BRAIN. Broad Research in Artificial Intelligence and Neuroscience
ISSN: 2068-0473 | e-ISSN: 2067-3957
Covered in: Web of Science (WOS); PubMed.gov; IndexCopernicus; The Linguist List; Google Academic; Ulrichs; getCITED; Genamics JournalSeek; J-Gate; SHERPA/RoMEO; Dayang Journal System; Public Knowledge Project; BIUM; NewJour; ArticleReach Direct; Link+; CSB; CiteSeerX; Socolar; KVK; WorldCat; CrossRef; Ideas RePeC; Econpapers; Socionet.

2023, Volume 14, Issue 3, pages: 516-529 | https://doi.org/10.18662/brain/14.3/488
Submitted: September 27th, 2023 | *Accepted for publication:* September 28th, 2023

Using Artificial Intelligence in Education

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Abstract: *The article discusses e-learning tools as a fundamental step in implementing digital learning technologies as a factor in the development of teachers' creativity today. Recently, higher education has been developing with the help of digital technologies that significantly enhance education quality. The integration of complex software-hardware systems into the educational process lies in incorporating big data analytics, robotics, neural networks and artificial intelligence. The objectives of reforming the educational system require corresponding changes in teaching methods, as well as in higher education, through informatization and digitalization. This has led to the emergence of open education which allows for unrestricted access to educational resources. Open education also contributes to the development of digital pedagogy. Indeed, every student can choose an optimal educational programme to follow a personalized learning trajectory online which considers one's characteristics and interests. After all, the development of digital pedagogy requires addressing various organizational, methodical and practical issues. They range from implementing digital learning technologies in the context of open education and culminating in the creation of a long-term strategic plan that will gradually transform the educational process and, in turn, encourage teachers to think creatively.*

Keywords: *Use, priorities, technologies, functions, tools, methods, implementation.*

How to cite: Shuliar, V., Shkurko, V., Polukhtovych, T., Semeniako, Y., Shanaieva-Tsymbal, L., Koltok, L. (2023). Using Artificial Intelligence in Education. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience, 14*(3), 516-529. https://doi.org/10.18662/brain/14.3/488

Introduction

E-learning serves as the foundation for developing digital pedagogy and open education. It is a form of education with the potential to enhance the quality of professionals, increase the competitive advantage of educational institutions by attracting new pedagogical and personnel resources to implement educational programmes and boost the institution's brand recognition in the informational space. According to Mahdavi (2014, p. 531) and Alemnge (2018, p. 802), the presence of an e-learning toolkit is a critical factor in e-learning and open education success.

Franchuk & Prydacha (2021) believe that developing teachers to skilfully use digital technologies is a complex scientific problem (p. 349). To ensure successful open education, teachers must be adequately trained to use e-learning as a way of promoting creative skills in their professional work.

Research methods include the following: a detailed analysis of philosophical, pedagogical, psychological, methodical and legal literature; pragmatic methods; qualitative and quantitative methods for processing scientific information.

Importantly, this article surveys the introduction of new tools with the progression of artificial intelligence (hereinafter "AI") in the educational sphere. The field of higher education is viewed as an experimental area for implementing AI products and transforming education digitally.

Thus, the article aims to theoretically analyze the integration of e-learning tools into the educational process, examine the advantages and disadvantages of e-learning as a new model of educational environment for teachers and specify the concept of AI as a factor in developing their creativity.

Theoretical Analysis of E-Learning Tools Integration into the Educational Process

Nowadays, pedagogy focuses on improving teaching methods and technologies since the preparation of highly qualified professionals in all fields of activity, amid dynamically changing economic and social spheres and the outlined prospects of integrating digital technologies, is a priority national task. Both the reform and modernization of higher education are closely linked to the use of digital learning technologies and the tendency towards informatization, which creates opportunities for new areas in research on organizing the educational process. Simultaneously, educational

informatization establishes an effective centralized hub for international learning, which constitutes the foundation of open education.

