



## PAST, PRESENT AND FUTURE OF DISTANCE LEARNING PROŠLOST, SADAŠNJOST I BUDUĆNOST UČENJA NA DALJINU

Sanja Selimović \*<sup>1</sup>, Stanko Blatnik <sup>1</sup>

<sup>1</sup> IPAK Institute for Symbolic Analysis and Development of Information Technologies,  
Velenje, Slovenia

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### ABSTRACT

The paper examines the development of distance learning with a focus on the application of the internet based on the authors' experiences gained from implementing various distance learning projects. The methodology of distance learning has not significantly changed since its inception in the 18th century; rather, the mode of communication between students and teachers has evolved. At present, there is little room for improvement in distance learning through the use of new technological solutions. However, the use of artificial intelligence opens up new possibilities for education that will fundamentally transform the shape of education in the future. Based on their experiences, analysis of the development of distance learning, and trends in artificial intelligence, the authors have conceptualized the P3 education model, which is predictive, personalized, and proactive. This model will first be applied in non-formal education and will be implemented more slowly in the formal education system, which is conservative and slow to embrace change. However, within a few years, as every individual with a smartphone will have their own digital teacher (an icon on the phone screen to be tapped), the formal education system will undergo seismic changes.

**Key words:** distance learning, artificial intelligence, education, paradigm change.

### SAŽETAK

U radu se analizira razvoj učenja na daljinu s fokusom na primjenu interneta, na temelju iskustava autora stečenih kroz realizaciju različitih projekata učenja na daljinu. Metodologija učenja na daljinu se nije značajno promijenila od svog nastanka u 18. stoljeću; promijenio se način komunikacije između studenata i nastavnika. Trenutno postoji malo prostora za poboljšanje u učenju na daljinu putem novih tehnoloških rješenja. Međutim, upotreba umjetne inteligencije otvara nove mogućnosti za obrazovanje koje će temeljno transformirati oblik obrazovanja u budućnosti.

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#### <sup>1</sup> Correspondence to:

Selimović Sanja, IPAK Institute for Symbolic Analysis and Development of Information Technologies

E-mail: sanja@ipak.si

Na temelju njihovih iskustava, analize razvoja učenja na daljinu i trendova umjetne inteligencije, autori su koncipirali P3 model obrazovanja koji je prediktivan, personaliziran i proaktivan. Taj model će se prvo primijeniti u neformalnom obrazovanju, a implementacija u formalnom obrazovnom sustavu će biti sporija zbog konzervativnosti i otpora prema promjenama. Međutim, za nekoliko godina, s obzirom da će svaka osoba s pametnim telefonom imati svog digitalnog učitelja (ikona na zaslonu telefona koju treba dodirnuti), formalni obrazovni sustav će proći kroz temeljne promjene.

**Ključne riječi:** učenje na daljinu, umjetna inteligencija, edukacija promjena paradigme.

## INTRODUCTION

The history of distance learning is much longer as it could be expected. In accordance with document (University of Florida) it started in 18th century. However some authors argue that the origins of distance learning can be traced back to 1840 when Sir Isaac Pitman, an English educator, taught shorthand through mail. He would send instructional texts on postcards to his students, who in turn would send him their completed assignments. Correspondence courses continued to evolve, and in 1858, the University of London became the first college to offer diplomas through distance learning, (Museum of Distance Education).

Three decades later, in 1888, the International Correspondence Schools was established as the largest private for-profit school based in Pennsylvania. Its primary purpose was to provide training for immigrant coal miners who aspired to become state mine inspectors or foremen. In 1894, the school enrolled 2,500 new students, and the following year witnessed the graduation of an impressive 72,000 students. This growth can be attributed to the practice of sending complete textbooks instead of individual lessons, coupled with the utilization of 1,200 proactive personal sales agents. By 1906, the total number of students enrolled in the International Correspondence Schools had reached an impressive 900,000.

While the advent of technologies such as radio, telephone, and television during the twentieth century contributed to the expansion of distance learning, the true revolution in this field came with the development of the internet in the late twentieth century. The internet allowed for a significant shift from a one-to-many communication system to a one-to-one model. With this new paradigm, teachers and students could maintain constant contact regardless of their geographic locations or time zones. The only prerequisites for successful engagement in distance learning are reliable internet access and appropriate devices such as computers, tablets, or smartphones.

An analysis of the online learning landscape reveals several key insights (guru99). Since its inception, the field of online learning has experienced an astounding 900% global growth, solidifying its position as a thriving industry. Microlearning, which refers to bite-sized e-learning modules, accounted for a significant 60.7% of online learning in 2018.

