

Post-COVID-19 Education: A Case of Technology Driven Change?

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Abstract: The transition from face to face to remote teaching during the COVID-19 health crisis, has been viewed by privately owned companies, prestigious universities, international organizations and politicians as an opportunity to promote the digital paradigm in education. A carefully carved rhetoric bundles the reduced funding of education, the maturity of digital technologies and the experience of remote teaching during the COVID-19 restrictions to promote the idea of rewiring and rethinking education as a synonym for change. How will education look like after the COVID-19 crisis? Although an answer to this question cannot be precise at the moment since it involves different stakeholders, this publication attempts to pinpoint some aspects of the post-COVID-19 educational landscape as it emerges comparing various texts and sources.


1 INTRODUCTION


Models estimating the transmission of COVID-19 (Contoyiannis et al., 2020; Flaxman et al. 2020), have raised worries concerning the likeliness of a series of rolling school closures during a period of 18-24 months following the pandemic announcement. International organisations like OECD (OECD, 2020a; OECD 2020b), the United Nations (UN, 2020), UNESCO (2020) and the World Bank have published a number of documents making recommendations on the immediate re-opening of the educational institutions. Besides, these documents include several ideas on the future of education in the post-COVID-19 era. On the 5th of May 2020, i.e. in a period when schools and universities were closed and the number of casualties was rapidly increasing, the OECD published “Back to school” (OECD, 2020b), while in August 2020 the United Nations published the “Policy Brief: Education during COVID-19 and beyond” (UN, 2020). Texts of international organisations provide a clue on the future of education. Narratives addressed by experts and international organisations, become persuasive to public and policy audiences (Miller, 2004 p.47). International organisations, government officials,


scientists, business leaders and other transnational actors, articulate persuasive accounts on various problems (Jasanoff, 2001; Miller & Edwards, 2001) including post-COVID-19 education. These accounts form the basis for understanding and interpreting the current situation in education and by doing so, make specific future options look preferable or even inevitable.

In the recent years there is an increasing number of environmental, economic and security issues, which are considered to call for global cooperation. International organisations like the World Trade Organisation, the UN and OECD have acquired a strong voice on issues that traditionally belonged to the authority of the sovereign state. The authority crisis and the reduced capacity of states and governments to respond successfully to major issues has opened the way for appealing to global policies (Miller 2004, p. 46-49).

In agreement with the above considerations, in 2012, Andreas Schleicher, the Director for OECD’s Directorate of Education and Skills, contended that education is not anymore, an issue of domestic policy but a global issue. This assertion was based on the assumptions: a) That education “is not a place but an activity”, b) The supposed superiority of international

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comparisons like PISA (Program for International Students Assessment) which, “have globalized the field of education that we usually treated as an affair of domestic policy” (Schleicher 2012).

2 DOING MORE WITH LESS

Both United States’ (Benson, 2020; Li, A.Y. 2017, Krug, 2016) and European Universities (EUA 2011; Kauppi, 2019) are suffering budget cuts since 2008. Higher Education budgetary cuts have negative impacts in various aspects of social life (DePillis, 2001). Despite the financial constraints, the number of full-time students has dramatically increased in the past few decades. This is partially because as unemployment levels rise, more people are driven to education to increase their competitiveness in the labour market. The combination of the growing number of students and reduced spending represents a major concern for maintaining quality in higher education (EUA, 2011).

Pay stagnation, a consequence of the financial constraints imposed on Higher Education, affects negatively the level of job satisfaction (Benson, 2020) and productivity (DePillis, 2001) of the university tutors. In the lack of an alternative vision (Kauppi, 2019), some universities have already closed some offered programs (EUA 2011, p.5) while professors are trying to accommodate professionalism (Mintzberg 1979) with the consequences of reduced funding. For example, the adoption of Computer Assisted Assessment has been often attributed, among other reasons, to its cost-effectiveness (Mandel et. al. 2011; Loewenberger P. & Bull J. 2003; Bull & McKenna, 2004, Topol et. al. 2010). Online and blended courses have gained accreditation among researchers and university tutors, not only because of their flexibility, pedagogy and ease of access but also for their cost-effectiveness (Abdul Rahman et al 2020; Vivitsou, 2019; Lieser et al, 2018), while students’ preference on traditional classroom teaching does not appear to be a strong factor to influence decisions (World Economic Forum 2020; Krug, 2016). Budgetary cuts have been often linked to changes in the public sector. Following the eruption of the 2008 crisis, researchers have focused on cutbacks in public sector organizations, at the national rather than institutional level (Schmidt, Groeneveld & Van de Walle, 2017).

COVID-19 crisis added more financial insecurity to the universities. According to a recent publication of the European University Association (EUA) “it is foreseeable and of concern that the financial effects

will arrive in the coming years and there will be austerity measures” (EUA, 2020). Similarly, 10% budgetary cuts have been proposed for the European Research Council (Nature, 2020). Moreover, for public-sector organizations there is considerable pressure to improve efficiency, by reducing costs, improving quality, and increase responsiveness to the clients’ needs (Curtain, 1993: 31). It is expected that, public funding allocations across Europe will decrease in the next two to four years (EUA, 2020)

For the universities that rely on student fees, there are additional pressures because of less international students’ enrolments, demands for reimbursement for fees already paid, reluctance among students to pay fees for online courses and high levels of student debt. On the basis of this reality, alternative strategic frameworks have been proposed for “reputed universities” (Govindarajan V., Srivastava A., 2020b), to expand their operations worldwide and offer residential, blended and fully online degrees at competitive prices.

3 THE VOICE OF THE INTERNATIONAL ORGANISATIONS

It was in 1996 when OECD raised the question of how education would look like in the 21st century. The Centre of Education Research and Innovation (CERI) was commissioned to answer this question gathering best practices and exploring alternative visions of the school of tomorrow (Ninomiya & Mutch, 2008). On the basis of this project OECD/CERI (2001) published “What schools for the future”, which has greatly influenced international thinking on educational policy (Facer & Sandford, 2010). The document outlines six scenarios for future education along three possible trends: continuation of status-quo, re-schooling and de-schooling.