The rise of educational informatisation and the development of an information-educational environment has sparked the emergence of pedagogical research in the field of ICT and digital technologies, as well as the promotion of e-learning. Indeed, e-learning has become a means of implementing open education within the framework of building an information-educational environment. This includes the use of databases to develop educational activities and implement educational courses, as well as information technologies, technical instruments, data and telecommunication networks to transmit this information via communication channels and facilitate interaction between students and teachers (Omarov et al., 2020).

Additionally, e-learning is identified as an educational process that is conducted over the Internet and multimedia platforms, due to its emphasis on multimedia content. It is an integral part of the educational process, as evidenced by the ongoing development of the legal framework for e-learning in education. E-learning is not only a means of implementing open education but also a new form of learning. By introducing digital technologies into pedagogy and providing new educational content, e-learning environments act as a catalyst to change the world and the foundations of education.

As noted by Khyzhniak (2010), this is the reason e-learning is seen as a revolutionary form of educational technology progress (p. 351). Different scholars have diverse understandings of the concept of e-learning. E-learning is the use of software tools to teach specific educational subjects, incorporating ICT to facilitate learning and creating conditions for different types of educational activities. At the same time, e-learning platforms should be characterized by their high standard of implementation and artistic construction, comprehensive informational material, first-rate teaching toolkit, technical superiority, attractive visuals, logical integrity and uniformity of display.

The didactic characteristics of e-learning tools cannot be maintained if they are transferred to their paper equivalents. According to this logic, they should have the following characteristics:

- E-learning tools should include a combination of graphical, textual, digital, voice, musical, video, photo and other types of information.
- E-learning tools may consist of information sources, tools for creating and processing information, as well as management structures.

- E-learning tools should prominently feature well-arranged material from science and practical knowledge fields, enabling students to create and actively acquire knowledge, abilities and skills in this area.

The use of e-learning tools adheres to fundamental didactic principles. Primarily, it entails the use of instruments to acquire data visually using a variety of strategies, including up-to-date multimedia tools, visual props, and traditional resources, in the learning experience. E-learning tools require a computer-based infrastructure within computer networks to function properly. Computers and computer networks are integral to the technical infrastructure, with computers being utilized to host and present educational information. Hence, e-learning tools can be accessible to students both in global and local networks.

Liashenko (2015) claims that today's teachers should employ teaching tools that exploit the capabilities of information technologies as e-learning instruments (p. 169). These tools include providing educational information using multimedia technologies, engaging in interactive feedback with users, monitoring learning outcomes and progress, automating information processes and facilitating methodical support for the educational process and organizational management of educational institutions. Such an approach to defining e-learning tools requires the adaptation of the teacher's personal qualities.

The teacher becomes not only a user of tools but also an administrator, which allows one to incorporate an authorial approach to implementing educational disciplines and enriching them with additional functions. These functions allow for tailoring the material to the student's requirements and the personal traits of the teacher.

Advantages and Disadvantages of E-Learning as a New Model of the Educational Environment for Today's Teachers

The current educational environment is being shaped by the introduction of new learning standards based on recent scientific discoveries, advanced tools and innovative teaching techniques. It needs to be acknowledged that outdated educational technologies are still employed in the educational process nowadays, which cannot meet the needs of the current information society and generate unsatisfactory learning outcomes. In the last decades, there has been intensive growth in information and communication technologies (webservices, streaming media, mobile applications, augmented reality), which are practically used in all spheres of human activity and define the development of the global community.

Online education can be obtained without leaving home, either for free or at significantly lower costs than traditional education. This tackles the problem of social disparity and equal opportunities as those with limited funds can still study at top universities around the world. Moreover, education becomes accessible regardless of the place of residence, age, health status, elite status or financial condition. E-learning technologies help intensify learning by combining various forms of educational information and interactive interactions between the learner and the system. Incorporating multimedia elements such as graphics, animation, video and audio formats enhances the visual memorability of materials (Driscoll, 2012, p. 7).

