development, innovative methods qualitatively exceed classical methods. They integrate processes, which cannot be united within the classical education: teaching, employment, career planning, continuing education. That’s why, the key of successful transformation of educational system from classic into innovative, is first of all the formatting of the strategic thinking of future professionals, realization of individuals, qualitative knowledge transfer from pedagogue to student and their rational usage.

The innovative activity of the educational process is specific and quite complicated, requires specific knowledge, skills, abilities. Implementation of the in-
Innovations is impossible without teacher-researcher, teacher-innovator, who has systemic thinking, developed ability to creativity, developed and conscious willingness to innovations. Educators-innovators of such type are called the educators of innovative direction, they are characterized by clear motivation for innovation, crystallized innovative position, ability not only to be included into the innovation process, but to initiate them by itself.

Today, the strategic task of educators-innovators is the effective educational motivation for students, which will remove the teaching strain, create the bilateral teacher-student contact, assist to practically assimilate the acquired theoretical knowledge, increases the self-identity. We believe that the effective motivation first of all is the correct selected education methods, which encourage students for teaching and effective usage of their knowledge.

I. METHODOLOGY

The methodology used is based on general scientific methods of scientific knowledge – analysis and synthesis, as well as on specific methods – the systematic approach, the historical approach, the method of comparison and the abstract-logical method. The information base of this study is the results of large studies of international professional organizations and by scientists on development on education and the impact of coronavirus on higher education.

II. EDUCATION 4.0

In general, Education 4.0 is an institute of believed that promotes intelligent and smart thinking in education. Education 4.0 promotes education differently, mainly by consuming technology-based tools and resources. This means that students will not learn to use textbooks, pens, and essay teachers in traditional classrooms. Instead, Education 4.0 allows remote students to access the Internet and enroll in courses through a variety of open online courses, video chats, or voice calls to learn more dynamic material about the same students. You may not learn as much as you do. The characteristics of education systems can be outlined in the Table 1 (Thi Lan Anh Vu, 2018).

Education 4.0 was recognized as a respond to Industry 4.0, greatly increasing the use of Internet technologies and cross-communication tools. In fact, Education 4.0 uses intelligent school management systems, learning management software, communication tools, and other teaching and learning tools. Personalized learning with Education 4.0 promotes understanding and allows students to reach really interested, more professional and memorable materials. It also means that students can become interested professionals. General education 4.0 allows stu-
students to achieve better learning outcomes based on real scientific or professional interests.

This is the most important goal of Education 4.0 for all educational institutions: to encourage students and improve students’ learning outcomes. Students are the main stakeholders of the educational ecosystem and are the main beneficiaries of the educational ecosystem.

Education 4.0 treats students as beneficiaries as before. Using technology, students can connect in a better way with many other stakeholders in the system, better communication with teachers, parents and management. Student learning outcomes are directly proportional to the level of implementation of Education 4.0.

Higher education in the Fourth Industrial Revolution (HE 4.0) is an open, rational and dynamic door that can change the thinking of society and upgrade the living standard of the people. The fourth industrial revolution was triggered by counterfeiting and altered the working environment in the central workplace. Peter Drucker said in 1997 that the university would not survive and higher education is in serious danger. The university campus as an institution will not survive. The current dormitory is completely inappropriate and completely redundant.

Table 1. The characteristics of education systems

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<thead>
<tr>
<th></th>
<th>MEANING IS.......</th>
<th>TECHNOLOGY IS.............</th>
<th>TEACHING IS DONE...............</th>
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</thead>
<tbody>
<tr>
<td>“Download” Education 1.0</td>
<td>Dictated</td>
<td>Confiscated at the classroom door (digital refugees)</td>
<td>Teacher to student</td>
</tr>
<tr>
<td>“Open Access” Education 2.0</td>
<td>Socially constructed, usually with aid of Internet access</td>
<td>Cautiously adopted open access (digital immigrants)</td>
<td>Teacher to student and student to student (progressivism); Internet resources are a normal part of learning activities</td>
</tr>
<tr>
<td>Knowledge Producing Education 3.0</td>
<td>Socially constructed and contextually reinvented knowledge</td>
<td>Everywhere (digital natives in a digital universe) for ubiquitous knowledge construction and transmission</td>
<td></td>
</tr>
<tr>
<td>Innovation Producing Education 4.0</td>
<td>Built through selective individual and team-driven focused innovations practices</td>
<td>Always changing with the direct input of learners acting as a major source of tech evolution in the service of innovation production</td>
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</table>
The current innovative and leadership-based learning objectives introduced by Education 4.0 have made the transformation obligatory from traditional classrooms of the industrial society to creation of digital classrooms. This transformation will embrace digital curriculum that might impact learning outcomes and reduce in-class management.

The Fourth Industrial Revolution makes three major changes namely intellectualization of human and machine, virtualization of the real and virtual, and hyper connection of human and things. This revolution brings about changes in future society due to technological progress. Technological progress includes infinite increase in data as well as explosive growth of network. This technological progress will bring increase in value of data and according to these changes the future society will evolve toward role change between humans and machines. In particular, we need to note the increasing data value, which will become more important in the near future.

The future education direction is to create a leading country of intelligence information society with creative fusion talents. This change trend also redefines the objectives of future of education in the following reflected ways:

1. Education to maximize student interest and aptitude
2. Education for thinking, problem-solving, and creativity
3. Customized education considering individual learning ability
4. Education to raise key talents in intelligence information technology
5. Education to focus on people and contribute to social integration.

These chain changes will develop intelligence learning platform to support activities for advanced learning according to individual interest and level and create a core personnel specializing in intelligent IT that is capable of leading

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**Source:** Thi Lan Anh Vu (2018), Building CDIO Approach Training Programmes against Challenges of Industrial Revolution 4.0 for Engineering and Technology Development and Author.
new industries. The content and areas of teacher competency development are summarized in Fig. 1.

![Fig. 1](image)

**Fig. 1.** Teacher competency development for educational innovation.

*Source: Göker Süleyman and Göker, M. (2019). Rethinking Innovative Learning Opportunities for Teachers in Educational Organizations toward Education 4.0.*

The huge transformation in learning and teaching models, digital classroom, and educational contexts will bring a radical change in teacher behaviors. For the teachers to change, creation of reflective learning communities is required together with a redefinition of the meaning and scope of teacher supervision. Such a change would only be possible through development of new coaching skills, which would require development of reflective and cognitive skills of the teachers themselves and peer coaching environments to be able to survive and cope with their adaptation to Education 4.0 within the educational contexts. Serving teacher development and collaboration for better learning and teaching, this model will also change teacher behaviors and it will help reshaping.

There is no clear definition of an ‘innovative teaching method’ in professional literature because of the ambiguity of the term ‘innovation’. In existing approaches ‘innovation’ presupposes the following characteristics of innovative teaching techniques:

1) they make use of scientific and technological achievements;
2) they have come into practice relatively recently;
3) they presuppose active forms of student involvement and techniques to assess students’ competencies and digestion of course units.

The emergence of the Internet and technological advances have also favored the adoption of several pedagogical approaches (online training, flipped classroom, blended learning, etc.) aimed at improving teaching. These ongoing innovations in the way we teach and learn require us to rethink and transform the model of integrating technologies into teaching in order to achieve intelligent collaboration and coordination of physical and/or virtual actors at the service of education.

The main difference between innovative and traditional teaching techniques is that the first are aimed at developing practical skills and competencies, they reveal so-called ‘implicit’ knowledge of students, identify the most important environmental factors and foster decision-making ability in dynamic economic environment.

III. INFORMATION TECHNOLOGY AND HIGHER FINANCIAL EDUCATION

Education is one of the sectors experiencing the most rapid impacts of the Industry 4.0 because the education itself will create new versions of the following revolutions. Revolution 4.0 promises to provide new changes to education and training activities, transform traditional training objectives and models by transferring and training completely new knowledge. Information technology development, digital tools, connected network systems and super data will be good tools and facilities to change ways of teaching organization and methodology. Traditional classrooms with drawbacks including costly organization and limited serving spaces that are inconvenient to particular learners will be replaced by online and virtual classrooms (Lubbe, 2016). The quality of online education can be easily regulated by assisting tools, such as sensors and network space connectors. Learning spaces will be more varied, instead of traditional laboratories or simulations, learners will experience learning with virtual spaces, with interactions in true-like conditions through software’s and network systems. Big data will be unlimited data resources for analysis, trend identification or business prediction with high precise. Digital learning resources in the condition of connecting real and virtual spaces will be of full plenty. Library spaces will not be a particular place, but they will be able to be operated anywhere with very simple actions. Academic curriculum will also be more variedly and particularly designed and will better satisfy learners’ demands (Thi Lan Anh Vu, 2018).
Education 4.0 is a response to the needs of IR4.0 where human and technology are aligned to enable new possibilities. Fisk (2017) explains that the new vision of learning promotes learners to learn not only skills and knowledge that are needed but also to identify the source to learn these skills and knowledge. There are nine trends related to Education 4.0 (Fisk, 2017).

✔ First, learning can be taken place anytime anywhere. e-Learning tools offer great opportunities for remote, self-paced learning. Flipped classroom approach also plays a huge role as it allows interactive learning to be done in class, while the theoretical parts to be learned outside the class time.

✔ Second, learning will be personalized to individual students. More practices will be provided. Positive reinforcements are used to promote positive learning experience and boost students’ confidence about their own academic abilities.

✔ Third, students have a choice in determining how they want to learn.

✔ Fourth, students will be exposed to more project-based learning. Students are required to apply their knowledge and skills in completing a couple of short term projects. By involving in the projects, they are practicing their organizational, collaborative and time management skills which are useful in their future academic careers.

✔ Fifth, students will be exposed to more hands-on learning through field experience such as internships, mentoring projects and collaborative projects.

✔ Sixth, students will be exposed to data interpretation in which they are required to apply their theoretical knowledge to numbers and use their reasoning skills to make inferences based on logic and trends from given sets of data.

✔ Seventh, students will be assessed differently and the conventional platforms to assess students may become irrelevant or insufficient. Students’ factual knowledge can be assessed during the learning process, while the application of the knowledge can be tested when they are working on their projects in the field.

✔ Eighth, students’ opinion will be considered in designing and updating the curriculum.

✔ Lastly, students will become more independent in their own learning, thus forcing teachers to assume a new role as facilitators who will guide the students through their learning process.

Apart from the advantages brought about by Industry 4.0, there is a great deal of problems posed to education sector that require universities to solve in the coming time. In the first place, the foundation of Industry 4.0 is the relationship between reality and vitality through IT software’s, digital tech and network
connections; therefore the knowledge and skills of IT and digital tech play a very important role to IT suppliers and consumers. The responsibilities of universities in the coming time are to provide adequate number of IT experts, equip graduates with relevant digital tech knowledge and skills to meet the society requirements in the Industry 4.0 (Thi Lan Anh Vu, 2018).

The educational methods, which practically help to realize for students their knowledge are using in higher education system and they are: meetings with famous practices, world well-known professors, “professional training”, students work in different industrial laboratories and technological parks. There are excreted the main two classification systems of training methods, which characterize educational system, without taking into account the modern requirements of informational society development (Table 2).