A substantial majority, at least 60%, of internet users actively engage in online learning. Learning platforms have gained remarkable traction, with 80% of businesses and 50% of institutional students utilizing these platforms for their educational needs. E-learning has proven to be highly efficient, saving employees and students between 40% to 60% of the time required for traditional learning methods.

One prominent platform, Udemy, boasts an impressive community of over 20,000 expert instructors, attracting approximately 12 million students worldwide. Another leading platform, Teachable, hosts more than 7,500 instructors and offers an extensive selection of over 20,000 online courses, catering to around 3 million students. The American and European markets collectively contribute to 70% of the global user base in the e-learning services market. Online learning tools have become an integral part of daily academic life, with 63% of American students relying on them regularly. Video-based content plays a pivotal role in online learning, as evidenced by Sony's sale of 500 million units of PlayStation Virtual Reality in 2017. Mobile devices are increasingly prominent in the learning process, with 67% of American college students utilizing their smartphones to complete course activities. The percentage of students exclusively graduating through online learning has risen from 3.8% in 2008 to 10.6% in 2016. Furthermore, a noteworthy category within online learning is MOOCs (Massive Open Online Courses) offered by universities, attracting a large enrollment of students. In 2020, leading MOOC platforms reported substantial participation numbers, a wide variety of courses, and an impressive count of degrees awarded. By the end of third quartal 2022, most popular MOOC platform Coursera had reached 113 million total registered learners. The number of courses on the platform grew from 8,250 to 10,300. in one year (Class Central, 2022).

## **INTERNET BASED DISTANCE LEARNING**

From 1995 to 2003, the Inova IR company and IPAK Institute collaborated to organize online courses in software development for students at the Computer Department of the Electrical Engineering faculty at the University of Sarajevo. This initiative was undertaken in the aftermath of the Bosnian war, during which many teachers had left Sarajevo, resulting in a shortage of instructors.

During a visit by Professor Baručija from Electrical Engineering Faculty from Sarajevo in late 1995 to Slovenia, discussions were held on how to provide assistance in educational process in Sarajevo. It was suggested that an online course, with an interactive format, could be the solution. However, at that time, advanced tools for online communication were not as readily available as they are today, and the communication infrastructure was not as fast and reliable. As a result, Internet Chat Relay (IRC) was chosen as the primary means of real-time communication, while email was used for submitting assignments and receiving feedback from students.

The course included IRC sessions twice a week, and at the end of the program, students traveled to Slovenia for a week-long visit. During their visit, they had the opportunity to explore various companies and witness the practical implementation of computers in process control. This firsthand experience provided valuable insights and practical knowledge to complement their online learning.

This course holds a significant place in the history of online learning as one of the earliest initiatives of its kind in Europe. Through this endeavor, the teachers gained invaluable expertise in the field of online education, knowledge that the IPAK Institute later utilized in multiple online learning projects. Here is a closer look at the teaching experience acquired during the execution of this course (Blatnik, Špegel, Protić, 1998).

From 1995 to 2003, we had the privilege of instructing students from the Computer Science unit of the Electrical Engineering Department at Sarajevo University. During this period, our primary mode of online communication was Internet Relay Chat (IRC). Unlike modern platforms like Zoom, IRC relied solely on typed text communication without any visual components. Surprisingly, this unique characteristic enhanced our ability to concentrate on delivering lectures effectively.

By relying exclusively on typed text, we found ourselves fully immersed in the lecture content and better able to convey information. The absence of visual distractions allowed us to maintain a strong focus on the subject matter, ensuring that my students received a comprehensive and uninterrupted learning experience.

Additionally, the nature of IRC fostered a more thoughtful and deliberate exchange of ideas. Unlike real-time video conferencing, where individuals might interject or respond spontaneously, IRC's asynchronous nature provided students with the opportunity to compose well-thought-out responses. This allowed for more in-depth discussions and analyses, as students had time to reflect and formulate their contributions.

Furthermore, the use of IRC promoted a sense of equality among all participants. Since everyone was represented solely by their text contributions, factors such as physical appearance or body language did not influence the dynamics of the discussion. This created a level playing field, empowering students to freely express their thoughts and ideas without the subconscious biases that may arise in a face-to-face setting.

Overall, the experience gained from this course proved invaluable, laying the foundation for future online learning projects. The teachers' enriched expertise in online education became a cornerstone for the IPAK Institute's subsequent endeavors, enabling them to deliver effective and engaging online learning experiences.