Scenario thinking has been employed for years by companies to cope with changes in the competitive environment (Schwartz, 1996), but after 2000 it has also been used by international organizations (OECD, 2001; OECD 2020a; WEF, 2009). The document reflects the developed countries’ perspective and a ‘Western’ world view (Ninomiya & Mutch, 2008). Expressions like “distilling the infinite range of possible futures”, “bringing together the big picture” borrowed from the management jargon convey an impression of an ideology free enterprise. Such future-oriented projects have been criticized for reproducing the ideal of a technology-rich, global knowledge

economy, where technology enhanced learning is considered as an essential modernizing feature for education (Facer & Sandford, 2010).

The dominant paradigm in education is presented as bureaucratic and adhering to the status-quo (scenario 1), a rhetoric and reality that generates discomfort and signals the need for change. Schools and universities provide their members extensive autonomy to perform their job. People outside education e.g. managers and government representatives, feel uneasy with such an autonomy and try to impose external control introducing mechanisms of supervision and standardization, which usually impede and discourage professionals (Mintzberg 1979, p.376). Bureaucratic management undermines the knowledge base of the teachers as they are asked to confront with detailed syllabuses, administrative rules and bureaucratic procedures usually in the name of quality. Additionally, as some commentators notice, globalization pressures and the influence of international organisations like the OECD have increased governments' intervention in education and bureaucratic control (Dahlin, 2017, pp. 113-122).

Scenarios are "just stories" that can be discussed more openly compared to actual policy choices (OECD, 2020a p. 420). As Paul Schoemaker (1998) explains, good scenarios connect to key managerial concerns and therefore reflect particular interests. Therefore, OECD scenarios propose the range of probable and desirable futures (OECD 2001, p.76) and as such, they rather describe the locus of the futures of education compatible with certain values and a OECD's world view. OECD's scenarios adhere to the "leader-follower" stereotype where the leader addresses solutions to long-standing problems, while the follower stubbornly resists them. These considerations are in resonance with Christopher Warren's description of OECD as an international organization committed to democratic governance and adherence to free market principles. OECD, unlike the United Nations, is not a universal organization and it is characterized by a clear economic and political orientation (Warren, 1998).

For OECD the schooling system is characterized by the following pathogenies: a) "politicized education", the classroom/teacher model, permanent employment of the teachers and strong unions. b) Teachers' professionalism (named "craft" professionalism) c) Much attention focuses on the curriculum (OECD, 2001).

The factors destabilizing the dominant paradigm, mentioned in scenarios 2 to 4, include: The development of a political culture that supports extended competition; privatization of various forms;

"efficiency" and "quality" become the prominent criteria; individualization; ICT as a factor of radical change to organizational structures of teaching and learning; corporate interest in the learning market; pressures from international surveys of educational performance; competition between countries over the model of education they adopt; high-trust relationships between authorities, teachers and employers; other professions involved in teaching-learning; networking among teachers and more flexible employment.

"Back to the Future of Education. Four OECD Scenarios for Schooling" was published in September 2020, and renewed the scenarios on education (OECD, 2020a). The new scenarios are: 1) Schooling extended, 2) Education outsourced, 3) Schools as learning hubs and 4) Learn-as-you-go.

Analysis of policy documents published by the European Commission and UNESCO, shows that there is consensus for promoting digital technologies for learning in order to make education more affordable and move away from outdated pedagogies and learning environments (Vivitsou, 2019). The four scenarios depart from the transition from face-to-face to remote teaching during the COVID-19 pandemic to promote the idea of a total transformation of education based on technology.

The main characteristic of education as it emerges out of the four scenarios is the Taylorisation of the school. Knowledge is transferred from the educated teacher to the computer network and education becomes knowledge availability; many countries operate common curriculum and assessment tools; education becomes increasingly privatised; the classroom/teacher model is replaced by the classroom/individual adult model; there are economies of scale; less teachers compared to today; different job content; reduced control by the state and reduced power for the teachers. Scenarios 1,2 and 3 are the realm of online and blended learning. Scenario 4 relies more heavily on artificial intelligence. Scenarios 1,2 and 4 imply a more global context while scenario 3 is more local. The transition from face-to-face to remote teaching has strongly influenced OECD's scenario thinking. Although the four scenarios reflect strategic objectives of the far future, it is possible to influence policies of the near future as well.

Beside OECD more universal organisations like the UN, UNICEF and UNESCO have undertaken certain initiatives and published their proposals regarding return to schools and post-COVID education. On September 2018 UNICEF announced a new partnership with the University of Cambridge

and Microsoft to develop a Learning Passport, a digital platform that will facilitate learning opportunities for children and young people within and across borders. According to the “Learning Passport Research and Recommendations Report “the project’s specific aim is to improve the quality of education for children who, for whatever reason, are unable to access national education systems satisfactorily, either temporarily or permanently” (Cambridge University Press & Cambridge Assessment 2020). On the 20th of April 2020, UNICEF (UNICEF 20/4/2020) and Microsoft (2020) announced that the platform has undergone rapid expansion to facilitate country-level curriculum for children and youth whose schools have been forced to close due to COVID-19. On the 27th of October 2020 Sony Corporation of America announced its participation and support to the program (Sony, 2020), while on the 28th of the same month UNICEF announced that science content developed by twig education and the Imperial College will be available to Learning Passport users from Jordan, Somalia, Timor-Leste and Ukraine (UNICEF, 28/10/2020).