<table>
<thead>
<tr>
<th>The classifications systems</th>
<th>Features</th>
<th>Components</th>
</tr>
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<tbody>
<tr>
<td>Traditional system of the educational methods classification</td>
<td>types of students educational work oral, written; lectures, independent, outside lectures;</td>
<td></td>
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<tr>
<td></td>
<td>general teaching methods collective, group, individual;</td>
<td></td>
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<tr>
<td></td>
<td>source of knowledge, skills and abilities lecture, document analysis, work with legislative basement, usage of visual aids and internet sources;</td>
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<td>degree of independence and the character of students participation in the educational area active, interactive, passive methods of education;</td>
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<tr>
<td></td>
<td>level of sustainability and innovation traditional, classical, custom. Innovative;</td>
<td></td>
</tr>
<tr>
<td>Current system of the educational methods classification</td>
<td>methods that ensure mastery of the learning process verbal, visual, practical, reproductive, problem search, inductive, deductive;</td>
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<tr>
<td></td>
<td>methods that stimulate and motivate the teaching and research activities educational discussions, problem situations, professionally-oriented business games, creative tasks, search and research, experiments, competitions and quizzes;</td>
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<tr>
<td></td>
<td>control and self-control methods in educational activity survey, test, exam, control papers, tests, questions for self-control.</td>
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Universities undertake training activities in accordance with the two directions: on the one hand, they should meet the social orientation; on the other
hand, they provide labour forces to satisfy the requirements of the labour market. However, the pressure to universities is higher when the training curriculum is not only able to meet the high expertise in particular majors, but also the interdisciplinary knowledge, for instance information technology, digital tech, networking and professional knowledge. The Education 4.0 paradigm constitutes a set of technological innovations and pedagogical transformations in education that promote a combination of man and technology in the service of improving and adapting learning to better meet the expectations of Industry 4.0. One transformation in higher education is Digital transformations. Today, digitalization is changing everything, and we are witnessing major revolutions in education that are disrupting the interaction between the different actors in education (Guéye, Exposito, 2020). The current context of digital transformations is based on the permanent integration of technology as a learning tool that promotes the development of new innovative learning methods. They are Learning management system, Mobile learning, Interactive and fun contents, Virtual teaching assistants (Chatbots), Digital interactions and Intelligent Tutoring Systems. Technological innovations have fostered pedagogical transformations that are changing the way we teach and learn. The current context of universities is marked by the adoption of new pedagogical approaches to facilitate access to educational content and improve the quality of learning. These approaches include:

- **Active pedagogy** – It is a pedagogical approach that aims to make the learner an actor in his or her learning process with active participation in the construction of knowledge.
- **Project-based learning** – It is a practice of active pedagogy that allows managing learning through the realization of an individual or collective project.
- **Flipped-classroom** – It is an approach that consists of reversing the nature of activities in the classroom (lectures) and at home (homework assignments).
- **Game-based pedagogy** – Definitions of game-based learning through play emphasize above all that it is a type of game with defined learning outcomes.
- **Blended learning** – It is a hybrid concept that combines face-to-face and online teaching.

Technological innovations and pedagogical transformations have fostered enormous needs in teaching and learning. To improve and adapt learning to align with the needs of learners and industry, educational organizations are moving towards the concept of Education 4.0.

A variety of software programs and the Internet are used in accounting lectures in order to attain the different teaching and learning objectives. Productivity software are group of software application (i.e. programs-banks), which are
commonly used by student for better learning of accounting concepts by practic-
ing quizzes, problem solving, multiple choice questions etc. This helps students
to rectify their errors and to concentrate on fundamental facts on the topics be-
ing taught with appropriate feedback (Boyce, 1999). Moreover, according to a
study by Gujarathi (2005) demonstrated the outcomes by using a ‘spreadsheet
productivity program’ for resolving and management of accounting issues. The
objective was for the students to familiarise in maintaining book keeping systems
with additional restrictions as well as simulated accounting faults. The student
highly appreciated the use of ERP software and claimed that the software ori-
ented approach aided the learning of accounting relatively easier compare to the
traditional ways.

The modelling and simulation software create simulated accounting is-
issues, questions, scenarios and simulations which the students would try to solve
(Boyce, 1999). Hoffjan (2005) also uses a pretty related game simulator around a
company called Calvados for the teaching better accounting concepts to students.
He concluded that the game improved the students’ responsivity with respect to
the problems of managing the decentralised components of the firm while studies
on the impact on the ability to detect fraud management with the help of plau-
sible simulations (reality-based simulations) by students who claimed realistic
simulations provide an overview of the risks involved and improve capability
for applying the knowledge gain at professional level along with reliability in
the outcome. In those two cases the students were optimistic about the utility the
“game approach” and recommend it in the curricula, Green and Calderon (2005).

