International Journal of Research in E-Learning

vol. 10(2), 2024

UNIWERSYTET ŚLĄSKI
WYDAWNICTWO

International Journal of Research in E-Learning

Vol. 10 (2), 2024

Wydawnictwo Uniwersytetu Śląskiego • Katowice 2024

Indexed in
ERIH PLUS, DOAJ, EBSCO, MIAR, ICI Journals Master List – Index Copernicus (ICV = 100 (2021)), Central and Eastern European Online Library CEEOL (https://www.ceeol.com), Academic Resource Index ResearchBib (https://www.researchbib.com/), Polska Bibliografia Naukowa (https://pbn.nauka.gov.pl), Google Scholar, The Journals Impact Factor (http://jifactor.org/), CEJSH, BazHum, Journal Factor, CEON, OAJI (Open Academic Journals Index), ESJI (Eurasian Scientific Journal Index)

Contents

International Journal of Research in E-learning
Vol. 10 (2), 2024, pp. 1–5

DOI 10.31261/IJREL.2024.10.2

Editorial

The Editorial Board of International Journal of Research in E-learning (IJREL) is privileged to present a new volume 10(2) 2024. The content of the current issue was divided into four chapters. The first is devoted to Theoretical, Methodological and Practical Aspects and Psychological Determinants of ICT and E-Learning in Education. The second contains articles concerned with Innovative Methods and Technology in Education. The third concerns Research on Distance, Online and Blended Learning Before, During and After the Pandemic Time of COVID-19. And the forth includes the Report on the international scientific conference DLCC2024.

The first part of the volume Chapter I: "Theoretical, Methodological and Practical Aspects and Psychological Determinants of ICT and E-Learning in Education", contains three articles.

The article **Education in the Era of AI, Enhancing Skills, Challenges and Perspectives – International Context and National Experience** prepared by an international team of experts from five countries – **Nian-Shing Chen**, from National Taiwan Normal University, Taiwan; **Eugenia Smyrnova-Trybulska**, from University of Silesia in Katowice, Faculty of Arts and Educational Sciences, Katowice, Poland; **Nataliia Morze,** from Borys Grinchenko Kyiv Metropolitan University, Ukraine; **Anna Ślósarz,** from University of National Education Commission, Institute of Journalism and International Relations, Kraków, Poland; **Todorka Glushkova,** from Plovdiv University "Paisii Hilendarski", Bulgaria; **Małgorzata Przybyła-Kasperek,** from University of Silesia in Katowice, Institute of Computer Science, Poland; **Miroslav Hrubý**, from University of Defence, Brno, the Czech Republic and **Štefan Gubo,** from J. Selye University, Faculty of Economics and Informatics, Komárno, Slovakia. The article summarizes insights from a round table debate on AI in education, focusing on three main topics: e-learning and soft skills enhancement, good practices using AI for soft skills development, and AI's perspectives and challenges in education. The experts concluded that AI and robots can revolutionize education via creating personalized, efficient, and inclusive learning environments. Benefits include task automation, real-time feedback, and support for diverse needs. However, challenges like equity, privacy, bias, and ethical concerns must be addressed. Success requires adequate

teacher training, focus on equity and accessibility, ethical considerations, strong data protection, and maintaining human interaction and creativity. By addressing these challenges thoughtfully, education systems can fully harness AI's potential to improve learning outcomes.

Tomasz Kopczyński, from University of Silesia in Katowice, Poland, elaborated on the research titled **The Use of Artificial Intelligence in Didactics and Academic Research: A Pilot Study Among Academic Lecturers in Poland.** The article reports on a pilot study examining AI use in didactics and academic work among Polish university lecturers. The study aimed to identify experience levels, barriers, and training needs related to AI. Conducted via a survey of 120 lecturers, it found most limited AI experience. Key barriers included lack of training, insufficient time, and inadequate technical support. Lecturers with higher academic titles and less frequent AI use showed greater training needs. Science and technical academics used AI more than others. The study highlights the need for training programs and technological support to enhance AI use in education. Preferences for AI tools were linked to financial accessibility, indicating a need to promote free or low-cost tools. These findings can inform strategies to support AI implementation in higher education, improving teaching quality and research efficiency.

The third research on **Technology Empowering Women of India** was prepared by **Harshita Bhatnagar**, from Vidya Bhawan Rural Institute, Affiliated to MLSU, India. This study examines the impact of technology on women's empowerment in India, focusing on awareness and adoption rates among women. Conducted with 120 women from semi-urban Udaipur, Rajasthan, it found that technology is mainly used by educated women aged 25–50, primarily homemakers. They use devices like smartphones and laptops for work, entertainment, and learning. However, many women lack knowledge of cyber security ethics and face barriers such as technical issues, privacy concerns, gender discrimination, and digital divide. Domestic responsibilities and low literacy rates also hinder technology adoption. The study suggests that strong support from family, government, policymakers, and educational institutions is crucial for empowering women. It calls for awareness programs, e-training, and better cyber security norms to enhance technology use. The economic and psychological impacts of demonetization and COVID-19 have highlighted the need for digital empowerment, making it a priority for nations.

Natalia Maria Ruman, from University of Silesia, Faculty of Arts and Sciences on Education, and **Zdenek Mruzek,** from Albrechtova Stredni Szkoła in Český Těšín, presented the research titled **Challenges for Youth Resulting from the Internet Use – a Reflection on the Example of Two Secondary Schools: in Pszczyna and in** Český Těšín**.** The article explores the vast possibilities of the Internet and its impact on young people. The research aims to understand both the negative consequences and positive outcomes of Internet use among students. The first part of the study covers key updates in new media, focusing on the Internet characteristics. It addresses various aspects of Internet use, including psychological

mechanisms, media education, challenges of online activities, and socio-practical phenomena in the digital world. This theoretical knowledge forms the basis for empirical research on the importance of computer and Internet use in secondary school students' lives. The results of this research, discussed together with their elaboration and the presentation of ways to counteract the threats and methods of a positive use of the Internet, can be a valuable source of knowledge, useful both in the pedagogical work of those involved in education and for parents, since they are most responsible for the education of their children in the use of media.

The second section contains two articles concerned with Innovative Methods and Technology in Education. **Daria Becker-Pestka,** from WSB University, Gdańsk, prepared the article **A Portuguese Model of E-learning for Prisoners as an Example of Successful Application of New Technologies in Education of Convicts: A Case Study.** The manuscript discusses the use of e-learning in the education of prisoners in Portugal, highlighting its role in complementing traditional education and addressing digital, social, educational, and economic disparities. It identifies infrastructural disparities, lack of computer equipment, and Internet access as major challenges. Security concerns in penitentiary institutions are also noted. The focus is on lifelong learning, with projects like EPRIS@@ and Open University serving as examples. The research, based on case studies, document analysis, and interviews, aims to explore the implementation, objectives, tools, challenges, strengths, and evaluation of e-learning solutions for prisoners. The findings suggest that these innovative solutions can inspire prison staff in other countries and emphasize the importance of modern technologies in prisoner education. The materials were collected in 2022 from the Institute Piaget and the Open University of Porto in Portugal.

The research titled **Preparing Pedagogy Students for Teaching Programming in Early Childhood Education** was prepared by **Ewelina Rzońca,** from The Cardinal Stefan Wyszyński University in Warsaw, and **Tomasz Warchoł**, from University of Rzeszów**,** Poland. The article examines the competencies of modern teachers in using information and communication technologies, especially in programming. The research aimed to assess the knowledge and skills of future early childhood education teachers in practical tasks. Conducted among students from two Polish universities, the study used a diagnostic survey with a knowledge test. The results showed that while future teachers have theoretical programming knowledge, only 35% could explain principles in detail, and practical application was less effective (45% for typical tasks, 47% for problem-solving). The authors suggest increasing programming-related study hours and emphasizing practical experience. They also highlight the need for a teacher education system that develops digital competencies, keeping pace with new technologies to prepare students for future challenges. Further research on digital competencies is recommended to adapt pedagogical programs and shaping future teachers' necessary skills.

The third chapter, concerning Research on Distance, Online and Blended Learning Before, During and After the Pandemic Time of COVID-19, includes one text. **Marzena Wysocka-Narewska,** from University of Silesia in Katowice, Institute of Linguistics, presented the study titled **English Teachers' Digital Competences in a Post-COVID Classroom: A Case Study.** The article examines the digital competences of English teachers in post-COVID classrooms from September 2022 to 2023. Initially, teachers lacked digital skills during the pandemic's early phase. In September 2022, a detailed analysis using the European Framework for the Digital Competence of Educators (DigCompEdu) was conducted. Teachers' competences were reassessed in September 2023 to evaluate the impact of time, experience, and training. The study, involving four teachers from two Polish primary schools, revealed varied proficiency levels over time. Three distinct patterns of competence development emerged. The findings indicate that teachers' digital skills are influenced more by their basic knowledge, education, and additional roles rather than age or seniority. The study suggests expanding research to a larger sample and examining actual classroom practices to better understand digital skill usage during language instruction.

The fourth chapter, **Reports,** includes one article **A Report from the International Scientific Conference "Theoretical and Practical Aspects of Distance learning" DLCC2024 (www.dlcc.us.edu.pl) subtitled: "E-learning & Enhancing Soft Skills" which was held at the University of Silesia, Cieszyn**, **Poland. Monday 14th and Tuesday 15th October 2024** written by **Eugenia Smyrnova-Trybulska**, from University of Silesia in Katowice, Faculty of Arts and Educational Sciences, Katowice, Poland, and **Aleksandra Słonka**, from the Higher School of Management and Entrepreneurship in Wałbrzych. The 16th International Scientific Conference, "Theoretical and Practical Aspects of Distance Learning" (DLCC2024), focused on "E-learning & Enhancing Soft Skills," was held on October 14–15, 2024, at the University of Silesia in Cieszyn, Poland. Organized by the Faculty of Arts and Educational Sciences, the Faculty of Computer Science and Materials Sciences, and the University of Silesia, it featured support from various international universities and associations. Among its participants were experts in e-learning area from 10 countries. Professor Nian-Shing Chen, from the National Taiwan Normal University, Taiwan, presented a Keynote Lecture titled "Revolutionizing Education with Pedagogical AI Agents" The conference gathered scholars, experts, and educators to discuss advancements in distance education, e-learning, and technology-enhanced learning. Papers from the conference published in a monograph by a distinguished publishing house, Springer, and will be indexed in Scopus. The event highlighted the importance of modernizing educational systems and implementing new technologies. The next 17th edition of the DLCC2025 conference is planned for October 2025 at the WSNE UŚ in Cieszyn. We thank you for your interest in this scientific event and invite you kindly to participate in this international forum.

We hope that studies and solutions in the present IJREL volume will be inspiring and encourage reflection on how to manage the increasing demand for online education in the current situation.

Eugenia Smyrnova-Trybulska
https://orcid.org/0000-0003-1227-014X

International Journal of Research in E-learning
Vol. 10 (2), 2024, pp. 1–30

DOI 10.31261/IJREL.2024.10.2.06

Nian-Shing Chen
National Taiwan Normal University, Taiwan
https://orcid.org/0000-0001-7768-0997

Eugenia Smyrnova-Trybulska
University of Silesia in Katowice, Faculty of Arts and Educational Sciences Katowice, Poland
https://orcid.org/0000-0003-1227-014X

Nataliia Morze
Borys Grinchenko Kyiv Metropolitan University, Ukraine
https://orcid.org/0000-0003-3477-9254

Anna Ślósarz
University of National Education Commission, Institute of Journalism and International Relations, Poland
https://orcid.org/0000-0001-5524-3227

Todorka Glushkova
Plovdiv University "Paisii Hilendarski", Bulgaria
https://orcid.org/0000-0002-6243-9364

Małgorzata Przybyła-Kasperek
University of Silesia in Katowice, Institute of Computer Science, Poland
https://orcid.org/0000-0003-0616-9694

Miroslav Hrubý
University of Defence, Brno, the Czech Republic
https://orcid.org/0000-0001-9417-2513

Štefan Gubo
J. Selye University, Faculty of Economics and Informatics, Komárno, Slovakia
https://orcid.org/0009-0001-7386-3187

Education in the Era of AI, Enhancing Skills, Challenges and Perspectives – International Context and National Experience

Abstract

The article analysed the main reflections presented by experts from different countries in the area of AI in education, who participated in the round table debate "E-Learning and Enhancing soft skills: Contemporary Models of Education in the era of Artificial Intelligence". The agenda included three topics: 1) E-learning and enhancing soft skills: contemporary models of education in the era of artificial intelligence; 2) Good practice examples using AI in education for soft skills development; 3) AI – perspectives and challenges of its use in education. The conclusions of the round table lead to the reflection that integrating AI and robots can enhance soft skills development and revolutionize education by creating personalized, efficient, and inclusive learning environments. AI offers benefits like task automation, real-time feedback, and support for diverse needs. However, challenges such as equity, privacy, bias, and ethical concerns must be addressed. Success requires adequate teacher training, a focus on equity and accessibility, ethical considerations, strong data protection, and maintaining human interaction and creativity. By addressing these challenges thoughtfully, education systems can fully harness AI's potential to improve learning outcomes.

K e y w o r d s: artificial intelligence (AI), education, robots, E-Learning, soft skills, contemporary models

Introduction

The round table debate "E-Learning and Enhancing Soft Skills: Contemporary Models of Education in the Era of Artificial Intelligence", was moderated by Eugenia Smyrnova-Trybulska and Magdalena Roszak. Experts were recruited on October 15th as part of DLCC2024 – the 16th edition of the International Scientific Conference, "Theoretical and Practical Aspects of Distance learning" DLCC2024 (www.dlcc.us.edu.pl) (subtitle: "E-learning & Enhancing Soft Skills"). The conference took place on October 14th and 15th, 2024, at the University of Silesia in Cieszyn. It was organized by the Faculty of Arts and Educational Sciences in Cieszyn and the Faculty of Computer Science and Materials Sciences in Sosnowiec, the University of Silesia in Katowice (Poland). The participants of the debate were Prof. Nian-Shing Chen – in Taiwan, Prof. Todorka Glushkova – in Bulgaria, Prof. Pedro Isaias – in Portugal; Prof. Anna Ślósarz – in Poland, Prof. Nataliia Morze – Ukraine, Prof. Štefan Gubo – Slovakia, Prof. Małgorzata Przybyła-Kasperek – Poland, Dr Miroslav Hruby – the Czech Republic.

In a recent development, Geoffrey Hinton, dubbed the 'Godfather of AI,' has been named a co-recipient of the 2024 Nobel Prize in Physics for his pioneering work in machine learning. Hinton shares the award with John Hopfield, whose energy-based models revolutionized the field. Their discoveries laid the foundation for today's AI applications, highlighting its growing significance. (https://edition.cnn.com/2024/10/08/science/nobel-prize-physics-hopfield-hinton-machine-learning-intl/index.html)

E-learning and Enhancing Soft Skills: Contemporary Models of Education in the Era of AI

Professor Nian-Shing Chen from the National Taiwan Normal University, Taiwan, brought his extensive expertise to initiate the discussion on integrating artificial intelligence (AI) and educational robots to develop soft skills in modern education. Highlighting the growing importance of soft skills, Professor Chen emphasized that AI and robotics can significantly enhance skill development. Drawing from contemporary research, the discussion delved into the rapid adoption of generative AI (GAI) applications, such as ChatGPT and Midjourney, in educational contexts (Hwang and Chen, 2024). While these tools hold great promise, they also present challenges, such as balancing enthusiasm with concerns about ethical implications and effective implementation. The research underscores the importance of transitioning from merely seeking information to leveraging programming prompts, which aligns closely with the "why" behind learning.

Further, scholars have explored how generative AI reshapes education. Lan and Chen (2024) provide a systematic framework for designing pedagogical AI agents, addressing both teacher and student perspectives. They outline key concepts, functional requirements, and practical templates, supported by a hands-on example of teaching sequencing words. This aligns with the need for well-structured AI applications that support both the cognitive and emotional aspects of learning. Similarly, Chiang, Chang, and Chen (2014) propose that generative AI necessitates a paradigm shift from purely outcome-oriented approaches to a balanced integration of learning processes and outcomes. Their recommendations to incorporate the experiential learning cycle and learning portfolios demonstrate the untapped potential of pedagogical AI agents in achieving this balance.

The necessity for innovative educational models arises from several challenges in traditional education, including an overemphasis on hard skills, a lack of focus on experiential learning, and limited personalization. AI and robotics present opportunities to overcome these barriers by fostering interactive, engaging,

and adaptable learning environments. Technologies such as pedagogical AI agents and the R&T Learning System exemplify how real-time feedback, and personalized support can empower learners to hone their soft skills effectively. Key methodologies include role-playing scenarios, simulations, and interactive activities that immerse learners in experiential learning environments. These approaches are essential to cultivating critical interpersonal and adaptive skills in today's dynamic educational landscape.

Professor Eugenia Smyrnova-Trybulska, from the University of Silesia in Katowice, Poland, the moderator of the debate, emphasized that in the 21st century, certain soft skills have become essential for personal and professional success. Among some of the most important ones are C*ommunication:* Effective verbal and written communication is crucial for building relationships and conveying ideas clearly (Danao, 2024); *Teamwork and Collaboration:* The ability to work well with others, including diverse teams, is vital in today's interconnected world (*Soft Skills: The Competitive Edge, 2024*); *Problem-Solving:* Critical thinking and the ability to solve complex problems are highly valued skills (*Soft Skills: The Competitive Edge, 2024*); *Adaptability:* Being flexible and able to adjust to new situations and challenges is important in a rapidly changing environment (Melnichuk, 2022); *Emotional Intelligence:* Understanding and managing your own emotions, as well as empathizing with others, is key to effective interpersonal interactions (Danao, 2024); *Time Management:* Efficiently managing your time and prioritizing tasks helps in achieving goals and maintaining productivity (Danao, 2024); *Creativity:* Innovative thinking and the ability to generate new ideas are essential for driving progress and finding unique solutions (Clark, 2024); *Leadership:* Inspiring and guiding others, even without formal authority, is a valuable skill in any setting (Danao, 2024); *Resilience:* The ability to recover from setbacks and stay motivated despite challenges is crucial for long-term success (Clark, 2024); *Self-Motivation:* Taking initiative and being proactive in your work and personal development are highly regarded traits (Clark, 2024).

Professor Nataliia Morze, from Borys Grinchenko Kyiv Metropolitan University, Ukraine, presented her perspective on E-learning and enhancing soft skills: contemporary models of education in the era of artificial intelligence. A list of soft skills offered by AI is presented below, along with visual representations in Figure 1 and Figure 2.

Soft skills are interpersonal, emotional, and communication skills that enable people to work well with others and navigate complex social environments. These are different from technical or hard skills which are specific to a particular task or profession. Soft skills are essential for success in most personal and professional situations. In response to a query about essential soft skills in the era of AI, ChatGPT 4.0 provided the following list (OpenAI (2024) :

1. *Communication skills* (Active listening; Verbal and written communication; Non-verbal communication).

2. *Emotional intelligence* (Self-awareness; Self-regulation; Empathy; Social skills).
3. *Critical thinking* (Problem solving oraz Decision-making).
4. *Teamwork and cooperation* (Conflict resolution oraz Trust and support).
5. *Leadership* (Conflict management).
6. *Adaptability* (Flexibility; Openness; Resilience).
7. *Time management* (Prioritization; Organization; Meeting deadlines).
8. *Creativity* (Innovation; Curiosity; Original thinking).
9. *Beliefs* (Influence others; Negotiations; Assertiveness).
10. *Interpersonal communication skills* (Building rapport; Diversity Sensitivity; Collaboration).
11. *Resolution of conflicts* (Mediation; Diplomacy).
12. *Mentoring and coaching* (Providing feedback).
13. *Work ethics* (Reliability; Decency; Professionalism).
14. Network (Building Professional Relationships; Relationship Management).

The use of artificial intelligence in education to develop soft skills is a growing trend, as skills such as communication, teamwork, problem-solving, emotional intelligence and leadership are crucial for student success in both personal and professional context s. Here is an overview of how AI can support the development of these skills (OpenAI (2024) ChatGPT):

AI in education has enormous potential to enhance the development of soft communication skills through personalized learning, simulation-based experiences, and real-time feedback. However, these tools should complement, not replace, human interaction, which remains essential for developing deep emotional intelligence, leadership, and collaboration skills.

Professor Todorka Glushkova, from Plovdiv University "Paisii Hilendarski", Bulgaria, contributed to the joint discussion and stressed that in the artificial intelligence (AI) era, e-learning is transforming the way soft skills are developed using technology to enhance education. Some of the approaches and directions for how artificial intelligence is influencing today's e-learning and soft skills development models:

Personalized Learning Experiences – Cyber-physical and Social (CPSS) educational platforms provide personalized learning paths by analysing learners' behaviours, strengths, and weaknesses. An individualized approach to the learning process provides a suitable environment for the development of students' "soft skills" and supports their adaptation to various social interactions. Due to the importance of this approach for the purposes of distance and e-learning, adaptive learning systems (ALS) are being developed which provide resources and services to learners through the collaboration between the physical and virtual worlds, i.e., as cyber-physical and social learning (CPSS) spaces. These platforms use personal assistants, intelligent agents and other intelligent components that, through machine learning and AI algorithms, personalize the learning process based on the individual needs and skills of each student. These systems use different methods

and techniques based on building a portfolio of each student and determining his/her profile characteristics. This allows systems to build a specific learning plan for each student. The educational content is specified, based on the initially constructed plan, the needs and interests of the student, as well as the feedback dynamic relationship with the system in the course of the training itself. Separately, the systems actively monitor the progress of each student so that they can enrich and improve the educational strategies for him/her, expanding the resources provided in the topics with which he/she struggles. In the educational platform Virtual Educational Space (VES), developed in DeLC laboratory of Plovdiv University adaptive information is based on domain models that are implemented through ontologies (Stoyanova-Doycheva et al., 2022). To ensure personalization in learning and the development of social skills among students at school, our team is developing a prototype of a cyber-physical and social educational platform BLISS which provides services and learning resources for students in different forms of learning: classroom, independent, blended, and lifelong learning. (Glushkova et al., 2019; 2024).

Gamification in Learning – Gamified learning environments motivate learners to improve their soft skills through rewards, challenges, and interactive tasks. These platforms use AI to create engaging simulations where users can practice decision-making, team management, and critical thinking. For example, VES, implemented in school education integrates gamification components tailored for students with special educational needs, offering targeted interventions (Toskova et al, 2021).

AI-Powered Feedback and Assessment – AI tools can assess soft skills based on video, audio and text inputs. For example, they can analyse facial expressions, tone and language during mock interviews or presentations to provide constructive feedback on communication and emotional intelligence. Verification of acquired knowledge, in the form of tests, is a service provided by the LMS with access to a test system. In VES, for the automatic generation of relevant questions and the generation of personalized tests, we use the capabilities of semantic networks and ontologies.

Collaborative Learning Platforms are AI-based and offer collaboration tools that enhance mutual learning. These platforms facilitate group projects, virtual discussions, and peer reviews, fostering essential soft skills like collaboration, leadership, and active listening.

Professor Anna Ślósarz, from the University of National Education Commission, Institute of Journalism and International Relations, Poland, continued the discussion and emphasized several other issues related to Topic 1:

1. *Adaptive learning.* Adaptive learning systems identify gaps and needs in students' learning and recommend content and tasks based on their abilities. A noteworthy example is demonstrating ChatGPT's limitations, such as hallucinations, and highlighting its repeatability in tasks like copywriting. AI can also assist in preparing diploma work by supporting tasks such as information

retrieval, analyzing problems from different perspectives, summarization, translation, and inference – though always under human control. Even deepfakes can have numerous positive educational applications.

2. *Virtual Classrooms* enriched with multimedia, 3D simulations, and technologies like Virtual Reality (VR) and Augmented Reality (AR) help cultivate practical abilities while avoiding risks and motivating learners. However, excessive reliance on such technologies may lead to cognitive overload. For example, medical students and future nurses have the opportunity to test their skills using applications like VirtualPT Clinician and DxR Nursing SELECT which provide simulated environments for hands-on learning (Szczeszek, Smelkowska, Karbownik, & Roszak 2023, p. 111).
3. *Student Assessment*: AI can enhance the preparation of tasks, questions, scoring, and evaluation. Tools like E-rater assist in correcting assignments, essays, and tests, while systems like Speech Rater (developed by the *American Educational Testing Service*) evaluate spoken utterances. These tools enable teachers to focus more on each student's moral and intellectual development. Teachers, thus, transition from being disseminators of knowledge to facilitators of learning and soft skills development (Huang, Saleh, & Liu, 2023, p. 211).
4. *Smart School / University / Campus:* Smart campuses integrate AI for identity authentication, facial recognition, and other visual observation enhancements, such as monitoring eye contact and hearing abilities. