E-Learning Efficiency in an Age of Global Risks and Changes

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Abstract: The age of global risks and changes that have come into play where stable development used to be a norm and the era of postmodernism, as a possibility of the multiplicity of meanings and solutions, determine the vectors of human development in the 21st century. Human society is undergoing changes, digital technologies are increasingly penetrating various domains of life, and it has become clear, they are here to stay because they are already changing life itself. The postmodern generation, consumed by "virtual reality", sees the world differently. They need knowledge different from what previous generations used where knowledge itself requires new methods of education. With all positive and negative implications, the e-learning format has established itself as a viable education option in times of the world pandemic. The way this learning format transforms the higher education system is irrevocable. Thus, an increasing number of universities are integrating online and personalized components into their courses. However, the role of the teacher remains invariably important. Although methods and format of their work may adjust and alter, it is the teacher who passes on human experience, imbues knowledge with emotional coloring and encourages reflection and reasoning. Therefore, the e-learning system rests on two factors, namely, the presence on the Internet and the development of student-teacher relations. All available research and resources are currently aimed at improving technical capabilities, whereas the "student-learner" system needs to be reconsidered. It will not be destroyed in the new conditions, rather transformed into new forms.

Keywords: *e-learning, distance learning, learning automation, quality of education, the role of the teacher, pedagogical experience.*

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Introduction

In the times of changes sweeping the entire planet, we talk about blasting economic meltdowns, the impact of the pandemic on all domains of human life, and global trends. They are becoming an integral part of postmodern life and an essential feature of the 21st century. They are to be perceived as harbingers of dramatic changes in the way we communicate, the way we study, convey our knowledge and spread our ideas. Human society is reshaping itself while digital technologies are increasingly penetrating our work and leisure. They are here to stay because they are already changing our lives. The current generation, consumed by "virtual reality", sees the world differently. They need knowledge different from what previous generations used, and knowledge itself requires new methods of acquisition (Gerasymova et al., 2019; Nerubasska et al., 2020; Nerubasska & Maksymchuk, 2020; Onishchuk et al., 2020; Sheremet et al., 2019).

In the 21st century, basic computer literacy skills are still deemed the main feature of an educated person. These skills are mastered in childhood and adolescence; however, despite the wide range of methods and pedagogical tools, the level of knowledge and abilities is no longer sufficient for a successful person. Such superficial nature of the knowledge acquired at school is revealed during the final school exams (Poirier & Feldman, 2004, p. 61). Thus, it is still a top priority with state bodies of all levels responsible for education to improve the quality of teaching to secondary school students and graduates of higher education institutions. The point here is not to provide formal support to the educational prestige of the country but to properly organize the educational process to promote the livelihood of the country and its people. This urgent need arose at the end of the 20th and the beginning of the 21st centuries, which was preconditioned by the end of the industrial and energy revolution in the world and the rapid information and technological progress in society today.

History of computers in education

Since the presidency of Ronald Reagan, and fifty years after him, his successors maintained a traditional position as for the multifaceted declaration in the field of education rich in proposals for reform and improvement. With the beginning of each reform, it was clear that these "reforms" would not bring any significant improvements, but would only create confusion in the local communities. The failure of these initiatives can be explained by them being rather "too far from pedagogy and pedagogical

psychology”, so they were hardly viable. Placing the priority with administrative measures, material incentives and strengthening the external control of educational institutions seemed to be the fallacy (Harlen & Doubler, 2004, p. 1255). This conventional field has been consistently overlooked by the US Department of Education as well as educational agencies worldwide, whereas the whole complex of issues and poor academic performance stay neglected.

The beginning of the sixties welcomed new progressive ideas for the implementation of e-learning in education. This time, groundbreaking educational principles that underlay the transition were as follows:

- a) pedagogical systems providing for the optimal level of learning processes have the priority for qualitative improvement of teaching and education;
- b) students and teachers acknowledge the primacy of moral incentives (recognition and demand) for their work;
- c) consistent use of prompt feedback to students and teachers with immediate correction of learning errors.

Along with the new educational principles, a new criterion base of education quality was developed. It worked as a genetically related system of indicators and criteria that manifest themselves in the didactic sense of the concept (Machtmes & Asher, 2000, p. 33).

First, the international community has accumulated more than fifty-year scientific experience and expertise in e-learning. What it proves is that the pedagogical potential inherent in the information systems can be actualized only if we speak about programming developed from the teaching standpoint.

Second, a computer is the only means available to society if we want to overcome the existing educational crisis and return education and pedagogical science to the evolutionary path, just like it works in society as a whole.

Third, as of today, we shall not doubt the inability of the computer to teach effectively based on "human" verbal pedagogy. Even a human teacher who possesses the teaching intuition and understanding of the polysemantic nature of human speech may struggle with it (Gilliver et al., 1998, p. 218).

For this purpose, we would need to deploy a specially designed pedagogic science reflected in the language of math and formal logic that would describe well-defined rules of operation (algorithms) in well-defined pedagogical situations (assignments).

The mass production of computers was launched more than half a century ago, and today they are widely used to control almost all areas of human life. They have proved effective in near to every domain of human activity except for pedagogy, where their application is, in fact, sabotaged. It is best illustrated by one of the recent US Department of Education reports, which outrageously denies opportunities offered by the use of computers in teaching. We should look into this report in detail, in particular, their research that compares online and face-to-face learning (Means et al., 2010, p. 33). This report features an erroneous interpretation of the research findings, thus denying any possibility of using a computer in education, and bringing on a counter-intuitive conclusion: “It is a waste of time and money”.

Since the advent of computers, educators have tried to incorporate them into the educational process, yet the results of these efforts have proved modest. Meanwhile, the US Department of Education has expressed a rather pragmatic standpoint. The official report emphasized that the effort to introduce computers into education was a waste of time and resources.

The failed application of computers in education is an attempt to build pedagogical software on the basis of traditionally intuitive, verbal pedagogy. The algorithm is simply too vague and obscure for a computer to follow. It contributed to the failure of the early attempts to computerize education and to the frustration of enthusiasts who, by embedding a textbook in a computer, turned a powerful machine into a regular e-book, which is comparable with the return to the medieval era of the original textbook. The computer does not comprehend the traditional pedagogy and cannot play by its rules.

Evolution of teaching methods

The introduction of the e-learning format allows using a computer to automate the management of the didactic (learning) process. The emergence of e-education is not accidental, but rather a natural phenomenon in the history of teaching science and educational practice. It is where pedagogy finally witnesses synergy of science and practice, which is a necessary condition for progressive evolution in any field of human activity. It is curious to know that pedagogy (as a science) and education (as a practice) have had only three pivotal moments in their millennial history.

The first milestone of the education evolution is believed to have happened back in the most ancient history of mankind, when in the tribes of Homo sapiens the profession and position of the teacher emerged, with the indispensable, albeit original, comprehension of the world. The most

prominent accomplishment of this period is, undeniably, the invention of writing, and later, manuscripts designed specifically for teachers (Bespalko, 1970, p. 167). In the history of education, this era can be called primitive as, through the millennia, it preserves most primitive forms, methods and content of "manual" education and dogmatic learning. As of the beginning of the 15th century, education in primitive societies appeared to be inconsistent with the requirements of the rapidly developing productive forces of mankind. The time has come for the second epoch that saw the invention of the printing press and the beginning of the Printing Revolution in the 15th century. This dramatic breakthrough has produced theoretical works of famous classics of pedagogical science and textbooks for students. It is natural to call this period in history the Renaissance of a conscious approach to solving pedagogical problems, which were first outlined in the works of ancient Greek philosophers and educators. Soon, there was another educational crisis looming due to the same mismatch between educational opportunities and the needs of developing countries and the productive forces of mankind. It caused the Third Age of Education, known as the Age of Automation. It began at the beginning of the 20th century, and computer specialists named e-learning to be its dominant feature (Schmidt, 2002, p. 52). However, e-learning professionals build their methodology of computer pedagogical programming either upon "down-to-earth" common sense or one of the variants of traditional pedagogy generated by the sages of the past (Bespalko, 1977, p. 56).

It should not be forgotten that traditional pedagogy was created with the personality of a teacher as its center, a personality endowed with innate pedagogical abilities and intuition for teaching.

Throughout their career, every practicing teacher designs and develops their unique methodology, which is typically far from both optimality and effectiveness. Pedagogically adequate introduction of the computer in the educational process is where the management of the educational process becomes automatized by a specially designed algorithm. Automatic control of the learning process is capable of radically remaking education. An automatic mode of education is essentially a mode of students' self-government of their learning process, just as any automated object controls its actions following the algorithm. The distinctive, essential feature of pedagogical automatization is the possibility to introduce an artificial object into an automatic mode by simply pressing the "Start" button. For a student to enter this mode, they are supposed to have the internal motivation to conscientiously perform the operations of educational activities.

It is curious to draw some historically known parallels between the fate of the didactic system put forward by the Czech monk Jan Amos Comenius more than 500 years ago, and the didactic system of e-learning introduced about fifty years ago.

Jan Amos Comenius believed that the printing press could supply textbooks for every student in the world, therefore making education accessible for everyone and universally effective. He pointed out, however, that for the textbook to be efficiently put to use, it has to be worked with at the class under close supervision of a teacher who would have a certain methodology. The textbook was not supposed to be worked with at home as a home assignment. This was how Comenius discovered the feedback mechanism in learning as a determining factor of its success. Sadly, over the past five centuries, this "single condition" was never followed. Despite textbooks being universally available today, traditional education has been actively brought to the Second World Crisis when its quality lags far behind the requirements today's society (Bespalko, 2008, p. 219).

The development of computer technologies and their integration in the educational process provided a viable solution. Unfortunately, most teachers seem reluctant to deploy this powerful tool and a revolutionary technique to revitalize education (Frederickson et al., 2005, p. 657). It happens because successful use of the computer in education is possible only if the pedagogical computer software is built on the method of e-learning, rather than vulgar empiricism and the notorious "common sense".

The popularization of e-learning in US universities serves as a compelling illustration. The transition was preconditioned not by the assumed didactic effect but rather a pragmatic economic interest.

In 2004, the US experienced an e-learning boom with universities competing to enroll almost 2.5 million students for this type of course. Despite unfolding with a traditionally big American scale they had rather little understanding of the essence of e-learning. By the middle of the first year of study, universities witnessed an uncontrolled outflow of students from such courses and/or their transfer to regular classes. Alternatively, a student would simply drop out. The major US university newspapers and journals promptly responded to this unexpected flop, among them *Chronicle of Higher Education*, *Educational Technology*, *Merlot Journal* and a few others. Many articles in these journals acknowledged that distance education is not better than face-to-face learning, but more expensive and difficult (Bernard et al., 2004, p. 401).

The articles also shed light on the findings of the teachers' surveys who elaborated on the factors that might have contributed to the e-learning

disappointing performance. It turned out that the willful ignorance of the majority of the respondents typical of the conventional education system pricked the bubble (Cladis, 2020, p. 358). Among the main factors, the respondents named “lack of funding” and “insufficient competence of instructors”. It might seem weird, however, these two factors of the inefficiency in education resurfaced in all the education reforms from Reagan to Obama. Despite massive investments in the education sphere and the increasing requirements for teachers to improve their expertise, the only thing that improved was the salaries of superintendents. Every next president coming into office faced with an even more deplorable state of education, along with even more sophisticated methods of extorting money from the government.

Quality of e-education

Quality of education, as an indicator, is preconditioned by the intellectual capability of a student, which is accumulated and grown only through independent and conscientious learning of an individual. The level of this capability to achieve results in learning relies on the methods and tools of learning brought about by the epoch in which education is functioning. Mere verbal education featured in the ancient communities in principle could not raise the quality of mass education above rudimentary acquaintance with the subject of study. If not impeded by the indifference of ignoramuses and the greed of criminals, education automatization can elevate our life to a truly human level of mass creativity and moral perfection. If this does not happen in the near historical perspective, the inevitable, new revival will sweep away all obstacles to educational and social progress resulting from it.

Unlike the conventional pedagogy that deals with the method of teacher’s “manual”, intuitive guidance, e-learning is the latest branch of pedagogical science that provides a methodology for automatic programming and control of computer-assisted learning. The essential difference between leadership and management is the feedback that informs the student about their progress in learning (Zavyalova, 2020, p. 433). Leadership does not often provide systematic and consistent feedback. Management allows it to be timely and relevant to a specific program.

The use of a computer in learning can be equated with the introduction of a new technical means of learning, the same as movies, projectors, tape recorders or television. A new teaching tool does not change the existing system of "manual" pedagogical work. The teacher just seeks to make use of some devices that are here to make things simpler. With the

pedagogically correct use of the computer, the machine assumes the function of a teacher, automating and streamlining teacher's work, which marks a new era in education. This is a change in the "means of production", the driving force behind the development of productive forces in this type of human productive activity (Zhang, 2005, p. 151). The pedagogically adequate use of the computer in education corresponds to the evolutionary way of civilization on the Earth: replacement of human manual work by machine, its mechanization, its subsequent electrification and, finally, automation. The use of computers comprehensively synthesizes all stages of updating education, turning it from a sporadic and poorly organized process into a process of purposefully managed and purposefully interconnected activities of students and teachers (Zhang et al., 2006, p. 22).

The e-learning mode does not defy a teacher in their capacity of a mentor, leader and supervisor for an undergraduate or a postgraduate student. Only a certain part of the learning process is subject to an automatization algorithm. The teacher would have enough time and freedom to solve creative didactic tasks, abundant in mass education in different volumes of courses and subjects.

E-learning prospects in education

The scientific and technological progress of the middle of the 20th century became a prerequisite to the rise of e-learning when a new science arose with its main principles conceived by the great American scientist, mathematician and philosopher Norbert Wiener in 1948 (Wiener, 1965). This science has undergone giant leaps in its development during the following sixty years and found its wide application in the development of other areas of human knowledge and practice (Kock et al., 2008, p. 191). Theoretical and practical applications in the field of information technology contributed to the rise of fundamentally new branches of science, technology and production, such as information theory and computer-assisted information technology systems. This, in turn, provided extensive automation to almost all aspects of production and managerial human activities, significantly increasing its effectiveness and quality.

While traditional pedagogical science and practical teaching remain out of the experts' focus, the use of computers, so essential in today's information world, has such a low level in the education context that the US Department of Education assesses their adoption as a "waste of time and money". Such devastating feedback to the computers in education was the result of a massive experiment by the US Department of Education, which was called to compare the efficiency of online and "face-to-face" education.

The findings were astonishing, suggesting that the didactic effect of using computers as a means of learning does not exceed the effect of face-to-face studying. Unfortunately, this analysis does not explain why computer technologies work wonders in other areas of human activity, while, when applied in pedagogy, have an effect below the cost of the metal the computer is made from (deBord et al., 2004, p. 67). Despite the obvious fallacy of the findings, their slashing conclusion as for the computer technologies adaptation in the learning process can become a long-term impediment to the progress in education allowing the current crisis and stagnation to continue. The computer must be programmed with the algorithmic rules understandable to the machine and not requiring intuitive activity to get any predetermined effect, including one that in principle can never be obtained by "manual" pedagogy (Mentzer et al., 2007, p. 241).

Conventional pedagogy is an ancient science that offers information a human being needs to successfully deal with daily activities of any range. By serving this function throughout centuries, pedagogy has been accumulating, conceptualizing and ameliorating the applied pedagogical experience of people, gradually turning into a science of human education and upbringing. Pedagogical science offers the teacher to use a certain set of generalized, speculatively proclaimed principles and methods of teaching, be it verbal, visual or practical. Given the specifics of human communication in learning processes, the teacher may choose to combine them and engage students in the process of discovery and cognition.

As we can see today, e-learning is gaining popularity in postmodern society. Its benefits have been recognized by specialists in multiple spheres outside education, including various enterprises and startups. Companies seek to streamline their activities and upgrade the professional knowledge of their staff while benefitting from cost-saving solutions. This trend has led to a clearer definition of the phenomenon of "e-learning". The European Commission interprets it as "the use of the latest multimedia technologies and Internet resources to improve the quality of education by providing access to tools and specific servers, as well as distance exchange of experience in a particular field" (Cavanaugh, 2001).

E-learning is a learning process deploying interactive electronic tools for data communication: e-courses, corporate networks, Internet.

E-learning offers several convincing benefits, including access to electronic resources of certain countries or certain fields of knowledge; affordability in terms of training costs; possibility to revise the past material at any time; the opportunity to find an adapted version of a particular course

to particular individual psychological characteristics; opportunity of continuing education, constant self-development, etc...

These advantages received positive feedback from the people acquiring higher education. Regular surveys among students of large foreign universities where e-learning technologies are applied as a supplementary feature, point out such strengths as flexibility, and time management, simple and effective revision of the training material.

In consideration of the matters described above, it is still necessary to address the number of issues, such as the level of quality of electronic resources, their verification, legal aspects (protection of intellectual property rights), costs, and search for appropriate specialists who would develop electronic courses.

Conclusion

There is no more denying that e-learning is not just a temporary fashion but it is here to stay. However, it requires a comprehensive approach to solving the above-mentioned problems. The adoption of combined learning is getting traction at a tremendous rate, transforming tertiary education with more and more universities integrating online and personalized components into their courses. Previous research has demonstrated that students may experience difficulty adapting, as motivation tends to falter in a mixed environment. When we look at conventional in-class learning, we see that there is more chance for leadership methods to be conveyed and put in place, thus, benefiting students' motivation. While relatively little attention is paid to teachers as mixed class supervisors, the teacher in mixed learning, with e-learning technologies taken advantage of, can play a crucial role in motivating students. Online presence and teacher-student relationship development are fundamental factors for e-learning. Therefore, while all available research and resources are aimed at improving our technical capabilities, the student-student system, which is not destroyed but is transformed into new forms, requires a fundamental rethink.

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