Hybrid teaching methods (also known as Blended learning) is a combination
of a right mixture of the traditional face to face teaching method and technologies
mostly computer-based (see Fig. 2). Hybrid teaching models not only prove to
be very flexible to the student and it has been of great help for time management
concerning part timer and working students and it was also find out that 88% of
the student and faculty member were satisfied with the blended courses (Dziuban,
Hartman, & Moskal, 2004). The student can review the coursework, download
the latter when needed.

Advantages:
✓ An exciting new technique to use in the classroom.
✓ Students become much more involved, excited, and motivated.
✓ A tremendous learning experience for the instructor.
✓ It can be fun for the instructor. I am having a blast doing this!
✓ Creates publicity for the business school in the community.
Fig. 2. The Hybrid model


IV. COVID-19 AND STUDENTS

According to UNESCO, on 1 April 2020, schools and higher education institutions (were closed in 185 countries, affecting 1 542 412 000 learners, which constitute 89.4% of total enrolled learners. At the beginning of May, some countries, experiencing decreasing numbers of cases and deaths, started lifting confinement measures. However, on 7 May, schools and higher education institutions were still closed in 177 countries, affecting 1 268 164 088 learners, which constitute 72.4% of total enrolled learners (Report on International Association of Universities, 2020). The International Association of Universities’ (IAU) survey provided the first global overview of the impact of COVID-19 on higher education. The silver lining is that higher education institutions reported developing innovative approaches to these challenges by introducing more flexible online learning options, including blended and hybrid models. There is also a reported increase in interest by policymakers in the field of higher education with two-thirds of participants reporting that senior management and faculty have been consulted by public or government officials in the context of public policies relating to COVID-19. More than half indicated that their government/ministry of education will support their institution during this time of disruption due to COVID-19. In addition, a third of participants indicated that COVID-19 has created new opportunities to pursue with international partner institutions.
The pandemic that has shuttered economies around the world has also battered education systems in developing and developed countries. Some 1.5 billion students – close to 90% of all primary, secondary and tertiary learners in the world – are no longer able to physically go to school. The impact has been dramatic and transformative as educators scramble to put in place workable short-term solutions for remote teaching and learning, particularly in emerging markets, where students and schools face additional challenges related to financing and available infrastructure.

While each level of education faces its unique challenges, it is the higher education segment that may end up, by necessity, triggering a learning revolution. Universities are distinctive in that their students are both old enough to handle the rigors of online work and technologically savvy enough to navigate new platforms. The real challenge lies for the institutions in which they have enrolled. Can traditional, campus-based universities adapt by choosing the right technologies and approaches for educating and engaging their students? The successes and failures that unfold should give us all a better grasp of what is possible.

CHALLENGES

This signals a rebirth and recommitment to higher education, but the grim short-term financial challenges will have long-lasting impacts for many institutions that are not able to withstand this disruption and are facing furloughs, layoffs, program and project cancelations, low enrollments or even institutional closures that will continue in the months ahead.

These challenges also create opportunities. Reimagining higher education in this new paradigm is paramount to future success and stability. Higher education must adapt to its current context and maximize the funds of knowledge that exist on their campuses, in their communities, and through their partnerships. Finding short-term solutions to immediate needs through local or national government economic relief will allow leadership and scholars at institutions of higher education to develop long-term strategies to respond to COVID-19. Long-term solutions must take advantage of new program models for teaching and learning online that have become the norm in recent months. Data informed decision making is critical to successful long-term planning and student success. Institutions of higher education have a major role to play in both finding solutions to the current pandemic and preparing for future disruptions. (Report on International Association of Universities, 2020)

The 2020 academic year is vastly different to previous years and institutions, staff, and students are facing complex challenges. Despite this, the ongoing coronavirus crisis has truly highlighted the importance of higher education and the investments that institutions and staff make to ensure a quality educational expe-
rience. Institutions are developing new online tools, addressing students’ needs and complaints, and adapting to rapidly evolving government guidance.