“Reimagining education in the post-COVID-19 era” was published by UNICEF in October 2020 (UNICEF, 26/10/2020). The article reminds the reader “We have the opportunity to move away from a model of the school of the last century and reimagine the school of the future. In this school, learning will be happening not only in the classrooms”. The article includes the picture of a little girl holding a big mobile phone. A green-blue web page is seen on the screen of the mobile phone saying ESKOLA BA UMA (The school goes home). The picture has been taken in the open air carrying the message of “any place any time” learning. No desk, no pen and paper, no teacher, digital pedagogy is free of them. The girl smiles happily to the camera. She is wearing a red T-shirt advertising the National Development Plan (NDP), which is described by IMF as “a participative process, involving constituents in every sector of the economy to identify the problems they face and to suggest solutions to those problems” (IMF, 2005). In the background, which is blurred, a woman is sitting on a stone, under a tree and next to her a little boy is playing. The girl with the mobile phone is the central person of the photograph, conveying the message of student-centred education facilitated by technology. The article gives out a clear message of determination “There is no going back”. What is needed, according to the article, is to leverage the internet and technology. Education for all, means internet connections for all. For poor countries, when there is little or no infrastructure “blended and hybrid

models of education should be explored to accelerate change in children’s education”. The role of the teacher is rather diminished in the new educational normal.

4 POINTS OF CONVERGENCE

OECD’s four scenarios describe the locus of the preferable futures of the globalized, technology driven school system. Short term considerations regarding the post-COVID education can be identified in less futuristic texts such as “Coronavirus special edition: Back to school, Trends Shaping Education Spotlights” (OECD 2020b) and “Policy Brief: Education during COVID-19 and beyond” (UN 2020).

Comparison of these documents brings to the surface four points of convergence regarding post-COVID education: a) The need to rethink education in all its aspects as a rhetoric for a change to come, b) The need for a new type of teacher c) Over-reliance on technology signifying a technology driven change and d) Vague descriptions on how these points join together to form a techno-educational mix to solve old existing problems in education.

The importance of technology as a lever for increasing the “learning opportunities in a manner never known before” (Jenkins, 2019) is one of the taken for granted points in many texts of the international organisations (Vivitsou, 2019). In response to this, the UN and UNESCO propose to expand the definition of the right to education to include connectivity entitlement (UN, 2020; UNESCO, 2020). The benefits of digital and internet-based teaching are taken for granted and what is needed is internet access for all (UNICEF, September 2020).

Subjective views and vague visions replace evidence to make-up a new reality unknown to the many. For example, Luthra and Mackenzie (2020) inform us that “educators around the world have been talking about the need to rethink how we educate future generations” and that “technology will continue to play a key role in educating future generations” because what generation Z expects is instant communication and feedback (Luthra, Mackenzie 2020). There is a widespread optimism of a successful change to come, as if the experience gained during the COVID-19 crisis, removed long standing problems, related to distance teaching. Research has shown that online students must be proficient readers exhibit self-direction, independence and self-discipline (McDonald, Dorn & McDonald, 2004), while McFarland et al. (2005)

found that more and more students nowadays seem to avoid studying. Instant feedback is central in the case of online learning, although a recent publication concluded that fast feedback is not enough to satisfy the students (Landrum et al. 2020). Additionally, distance education implies psychological isolation, cultural distance (Stunkel, 1991) and a total disruption of what is considered to be “students’ life”.

5 “A CHANGE IS GONNA COME”

It was only a few days after the World Health Organization declared the coronavirus outbreak a pandemic, when the first articles appeared on various web pages to point out how the COVID-19 health crisis could change education (e.g. Luthra, Mackenzie 2020). In a period when students and teachers, at all levels, were trying hard to find their pace within the distance teaching endeavor prophetic articles which underlined how the COVID-19 crisis affects “how we educate future generations” seemed to put education on the fast forward.

After May 2020, when Emergency Remote Teaching had been already widely adopted by students and educators, the voices commenting on the post-COVID higher education increased in frequency: “Universities beware: shifting classes online so quickly is a double-edged sword” (The Guardian 20 May 2020a), “No sex, no booze: how the move online will take all the fun out of university” (The Guardian 20 May 2020b), “Post-pandemic, remote learning could be here to stay” (CNBC, 20 May 2020) “The Future of College Is Online, and It’s Cheaper” (New York Times, 25 May 2020), “Students like the flexibility: why online universities are here to stay” (The Guardian 27 May 2020), “We shouldn’t go back to lectures: why future students will learn online” (The Guardian 3 July 2020), “5 Major Shifts Needed Post-COVID-19 to Transform Education” (Center for Digital Education 12 August 2020), “L’enseignement supérieur bascule dans le monde post-Covid” (Le Monde 14 August 2020). In the case of Greece, government officials made clear that synchronous distant teaching, as well as blended, is going to be part of the post-COVID-19 higher education reality. Similar views were also promoted by a number of media (e.g. MEGA, 2020; Kathimerini 1 June 2020).

Online teaching advocates consider that after students and teachers have had a direct experience of the specific technology, acceptance will be higher and resistance lower. Such beliefs concerning the acceptance of remote teaching in the post-COVID

era, are backed by theoretical considerations developed within the technology acceptance literature. Technology acceptance models consider that prior experience of a certain technology is a factor, exerting a positive influence towards the acceptance of a technology (Abdullah, Ward & Ahmed, 2016; Venkatesh, Davis 2000).

6 CRISES AS A TRIGGER FOR CHANGE

Crises are considered to be opportunities for reform, creating a state of shock, which facilitates bolder intervention (Cepiku, Sauvignon 2012). Crises or other external events are considered to generate the necessary conditions for change (UNDP, 2006; Govindarajan, Srivastava, 2020). The COVID-19 crisis has been considered by commentators as an opportunity for change. “Crises can make innovations that seemed previously impossible suddenly inevitable... There will be years of a reckoning that higher education institutions will go through. Higher education institutions need reimagining, not just repairing” (University World News, 2020). Academic publications have commented on the changes to come in Higher Education adopting various perspectives: Govindarajan and Srivastava (2020) mention that COVID-19 will affect education provided that remote teaching experiment proves to be a success. Zimmerman (2020) emphasizes on the importance of research to show whether online learning is good or bad for students.