There are two key lessons we have derived from this course. The first is the effectiveness of blended learning, which combines online and face-to-face instruction. We have found that this blended approach yields the best learning outcomes. The second lesson pertains to teaching about the use of computers in industrial processes, where we discovered the significance of a concept now known as digital twinning.

In all the courses we organized, we adopted a blended learning model, recognizing its value in facilitating comprehensive learning experiences. By integrating online resources and activities with in-person interactions, we were able to create a dynamic and engaging educational environment that catered to diverse learning styles and preferences.

Furthermore, in the Minerva project "Distance Learning Course in Science and Engineering Using Online Case Studies" we endeavored to incorporate the concept of digital twinning (Blatnik, Carey, 2002). Digital twinning involves creating a virtual replica or simulation of physical systems or processes, enabling learners to explore and interact with them in a digital space. This approach offers a unique opportunity to bridge the gap between theory and practical application, allowing students to gain hands-on experience and develop a deeper understanding of the subject matter.

However, it is important to note that the limitations of the technology available at the time hindered us from fully realizing the intended outcomes.

The level of technological advancement at that period constrained our ability to achieve the planned results. Nonetheless, the experience gained from exploring hybrid learning and the potential of digital twinning has served as a valuable foundation for future endeavors in leveraging technology for effective education and training.

During and after the Covid crisis, we actively participated in two Erasmus+ projects: (Train4inclusive, 2021 and (IDEAL, 2022). Our role in these projects involved the development of a web platform and the organization of online training sessions. While we had the option to utilize more advanced technologies like synchronous Zoom for online training, we encountered certain limitations that prompted us to reconsider this approach.

One significant challenge we encountered while teaching through Zoom is the limited visual perspective we have of the classroom. Unlike in traditional face-to-face learning, where we can observe our students in real-time, Zoom only allows us to see individual video feeds or a grid view of participants. This lack of a comprehensive view makes it difficult for us to gauge the overall classroom dynamics and effectively assess student engagement.

In a physical classroom, we can readily observe students' reactions, body language, and facial expressions, which provide valuable cues about their understanding, confusion, or interest in the subject matter. These non-verbal signals help us adjust our teaching approach, clarify concepts, or delve deeper into a topic if necessary. However, when teaching on Zoom, these non-verbal cues are limited or, at times, even absent, making it harder for us to gauge students' level of comprehension and address their individual needs.

Additionally, the absence of spontaneous interactions and immediate feedback from students can hinder the learning experience. In a traditional classroom, students can easily ask questions, seek clarification, or provide input during discussions, contributing to a more dynamic and engaging learning environment. However, in a Zoom setting, students may feel less inclined to actively participate or might hesitate to unmute themselves, resulting in a less interactive and vibrant classroom atmosphere.

Moreover, Zoom fatigue and limited attention spans due to extended screen time can further compound the problem. Students may become less responsive or disengaged during online classes, making it challenging for us to gauge their understanding or identify areas that need more focus.

While Zoom offers features like virtual hand raising, chat functions, and breakout rooms to enhance interaction, these alternatives cannot fully replicate the immediacy and richness of face-to-face communication.

As an educators, we value the feedback and connection that comes from in-person teaching. The ability to read the room and adjust our teaching accordingly is an invaluable aspect of the learning process. Although Zoom and other online platforms have been instrumental in ensuring the continuity of education during challenging times, we do miss the holistic view of the classroom and the valuable feedback that can only be obtained in a face-to-face learning environment.

We experimented with combining face-to-face and Zoom-based teaching approaches, and our experience led us to conclude that it can be challenging to seamlessly integrate these two different methods. We believe that a successful combination could be achieved only with the availability of more sophisticated equipment and technology.

When attempting to merge face-to-face and online teaching, we encountered various hurdles. One major obstacle was ensuring equal participation and engagement from both the in-person and remote students. It was difficult to strike a balance between addressing the needs of those physically present in the classroom and simultaneously catering to the online participants. The hybrid nature of the class required careful coordination and adaptability to accommodate both groups effectively.

Another challenge we encountered was the technical aspect of conducting hybrid classes. Inadequate equipment and infrastructure posed limitations in terms of providing a seamless experience for both sets of students. It became apparent that for a truly efficient combination of face-to-face and Zoom-based teaching, more sophisticated and reliable technology would be necessary. This would include features such as high-quality audio and video equipment, seamless connectivity, and enhanced interactive tools to ensure smooth communication and engagement.

Additionally, the integration of face-to-face and online teaching approaches demanded a reevaluation of instructional strategies and classroom dynamics. It required the development of new methodologies that would leverage the strengths of each approach while mitigating the inherent challenges. This process of adapting teaching methods and finding a harmonious balance between the two modes of instruction was time-consuming and required extensive planning and training.