In terms of the impact of the COVID-19 pandemic on different countries’ education systems many differences exist. This lack of homogeneity is caused by such factors as the start and end dates of academic years and the timing of school holidays. While some countries suspended in-person classes from March/April 2020 until further notice, others were less restrictive, and universities were only advised to reduce face-to-face teaching and replace it with online solutions wherever practicable. In other cases, depending on the academic calendar, it was possible to postpone the start of the summer semester (Connell, 2020). Fortunately, there is a range of modern tools available to face the challenge of distance learning imposed by the COVID-19 pandemic. E-learning has experienced significant change due to the exponential growth of the internet and information technology. New e-learning platforms are being developed for tutors to facilitate assessments and for learners to participate in lectures. The inclusion of e-Learning tools in higher education implies that a greater amount of information can be analyzed, improving teaching quality.

The Hindu (April 14, 2020) states that online learning is an amalgamation of various pedagogical models instead of any one single model as it is a specialized learning science that includes delivery of content, behavioral analytics, learning psychology and assessments. Online classes require long hours of internet service, peaceful space and one device/phone dedicated to each student in a family, which might not be affordable for everyone. In a country like India, where students from diverse socio-economic backgrounds have to take care of domestic chores, family members and children, managing with limited space in the house, managing with a limited budget and poor connectivity in rural areas etc. may cause them to deal with discomfort, frustration and shame. Thus, according to Sarkar (2020), online classes have added to the already existing feelings of vulnerability among students.

With COVID-19 pandemic, it has become clearer that education system is susceptible to external dangers (Bozkurt & Sharma, 2020). Ribeiro (2020) rightly noted that this digital transformation of instructional delivery came with several logistical challenges and attitudinal modifications. Feldman (n.d.) while addressing student assessment during this pandemic on how districts can legislate unbiased and evenhanded grading policies based on these recommendations; (i) pandemic related anxiety will have negative effects on student academic performance, (ii) academic performance of students might be affect by racial, economic and resource differences, and (iii) the larger parts of instructors were not effectively ready to deliver high-quality instruction remotely. The challenges discussed here are limited to digital transformation of instructional operations during the period of COVID-19 pandemic.
As a result of inequality in the socio-economic status of students, some rely on the computer and free internet in school (Demirbilek, 2014), and due to the closure of schools, the migration process of these set of students is expected to be slow. It becomes undeniable that students with low socioeconomic background will definitely find it difficult to migrate as early as expected since they cannot come to school due to the pandemic. Fishbane and Tomer (2020)’s research findings on what students with no internet access are to do during this Covid-19 pandemic show that as the level of poverty increases in the community, the rate of internet accessibilities declined rapidly and by implications, students with no or low socio-economic power to afford broadband connection are most vulnerable to fall behind or encounter additional challenges to meet up with others in online learning.

CONCLUSION

Despite the Education 4.0 paradigm, universities are characterized by a plurality of learners with different profiles, interests, and learning rhythms, which makes it extremely difficult to implement certain resource-intensive techniques to provide each learner with personalized follow-up. The need to integrate resources and actors to allow the design of intelligent and self-adaptive cyber-physical systems capable of managing learning processes also slows down the perfect application of the education 4.0 paradigm.

Digitization and virtualization in education are motivating, inspiring and potentially broad challenges for individuals and societies. Smart and intelligent educational tools and resources should allow individuals to develop more complete expertise, knowledge and skills and unleash their innovative prospective.

The current innovative and leadership-based learning objectives introduced by Education 4.0 have made it obligatory for teachers to change. As Education 4.0 environments require future creative convergence talents, teachers should carry out new tasks to take greater ownership of growing creative convergence talents and to change processes of their school culture. This change process could be achieved through creating reflective learning communities together with a re-definition of the meaning and scope of teacher supervision.

The pandemic of COVID-19 has also made people realize how dependent we are on so-called low-skilled workers to keep our lives going. During shutdowns, lock downs, curfews, it’s these workers who are on the front lines, working multiple shifts to maintain delivery and take care of our basic needs. Over time, automation will continue to eat into these jobs. While there will always be services provided by low-skilled workers, most new jobs will require higher
skills levels. Being able to reskill and upskill in this rapidly changing world is not only a necessity but an economic imperative.

COVID-19 has struck our education system like a lightning bolt and shaken it to its core. Just as the First Industrial Revolution forged today’s system of education, we can expect a different kind of educational model to emerge from COVID-19.

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Received 19.07.2021