Acceptance of a change is one of the central questions in planned change management (Nutt and Backoff, 1997). For most of the management perspectives, creating and communicating a clear and meaningful vision, is of paramount importance in change management. Vision gives direction and motivation to those experiencing the change (Palmer et. al. 2014, pp. 172-184). In change management, the vision promotes the proper way of understanding the current situation and justifies the promises of the proposed change. A new vision for change borrows elements from real life properly selected and interpreted. This may include crises, poor performance, reduced budget etc. Change leaders or other influencers use narrations and stories to frame the interpretation of the current situation and generate dissatisfaction with it. Dissatisfaction with the current situation reduces scepticism and resistance for the proposed change. Creating a proper vision is one of the powerful tools for making the acceptance of the

proposed change the preferable option (Palmer et al., 2017 pp. 180-181). This is part of the legitimization of the change, i.e. the wide acceptance by the organization or the society that certain actions are desired and appropriate (Landau et al. 2014).

Such practices have given rise to criticisms regarding the ideological and ethical nature of several change programs (Martin et al. 1988). Change in Organizations usually involves practices of incontestable effectiveness but of debatable political neutrality. As John Kotter, one of the leading figures in change management comments: "In some situations, managers also resort to covert attempts to influence others. Manipulation, in this context, normally involves the very selective use of information and the conscious structuring of events" (Kotter, Schlesinger; 2008).

Change is not easy and in number of cases it may cause more problems than those supposed to solve. Change is usually presented as a well-orchestrated linear management initiative moving through the well-known unfreeze, change and refreeze steps (Cummings et al. 2016). Moving from face-to-face to remote teaching can be considered as a case of change management (Mishra et al., 2020), but change management is not always successful.

There is a wide spread optimism that ICTs can change education providing the opportunity for any time, any place learning, modernise education, reduce obstacles to learning for the poor and disadvantaged. Nonetheless, this is not the first-time technology is considered as the vehicle for revolutionary changes in education.

Thirty years ago, the development of electronic media and computers generated a widespread optimism on the potential of global networks, which would make distance irrelevant and provide educational services to those unable to participate in traditional campus-based learning (Stunkel, 1991). At those days, as it happens nowadays, a number of publications compared student performance in traditional and computer mediated instruction to conclude that media are mere vehicles to deliver instruction and they do not influence student performance (Whittington, 1987, Stunkel 1991). Research conducted in the nineties had shown that videotapes were a more powerful tool for instruction compared to videoconferences because with the former the students could pause, review, and take more detailed notes (Lundin, 1989). Besides, recommendations on proper combinations of technologies promised more effective instruction allowing the teacher to know which students are keeping up, which ones are bored, and which ones

have questions, and the ability to queue them for answers (Perkins, 1989).

The points raised in the publications of those days sound very similar to contemporary ones. Not surprisingly the terms used by the enthusiasts of those days remind a lot of today's vocabulary: Learner control (Moore, 1988), high learner motivation (Lundin 1989), learner-centred teaching (Knapper, 1988), new roles for faculty members (Strain, 1987) and teacher training (Knapper, 1988). Some years ago, it was believed that massive open online courses would change the educational landscape, but face-to-face teaching stood the test once more (Govindarajan & Srivastava, 2020).

Inclusion of technology in the learning process is attractive in itself opening the possibility of more interesting and playful learning but its effectiveness depends on the skills of the teacher and the attributes of the students. Although, teacher's contribution can in principle be ameliorated by training, the students' skills cannot be taken for granted (Sarewitz, Nelson, 2008). Factors like social relationships, inherent to face-to-face teaching, play a pivotal role in accepting technology driven changes in education. Indeed, research has shown that lack of direct communication with teachers and colleagues is the main pitfall of online teaching (Landrum et al. 2020; Martínez-Caro & Campuzano-Bolarín, 2011; Knowles & Kerkman, 2007).

7 THE TECHNOLOGICAL FIX

Recent publication of the UN and UNICEF focus on long standing inadequacies of the educational systems to consider the COVID-19 crisis as an opportunity to introduce changes that were unthinkable before (UN, 2020; UNICEF September 2020). Before the pandemic, 250 million of children were out of school, 800 million of adults remained illiterate and 56% of primary school children lacked basic reading skills. The COVID-19 crisis made this situation even worse (UN, 2020).

The above-mentioned documents suggest that technology driven changes, can solve long standing problems in education. In 2008 Daniel Sarewitz and Richard Nelson spotted the difference in the effectiveness of the various technological solutions comparing vaccines and educational technology, two artefacts which are dominant in today discussions. As they notice, technological fixes can be successful if they obey three rules: Firstly, they must largely embody the cause-effect relationship connecting the problem to the solution (Sarewitz and Nelson, 2004)

in order to be effective. The effectiveness of a vaccine is independent of the person who gives or receives it, as well as the setting in which it is given. Unlike vaccines, books, software, the internet and communication technologies do not provide the ‘basic go’ of teaching and learning. The effectiveness of technology mediated teaching is influenced by many other factors and applying technological solutions in education does not necessarily lead to success. As the authors notice, years of research and application of new technologies in education has failed to translate to some significant overall improvement in reading abilities. Secondly, there must exist clear and unambiguous criteria in order to assess the effectiveness of a technological fix. Thirdly, successful technological solutions would result from an existing standardised technical core. Unlike vaccines, such an uncontroversial core is not available in the case of education. Although only few would disagree on the benefits of incorporating technology in education, technological solutions in education do not appear to comply with the conditions set by Sarewitz and Nelson, at least to a degree similar to that of other technological solutions popular today, such as vaccines. Some problems of our society are amendable to technological fixes, while others are not. Decisions on technology investment are difficult in a world of limited resources and have long lasting implications.