Recent psycho-pedagogical studies have shown that multimedia presentation of information provides more opportunities for effective learning. Multimedia tools can have a synergistic effect on the human senses, which is what enables learning to be successful. The implementation of e-learning leads to increased effectiveness of individual learning. At the same time, learning individualization allows one to choose an individual learning pace based on individual abilities.

This format bolsters the development of self-study abilities since the students can select their course of study and speed, overlook or backtrack to particular modules and segments and are not dependent on the teacher, in addition to other gains. In this regard, e-learning technologies help eliminate negative attitudes towards learning, such as passivity resulting from a lack of understanding of covered or missed material. Electronic resources have been found to be instrumental in improving motivation, diminishing nervousness and anxiety and eliminating the stress of teacher and group influence that often stifles students from reaching their highest potential, while disposing of the factor of subjective assessment (Buhaichuk, 2016, pp. 13–15).

The positive aspects of e-learning notwithstanding, considerable self-discipline is necessary to master an online course. Key factors for successful learning include self-confidence, self-organization and strong motivation from the learner's side. If one is not capable of acquiring knowledge without instructor control, e-learning may not be suitable for them. After all, e-learning is a conscious and deliberate decision. On the other hand, the lack of computer skills may be another obstacle. Mastering mobile applications, downloading files working with text and video communication can be a serious challenge.

E-learning does not involve any direct communication between the teacher and other students. For certain individuals, missing out on an emotional connection is a con of this learning format. Webinars and video conferences can partially compensate for this limitation. A potential problem

with e-learning is the overload of information and the cognitive burden it can bring. Working with webpages, numerous hyperlinks, simultaneous assimilation of read (or viewed) material and building a logical chain of reasoning when navigating through hyperlinks expand and complicate the context of the task. Due to improper structuring of information, the learner may deviate from their learning objective.

Some researchers point to the issue of "knowledge erosion" as a disadvantage of e-learning, which is caused by the availability of "semi-finished" knowledge in the online space, leading to a discrepancy between knowledge acquisition and practical experience (Maksymchuk et al., 2022a, p. 512; Maksymchuk et al., 2022b, p. 430). Hence, certain requirements arise for minimizing the negative effects of multimedia (information overload, ergonomic issues, distraction). This format has both its advantages and disadvantages, as has been already mentioned. Short modules and online learning sessions are not suitable for in-depth exploration of topics, solving complex problems or developing skills.

They encourage thinking within brackets instead of mosaic thinking that creates a holistic picture of the world. At the start of using e-learning, teachers may experience a range of challenges. These include a) investing considerable amounts of time into creating digital educational materials, b) low proficiency in information technology, c) the difficulty or complexity of transferring courses into digital format, d) the need to revise the orientation of educational material, e) stimulating personal creativity, f) lack of enthusiasm from the management. Creating a motivating system that is compatible with the university's rewards scheme and local customs can help teachers become part of the e-learning system (Sarancha et al., 2022).

It is a matter of such motivations as a) taking into account the time devoted to developing e-content in the educational workload, b) implementing individual assessment of teachers and awarding points for use, adoption and application of e-learning tools, which can be converted into bonuses, c) assigning quality ratings. Despite temporary challenges, e-learning provides new possibilities for teachers.

Using the latest ICT, as well as innovative didactic and methodical approaches, can boost pedagogical skills and qualifications, thereby increasing their value in pedagogical assessment. Additional skills acquired by teachers include proficiency in the use of current communication technologies (the ability to use relevant equipment for local and international networks, webcams and software to conduct audio-video conferences).

Current conditions require educational institutions (universities, colleges, training centres) to make maximum efforts to attract their target

audience since the increased demands on educational activities, reduced funding and demographic shifts have led to intensified competition in the educational services market. One of the most important factors of institutional competitiveness is the innovative component: a) the implementation of innovative educational technologies and programmes, b) advanced forms of education organization c) active teaching methods accorded with global standards, d) the integration of education and innovations, e) the development of graduates' professional competencies to ensure their competitiveness in the labour market.