We firmly believe that the most effective approach to education is blended learning, which combines both online and face-to-face elements. Blended learning offers students the flexibility to choose when and where they learn while still providing the opportunity for direct contact with teachers to seek clarification on challenging subjects.

One of the key advantages of blended learning is the freedom it provides to students in managing their learning schedules. With online components available, students have the flexibility to access course materials, lectures, and assignments at their convenience. They can engage in self-paced learning, allowing them to delve deeper into topics of interest or review concepts as needed. This flexibility accommodates diverse learning styles and individual preferences, fostering a personalized learning experience.

In addition, blended learning offers the valuable opportunity for direct contact with teachers when students encounter difficulties understanding certain subjects. Through face-to-face interactions, students can engage in discussions, ask questions, and receive immediate feedback from their teachers. This personalized support enhances comprehension and allows for a deeper exploration of complex concepts. The availability of direct contact helps build stronger teacher-student relationships, creating a supportive and engaging learning environment.

Moreover, blended learning enables students to benefit from the best of both worlds: the convenience and accessibility of online learning combined with the social interaction and collaborative learning opportunities provided by face-to-face instruction. In-person interactions facilitate peer-to-peer engagement, teamwork, and the exchange of diverse perspectives, which are essential components of a well-rounded education.

Blended learning also prepares students for the digital age by equipping them with essential technological skills and digital literacy.

As technology continues to play a significant role in various aspects of life, including education and careers, blending online components into traditional classroom settings helps students develop the necessary competencies for success in the digital world.

## **FUTURE OF DISTANCE LEARNING**

We believe that the future of distance learning lies in the integration of Artificial Intelligence (AI), which will enable the development of what we refer to as P3 education. P3 education represents a paradigm shift in education, encompassing three key elements: personalization, proactive guidance, and predictive analytics.

Personalization is at the core of P3 learning. By harnessing the power of AI, educational platforms can adapt and customize the learning experience to meet the unique needs and preferences of each individual learner. AI algorithms can analyze vast amounts of data, including learners' performance, interests, and learning styles, to deliver personalized content, resources, and assessments. This tailored approach ensures that learners receive the most relevant and engaging educational materials, maximizing their learning outcomes.

Proactive guidance is another crucial aspect of P3 learning. AI-powered systems can act as intelligent mentors, providing real-time feedback, guidance, and support to learners. Through natural language processing and machine learning algorithms, these systems can interact with learners, answer questions, and offer personalized suggestions for improvement. Proactive guidance empowers learners to navigate their educational journey with confidence, fostering self-directed learning and enhancing their overall experience.

Predictive analytics forms the third pillar of P3 learning. By analyzing learners' past performance, engagement patterns, and other relevant data, AI algorithms can generate insights and predictions about their future progress. These analytics enable educators and institutions to identify at-risk learners, intervene in a timely manner, and provide targeted interventions to support their success. Predictive analytics also help optimize educational resources and identify areas where instructional design or curriculum adjustments may be beneficial.

Incorporating AI into distance learning offers immense potential for revolutionizing education. The integration of personalization, proactive guidance, and predictive analytics through P3 learning will empower learners to achieve their full potential, enhance the effectiveness of educators, and enable educational institutions to make data-informed decisions. As technology continues to advance, we are excited about the transformative possibilities AI brings to the future of distance learning and the opportunities it creates for lifelong learning and inclusive education.

## **CONCLUSION**

Through an analysis of the past, present, and future of distance learning, we have made significant findings. Distance learning has a rich history where the educational methodology has remained unchanged, while technology has shaped the communication between students and teachers. It began with traditional mail, and then evolved through telephone, radio, TV, and eventually the internet in the 1990s.

At present, distance learning has reached a point where there is limited scope for further improvement in student-teacher communication. However, we anticipate radical changes primarily in the methodology of distance learning in the future.

The advent of artificial intelligence will play a crucial role in the development and implementation of a groundbreaking model we have conceptualized as the P3: predictive, personalized, and proactive education model. Initially, this model will be applied in non-formal education settings, such as distance learning. Its integration into the formal education system will be a slower process due to the challenges posed by the need to shift paradigms in a complex and conservative educational system entrenched with significant inertia.

Nonetheless, once the P3 model is successfully implemented within the formal education system, the resulting changes will be transformative. The education system will undergo seismic shifts, marking a departure from the established norms of the past two centuries. The future of education will be forever altered.

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