8 CONCLUSIONS

One of the aims of this paper was to explore how texts of international organisations influence our understanding of the present and shape our expectations of the future. OECD, an organization characterized by a clear economic and political orientation, has played a pivotal role in addressing education as global, rather than an affair of domestic policy. The underlying idea behind the four scenarios (2020a) is that of a technology driven radical change. A change that transforms not only education but also the lives of teachers and students. Scenarios 1,2 and 3 bring to the fore a future of education which shares a lot with Fordism, while scenario 4 reminds of a fully digitalized, teacher depleted school. Such groundbreaking changes signify a turning point in schooling and make online learning “a politicized term” (Hodges et al. 2020). Scenario 1 (2001, p.79) refers to the “Dominance of the classroom/individual teacher model”. Twenty years later, this has been changed to “Schools continue to operate under the classroom/individual adult model” (2020, p.45),

which clearly means that technology is going to replace the well-educated teacher and other individuals will be involved in knowledge delivery. A displacement of teaching professionals and a change in teaching and learning is apparent throughout the four scenarios e.g. “A reduced but distinct, well-trained teaching corps remains in charge of designing learning content and activities”. In the new learning environment, the teacher becomes a designer, a coach, a mentor and a facilitator (Schleicher, 2020), but this new elevated role concerns only a small portion of the teachers who are in service today.

Paraphrasing Meyer (1981): Over reliance on technology will affect teaching, dilute skills, degrade work and transform social relationships in schools and universities. Technical and organizational innovation will displace academic expertise and administrative staff will supervise the knowledge delivery system run by computers, in virtual classes, through networks. Technology will standardize the design and the content of teaching globally. ICT using the most recent advantages of information technology will transfer academic knowledge and skills from the teachers to sophisticated and complicated technologies. In effect this will Taylorize education and reduce its cost. Some teachers will play the role managers and engineers played in Ford’s lines: they will set up the learning machine. This will bring new forms of control in schools and University departments.

Information and communication technologies will play a central role in the post-COVID education. It is a journey to the unknown, where “innovation and change is important”. The new normal “is not just possible, it is essential. There is no going back” (UNICEF, 26/10/2020). These words convey a message of determination. There is little room for discussion or compromise, but there is plenty of room for contribution on decisions made.

Can technology provide a viable solution to literacy and education? The question is not a new one. Distance teaching fifty years ago was implemented via correspondence, posted material for written work, radio and television programs (Antonowicz, Soobrayan, 2020). Fifty years of research in the United States, in the application of new technologies and development of new methods have not been translated in improved reading abilities for students (Sarewitz, Nelson, 2008). The various modalities of distance learning provide the opportunity for knowledge availability at any place and any time but they do not ensure learning. Besides, distance learning means “psychological isolation, lack of skills or low self-confidence, alienation from campus

environments even for those living next door, cultural distance, and value dissonance with educational institutions” (Stunkel, 1991). In resonance with the aforementioned considerations a recent UNICEF publication (Yankova, 2020) notices that, half of the students in Bulgaria experienced negative feelings, such as loneliness, insecurity, irritability and anxiety due to reduced social contacts during the period of social distancing. What about the new role of the teacher? Technology has not always made working life better or more interesting. Unlike mainstream management thought changes are not linear neither planned. Their outcome is a compromise which hopefully will open the way for taking advantage of the new technologies in education.

Thirty years ago, Edith Stunkel (1991) commented on the novel teaching modalities of those days noticing, that although traditional classroom instruction evolved in pre-industrial medieval European countries it still casts a long shadow on distance education as a second-class form of instruction. It is still a question how the new technologies, which can simulate face-to-face communication, can build upon a successful paradigm.

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REFERENCES

- Abdullah, F.; Ward, R.; Ahmed, E., (2016) “Investigating the influence of the most commonly used external variables of TAM on students’ Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) of e-portfolios”, *Comput. Hum. Behav.*, 63, pp. 75–90
- Antonowicz L., Soobrayan P., (2020), “Building Resilient Education Systems beyond the COVID-19 Pandemic: Considerations for education decision-makers at national, local and school levels”, Retrieved form: <https://www.unicef.org/eca/media/13411/file>
- Benson W., Probst T., Jiang L., Olson K., Graso M., (2020) “Insecurity in the Ivory Tower: Direct and indirect effects of pay stagnation and job insecurity on faculty performance”, *Economic and Industrial Democracy*, 41(3) 693–708 <https://doi.org/10.1177/0143831X17734297>
- Bull, J. & McKenna, C., 2004, *Blueprint for computer-assisted assessment*, London, Routledge Falmer pp.7-9 Cambridge University Press & Cambridge Assessment.
- (2020). “The Learning Passport Research and Recommendations Report: Summary of Findings”. UK: Cambridge University Press & Cambridge Assessment. Retrieved from: cambridgeassessment.org.uk/Images/577273-the-learning-passport-research-and-recommendations-report.pdf
- Center for Digital Education 12 August 2020 <https://www.govtech.com/education/k-12/Five-Major-Shifts-Needed-Post-COVID-19-to-Transform-Education.html>
- Cepiku, D. and A.B. Savignon. 2012. “Governing Cutback Management. Is there a Global Strategy for Public Administrations?”, *International Journal of Public Sector Management* 25 (6): 428–436.
- CNBC, 20 May 2020 <https://www.cnb.com/2020/05/20/post-pandemic-remote-learning-could-be-here-to-stay.html>
- Contoyiannis, Y.; Stavrinides, S.G.; P. Hania, M.; Kampitakis, M.; Papadopoulos, P.; Picos, R.; M. Potirakis, S., (2020) “A Universal Physics-Based Model Describing COVID-19 Dynamics in Europe”, *Int. J. Environ. Res. Public Health* 17, pp. 6525–6543, <https://doi.org/10.3390/ijerph17186525>
- Cummings S., Bridgman T., Brown K., G., (2016), “Unfreezing change as three steps: Rethinking Kurt Lewin’s legacy for change management”, *Change Management*, 69(1), pp. 33-60 <https://doi.org/10.1177/0018726715577707>
- Curtain, R. (1993) 'New Job Structures in the Public Sector: Intent, Process and Outcomes'. In Gardner, M. (ed.) *Human Resource Management and Industrial Relations in the Public Sector*, South Melbourne: Macmillan Education Australia.
- Dahlin, B., (2017) *Rudolf Steiner*, SpringerBriefs on Key Thinkers in Education DOI 10.1007/978-3-319-58907-7_6
- Davis F. D., (1989) “Perceived usefulness, perceived ease of use and user acceptance of information technology”, *MIS Quarterly* 13(3), 319–340.
- DePillis, E. G., & DePillis, L. G. (2001), “The long-term impact of university budget cuts: A mathematical model” *Mathematical and Computer Modeling*, 33, 851–876 [https://doi.org/10.1016/S0895-7177\(00\)00285-5](https://doi.org/10.1016/S0895-7177(00)00285-5)
- European University Association (2011), <https://eua.eu/downloads/publications/impact%20of%20the%20economic%20crisis%20on%20european%20universities%20january%202011.pdf>
- European University Association (2020) <https://eua.eu/resources/publications/944:public-funding-observatory-2020-2021.html> and “The impact of the Covid-19 crisis on university funding in Europe” (2020) <https://eua.eu/downloads/publications/eua%20briefing%20the%20impact%20of%20the%20covid-19%20crisis%20on%20university%20funding%20in%20europe.pdf>
- Facer K., & Sandford R., (2010) “The next 25 years?: future scenarios and future directions for education and technology” *Journal of Computer Assisted Learning*, 26, pp. 74–93 doi: 10.1111/j.1365-2729.2009.00337.x

- Flaxman, S., Mishra, S., Gandy, A. et al. (2020) "Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe" *Nature* 584, pp. 257–261 <https://doi.org/10.1038/s41586-020-2405-7>
- Govindarajan V., Srivastava A., (2020) "What the Shift to Virtual Learning Could Mean for the Future of Higher Ed", *Harvard Business Review* Retrieved from: <https://hbr.org/2020/03/what-the-shift-to-virtual-learning-could-mean-for-the-future-of-higher-ed>
- Govindarajan V., Srivastava A., (2020b) "A Post-Pandemic Strategy for U.S. Higher Ed", *Harvard Business Review* Retrieved from: <https://hbr.org/2020/06/a-post-pandemic-strategy-for-u-s-higher-ed>
- Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020), "The difference between emergency remote teaching and online learning" *EDUCAUSE Review*. <https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning>.
- IMF (2005) Retrieved from: <https://www.imf.org/en/Publications/CR/Issues/2016/12/31/East-Timor-National-Development-Plan-18437>
- Jasanoff S., (2001) "Image and Imagination: The Emergence of Global Environmental Consciousness", pp. 309–337 in C. A. Miller and P. N. Edwards (eds) *Changing the Atmosphere: Expert Knowledge and Global Environmental Governance*, Cambridge MA: MIT Press.
- Javidan, M., Mansour, Dorfman, P.W., Sully de Luque, M., and House R.J., (2006) 'In the eye of the beholder: cross cultural lessons in leadership from project GLOBE', *Academy of Management Perspectives*, 20(1), pp. 67–90 <https://doi.org/10.5465/amp.2006.19873410>
- Jenkins R., (2019) "The future of learning" Retrieved from: <https://blogs.unicef.org/blog/future-of-learning/>
- Kathimerini 1 June 2020: <https://www.kathimerini.gr/pages/matter-of-class/1080325/i-ex-apostaseos-ekpaidaysi-ilthe-gia-na-meinei-sto-elliniko-scholeio/>
- Kauppi Niilo (2019) "Waiting for Godot? On some of the obstacles for developing counter-forces in higher education", *Globalizations*, 16(5), pp. 745–750, DOI:10.1080/14747731.2019.1578100
- Knapper, C., (1988), "Lifelong learning and distance education", *The American Journal of Distance Learning*, 2(1) pp. 63–72
- Knowles, E., & Kerkman, D., (2007) "An Investigation of Attitude and Motivation toward Online Learning", *Student Motivation*, 2, pp. 70–80 DOI: 10.46504/02200708kn
- Kotter J.P. and Schlesinger L.A., Choosing Strategies for Change, *Harvard Business Review*, July-August 2008, available online at: <https://hbr.org/2008/07/choosing-strategies-for-change>
- Krug, K.S., Dickson, K.W., Lessiter, J.A. et al., (2016) "Student Preference Rates for Predominately Online, Compressed, or Traditionally Taught University Courses", *Innov High Educ* 41, 255–267 (2016). <https://doi.org/10.1007/s10755-015-9349-0>
- Landau D., Drori I., Terjesen S., (2014), "Multiple legitimacy narratives and planned organizational change", *Human Relations* 2014, Vol. 67(11) pp. 1321–1345 DOI: 10.1177/0018726713517403
- Landrum B., Bannister J., Garza G., & Rhame S., (2020) "A class of one: Students' satisfaction with online learning", *Journal of Education for Business*, DOI: 10.1080/08832323.2020.1757592
- Le Monde 14 August 2020 https://www.lemonde.fr/campus/article/2020/08/14/l-enseignement-superieur-bascule-dans-le-monde-post-covid6048926_4401467.html
- Li, A.Y., (2017), "Dramatic Declines in Higher Education Appropriations: State Conditions for Budget Punctuations", *Res High Educ* 58, 395–429 (2017). <https://doi.org/10.1007/s11162-016-9432-0>
- Lieser P, Taf S D and Murphy-Hagan A., (2018), "The Webinar Integration Tool: A Framework for Promoting Active Learning in Blended Environments" *J. Interact. Media Educ.* no 1.
- Loewenberger P. & Bull J. (2003), "Cost-effectiveness analysis of computer-based assessment", *Research in Learning Technology Journal*, 11(2), pp. 23–45 <https://doi.org/10.3402/rlt.v11i2.11275>
- Lundin R., (1989), "Teleconferencing: The design and delivery of educational programs", Videotape presentation at Kansas State University, Manhattan, KS, cited in Stunkel, (1991).
- Luthra P., Mackenzie S., (2020) "4 ways COVID-19 could change how we educate future generations" Retrieved from: <https://www.weforum.org/agenda/2020/03/4-ways-covid-19-education-future-generations/>
- Mandel A., Hörnlein A, Ifland M., Lüneburg E., Deckert J., Puppe F., (2011) *GMS Zeitschrift für Medizinische Ausbildung*, 28(4), ISSN 1860-3572
- Martin G., Beaumont P. and Staines H., (1998) "Changing Corporate Culture: Paradoxes and Tensions in a Local Authority", in Mabey, Skinner and Clark (eds.) *Experiencing Human Resource Management*, London: Sage Pubs. pp.73–74
- Martínez-Caro E., & Campuzano-Bolarín F., (2011) "Factors affecting students' satisfaction in engineering disciplines: traditional vs. blended approaches", *European Journal of Engineering Education*, 36(5), pp. 473–483, DOI: 10.1080/03043797.2011.619647
- McDonald, M., Dorn B., and McDonald G., (2004) "A Statistical Analysis of Student Performance in Online Computer Science Courses", *Proceedings of the 35th SIGCSE Technical Symposium on Computer Science Education*, Norfolk, Virginia, pp. 71–74 <https://doi.org/10.1145/971300.971327>
- McFarland D., & Hamilton D., (2005) "Factors Affecting Student Performance and Satisfaction: Online versus Traditional Course Delivery", *Journal of Computer Information Systems*, 46(2), pp. 25–32 <https://doi.org/10.1080/08874417.2006.11645880>
- MEGA 2020, <https://www.youtube.com/watch?v=nGoJ8Am95HY>
- Meyer, S., (1981) *The Five Dollar Day*, State University of New York Press
- Microsoft 20/4/2020, Retrieved from: <https://news.microsoft.com/2020/04/19/unicef-and-microsoft-launch>