E-learning is essential in implementing innovative technologies in education (Alemnge, 2018; Bartoszewicz & Gulińska, 2013). Besides, e-learning tools promote integration into the global information-educational space and improve education quality by providing access to high-quality educational and methodical materials. They assist one in studying the experience of colleagues and expanding opportunities for professional teacher development. Furthermore, e-learning tools enhance education organization and comprehensively address the objectives of designing, implementing and supporting the educational process. Finally, implementing advanced educational technologies lessens the amount of work for students, abolishes spatial and temporal restraints for learning, improves the effectiveness of communication between teachers and students and speeds up the sharing of educational resources.

Importantly, the rise of e-learning has spawned new research opportunities in the field of educational technologies, learning management systems and the social and cultural implications of open education. The development of e-learning is associated with financial, organizational and technical challenges. It is essential to use the most advanced equipment to implement revolutionary educational ideas. This guarantees the formation of qualified technical experts and instructors who are proficient at developing virtual information-educational environments. It also entails offering advisory, methodological and organizational support, leveraging contemporary digital resources and information and communication technology (ICT) to craft e-learning materials and sustaining a cutting-edge educational technology ecosystem (Krouska et al., 2018).

AI as a Factor in Training and Development of Teachers' Creativity in Today's Educational System

Digital transformation is the latest process of applying digital technologies to the entire spectrum of the human knowledge lifecycle, radically changing human existence. It is a crucial tendency nowadays, especially within higher education. By using digital technologies in higher education, students can access a wider range of educational resources and opportunities, particularly through reduced financial expenses on education.

The concept of a "digital curriculum" emerged with the introduction of computers in education. Digital educational programmes and their elements were gradually implemented to enhance the educational space. AI is presently employed as part of online educational programmes and platforms, thus helping teachers to nurture their creative skills. It is designed to help organize educational activities by creating a specialized interactive learning environment. The main advantage of such a system is its ability to accommodate the individual learning characteristics of each student.

Furthermore, AI can detect and correct errors made by students when using up-to-date educational materials such as e-books, multimedia guides, simulators and others. An AI-based platform can provide feedback to the actors in the educational process, track their progress and improve the educational content. Another use of AI as a creative tool to implement the most advanced teaching methods is to generate additional educational resources and make them obtainable to students (Yusupova et al., 2016).

At the same time, AI can consolidate various educational materials into unified online resources for teachers and students. This ensures better access to subject-specific materials, making teaching more effective and allowing teachers to integrate educational content from different sources into a cohesive whole. AI can be a significant aid in assessing student work (assuming precise assessment is feasible, such as with questionnaires or tests). By using AI, teachers can reduce the time spent on assessment and increase the quantity and format of relevant assessable tasks.

Bednarczyk & Krawczyk (2009) commented that the new technologies, inventive education techniques and methods related to AI in education have promising applications in the following areas:

- Tailoring technologies to meet the specific requirements of those with special educational needs.

- Personalized learning paths (teaching strategies and learning styles are customized to suit each student's individual requirements, skills and interests).
- Independent assessment systems.
- Testing systems and processing of their results.
- Personalized feedback.
- Interval learning (p. 27).

When conducting pedagogical experiments or data collection, AI eliminates the human factor and makes the process more efficient and accurate.

Technological progress is becoming increasingly accessible, and many fields are expected to benefit from the technological achievements that AI can bring. On the one hand, AI offers numerous advantages in solving social issues. Human mistakes are the primary source of issues in our society, and AI can help to rectify this by improving people's judgement abilities. Thus, it follows that AI has many positive aspects and addresses both educational and social problems.

Universities are using AI to enhance the educational environment and create a more efficient and effective learning environment. However, there is a risk of developing unethical AI technologies. As AI becomes more "intelligent", neural networks offer a wide range of applications in many areas of human activity, making the world much more convenient. Simultaneously, they have also created numerous ethical dilemmas. Overall, AI has the potential to create serious challenges for humanity. In recent years, AI has become a topic of significant scientific and practical interest.

Intelligent systems are capable of performing tasks that require common sense and human intelligence. AI is rapidly becoming a reality as such concepts as machine learning, natural language processing (machine translation), computer analysis and robotics are becoming more accessible to universities as the latest equipment becomes available. Educational methods and approaches are being advanced and updated.

Today, universities possess access to powerful computers used for educational purposes. These machines can analyze an abundance of data in a much faster manner than before. Additionally, cloud services provide easy access to high-performance computing resources on the Internet. This facilitates the use of intricate machine learning algorithms at a wide scope. With hardware and software developing at a rapid pace, AI technologies are becoming a reality in higher education.

Neural networks can enable universities to generate adaptive educational systems and construct personalized learning pathways. E-learning provides easy access to educational materials regardless of location and time zone. Personalized e-learning programmes can accelerate learning as they cater to the specific needs of individual students. AI technologies are also used for research purposes, helping one understand human thinking and behaviour better. This is especially useful when studying human motivation, decision-making, and more complicated psychological actions. The high-tech teaching and research environment leads to significant breakthroughs in fields such as psychology, neurosciences, cognitive sciences and social sciences research. The results have far-reaching implications for society as a whole, both positive and negative, as evidenced by recent advancements in AI technologies.

Numerous ethical questions arise when they are applied in higher education (McCarthy, 2016, pp. 725–727). These are the following: a) the limits of using technologies in the educational process; b) whether students should be aware that their performance is being monitored by computer algorithms; c) the availability of safeguards against fraud when using these technologies; d) whether teachers should know how machine algorithms assess their work. It is crucial to address them shortly as AI technologies become increasingly prevalent in higher education.

Education is increasingly incorporating advances in science and technology. The greatest challenge in this field is the question of how machines should behave from an ethical standpoint. Despite its helpful applications, employing AI ethically is often a complex process. What poses the greatest ethical conundrum is who will control AI and how it should act ethically. To avoid any potential danger to people, it is prudent to be aware of techniques to keep neural networks under human control. Before such circumstances come to pass, one must be ready to address these questions as how humanity uses AI will have a major effect on the future of higher education.

If AI reaches a level of intelligence similar to humans, then the development of AI could pose a potential risk of human control being overtaken (Muehlhauser & Helm, 2013, p. 111). Recently, there has been significant speculation regarding the impact of AI on humanity's future. Numerous experts emphasize the need for caution in the advancement of new technologies, especially when dealing with neural networks. Additionally, researchers note that the exploration of how machines can influence human behaviour is still in its early stages within the field of ethics.

Conclusions

The relevance of this article lies in the current social and economic shifts in the post-industrial realm, where the implementation of digital advancements in education has made open education a necessity. E-learning becomes a crucial means of implementing open education within the information-educational environment of educational institutions. The contradiction between a need for a digitally competent staff in the educational community and the lack of preparation of teachers for the use of digital technologies in the classroom can be addressed by introducing a scientifically based system for training them to engage in inventive professional activities and advance their qualifications.

The article argues that the effective preparation of university teachers for the use of e-learning tools in professional activities can be measured by indicators of education quality, such as academic performance and results of tests, satisfaction with learning processes and individual educational pathways. By having an open and clear system of evaluation for learning outcomes, educational institutions can tackle the issue of establishing the right conditions for electronic resource-based educational programmes.

The article concludes that using AI technologies in the educational process has the potential to significantly foster essential competencies in higher education, develop the creative skills of today's teachers, upgrade the competitiveness of educational programmes, boost the quality and availability of the educational environment and introduce innovative learning formats. Despite the various advantages of AI, colleges and universities have yet to fully capitalize on its potential.

Acknowledgement

Authors 1 and 2 theoretically analyzed the integration of e-learning tools into the educational process. Authors 3 and 4 specified the advantages and disadvantages of e-learning as a new model of the educational environment for today's teachers. Authors 5 and 6 studied the concept of AI as a factor in training and developing teachers' creative potential in the current educational system.

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