- h-global-learning-platform-to-help-address-covid-19-education-crisis/#_ftn1
- Miller C. A., (2004) "Climate science and making of a global political order", pp. 46-66 in Jasanoff (ed.) *States of knowledge. The co-production of science and social order*, New York: Routledge,
- Miller, C. A. and Edwards, P. N. (2001) "Introduction: The Globalization of Climate Science and Climate Politics", pp. 1–30 in C. A. Miller and P. N. Edwards (eds) *Changing the Atmosphere: Expert Knowledge and Global Environmental Governance*, Cambridge MA: MIT Press
- Mintzberg H., (1979) *The Structuring of Organizations* Prentice Hall, pp. 352-354
- Mishra L., Gupta T., Shree A., (2020) "Online teaching-learning in higher education during lockdown period of COVID-19 pandemic", *International Journal of Educational Research Open*, Retrieved from: <https://doi.org/10.1016/j.ijedro.2020.100012>
- Moore, M. G., (1988), "Telecommunications, internationalism, and distance education" *The American Journal of Distance Learning*, 2(1) pp. 1-7
- Nature 2020, Vol 585, 17 September 2020, <https://www.nature.com/articles/d41586-020-02620-x>
- New York Times, 25 May 2020 <https://www.nytimes.com/2020/05/25/opinion/online-college-coronavirus.html>
- Ninomiya A. & Mutch M., (2008) "Visioning scenarios for schooling for tomorrow", *Journal for International Cooperation in Education* 11(1), pp. 7-21
- Nutt, P. C., and Backoff, R. W., (1997) "Crafting vision", *Journal of Management Inquiry* 6(4):308–328.
- OECD (2001), "What Schools for the Future? Schooling for Tomorrow", OECD Publishing, Paris, <https://doi.org/10.1787/9789264195004-en>.
- OECD (2020a), Back to the Future of Education: Four OECD Scenarios for Schooling, Educational Research and Innovation, OECD Publishing, Paris, <https://doi.org/10.1787/178ef527-en>.
- OECD (2020b), "Coronavirus special edition: Back to school, Trends Shaping Education Spotlights", No. 21, OECD Publishing, Paris, <https://doi.org/10.1787/339780fd-en>.
- OECD 23/3/2020, "Education responses to covid-19: Embracing digital learning and online collaboration Updated 23March 2020", Retrieved from: <https://www.oecd.org/coronavirus/policy-responses/education-responses-to-covid-19-embracing-digital-learning-and-online-collaboration-d75eb0e8/>
- Palmer I, Dunford R., Buchanan D. A. (2017) *Managing Organizational Change, A Multiple Perspectives Approach* New York: Mc Graw Hill, 3rd Ed.
- Perkins, L. B., (1989), "Interactivity: An important link in distance education", *Tel-Coms*, cited in Stunkel, (1991)
- Rahman A., Arifin N., Manaf M., Ahmad M., Mohd Zin N. A., and Jamaludin M., (2020), *J. Phys.: Conf. Ser.* 1496 012012, doi:10.1088/1742-6596/1496/1/012012
- Sarewitz, D., Nelson, R. (2008) "Three rules for technological fixes", *Nature* 456, pp. 871–872 <https://doi.org/10.1038/456871a>
- Schleicher A., (2012), "Use data to build better schools" available at: https://www.ted.com/talks/andreas_schleicher_use_data_to_build_better_schools#t-2029
- Schleicher A., (2020) "Schooling in Times of COVID-19" OECD Forum Virtual Event, 21/9/2020 Retrieved from: <https://www.oecd-forum.org/posts/schooling-in-times-of-covid-19-highlights-from-the-oecd-forum-virtual-roundtable>
- Schmidt, J.E.T., Groeneveld, S.M. & Van de Walle, S. (2017) "A change management perspective on public sector cutback management: towards a framework for analysis", *Public Management Review*, 19(10), pp. 1538-1555, DOI: 10.1080/14719037.2017.1296488
- Schoemaker, P. J. H. (1998). Twenty common pitfalls in scenario planning. In L. Fahey & R. Randall (Eds.), *Learning from the future: Competitive foresight scenarios* (pp. 422-431). New York, NY: John Wiley & Sons.
- Schwartz, P. (1996). *The art of the long view: Planning for the future in an uncertain world*, New York, NY: Currency/Doubleday.
- Sony (2020), Retrieved from: https://www.sony.com/content/sony/en/en_us/SCA/company-news/press-releases/sony-corporation-of-america/2020/sony-corporation-of-america-joins-with-unicef-to-support-learnin.html
- Strain, J., (1987), "The role of faculty member in distance education", *The American Journal of Distance Learning*, 1(2) pp. 61-65
- Stunkel E. MSW, (1991) "The Technological Fix", *Gerontology & Geriatrics Education*, 11(4), pp. 1-16, DOI: 10.1300/J021v11n04_01
- The Guardian 20 May 2020a <https://www.theguardian.com/education/2020/may/20/universities-beware-shifting-classes-online-so-quickly-is-a-double-edged-sword>
- The Guardian 20 May 2020b, <https://www.theguardian.com/education/2020/may/20/no-sex-no-booze-how-the-move-online-will-take-all-the-fun-out-of-university>
- The Guardian 27 May 2020 <https://www.theguardian.com/education/2020/may/27/students-like-the-flexibility-why-online-universities-are-here-to-stay>
- The Guardian 3 July 2020 <https://www.theguardian.com/education/2020/jul/03/we-shouldnt-go-back-to-lectures-why-future-students-will-learn-online>
- The World Bank (2020), "How countries are using edtech (including online learning, radio, television, texting) to support access to remote learning during the COVID-19 pandemic" Retrieved from: <https://www.worldbank.org/en/topic/edutech/brief/how-countries-are-using-edtech-to-support-remote-learning-during-the-covid-19-pandemic>
- Topol, B., Olson, J., & Roeber, E., (2010), "The Cost of New Higher Quality Assessments: A Comprehensive Analysis of the Potential Costs for Future State Assessments", Stanford, CA: Stanford University, Stanford Center for Opportunity Policy in Education.
- twigeducation (2020) Retrieved from: <https://twigeducation.com/blog/learning-passport-launches-to-learners-worldwide/>

- UN (2020), "Policy Brief: Education during COVID-19 and beyond" Retrieved from: unsdg.un.org/resources/policy-brief-education-during-covid-19-and-beyond
- UNDP (2006), "Institutional Reform and Change Management: Managing Change in Public Sector Organisations", A UNDP Capacity Development Resource, available at: <https://www.undp.org/content/dam/aplaws/publication/en/publications/capacity-development/institutional-reform-and-change-management-/Institutional-Reform-cp5.pdf>
- UNESCO 2017, <https://broadbandcommission.org/Documents/publications/WG-Education-Report2017.pdf>
- UNESCO (2020), "Education in a post-COVID world: Nine ideas for public action", International Commission on the Futures of Education 2020 Paris, UNESCO <https://en.unesco.org/news/education-post-covid-world-nine-ideas-public-action>
- UNICEF 20/4/2020, Retrieved from: <https://www.unicef.org/press-releases/unicef-and-microsoft-launch-global-learning-platform-help-address-covid-19-education>
- UNICEF 26 September 2018 (2018), Retrieved from: <https://www.unicef.org/press-releases/unicef-announces-new-partnership-microsoft-address-education-crisis-affecting>
- UNICEF September 2020, Retrieved from: data.unicef.org/topic/education/covid-19/
- UNICEF, 26 October 2020. Retrieved from: [unicef.org/timorleste/stories/reimagining-education-post-covid-19-era](https://www.unicef.org/timorleste/stories/reimagining-education-post-covid-19-era)
- UNICEF, 28/10/2020 Retrieved from: <https://www.learningpassport.org/post/twig-education-imperial-college-join-unicef-s-learning-passport>
- UNICEF, 7/12/2020, "COVID-19: UNICEF warns of continued damage to learning and well-being as number of children affected by school closures soars again", Retrieved from: <https://www.unicef.org/press-releases/covid-19-unicef-warns-continued-damage-learning-and-well-being-number-children>
- University World News 2020, available at: <https://www.universityworldnews.com/post.php?story=20200612100902318>
- Venkatesh V., Davis F. D., (2000) "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies", *Management Science* 46(2), pp. 186-204. <http://dx.doi.org/10.1287/mnsc.46.2.186.11926>
- Vivitsou M., (2019), "Digitalisation in Education, Allusions and References", *Center for Educational Studies Journal* 9(3) Robotisation, Automatisations, the End of Work and the Future of Education doi: 10.26529/cepsj.706
- Warren C., (1998), *In the Stream of History: Shaping Foreign Policy for a New Era*, Stanford: Stanford University Press, 1st Ed. pp. 165-167
- Whittington N., (1987) "Is instructional television educationally effective? A research review", *The American Journal of Distance Education*, 1(1), pp.47-57
- World Economic Forum, (2009). *The future of the global financial system. A near term outlook and long-term scenarios*. Geneva, Switzerland: The World Economic Forum.
- World Economic Forum (2020), "Is this what higher education will look like in 5 years?" Retrieved from: <https://www.weforum.org/agenda/2020/11/higher-education-online-change-cost-covid-19>
- Yankova M., (2020), "Rapid Assessment of COVID-19 impact on education in Bulgaria Deepening learning loss and increasing inequalities" Retrieved from: <https://www.unicef.org/eca/rapid-assessment-covid-19-impact-education-bulgaria>
- Zimmerman J., (2020), "Coronavirus and the Great Online Learning Experiment", *The Chronicle of Higher Education* Retrieved from: <https://www.chronicle.com/article/coronavirus-and-the-great-online-learning-experiment/>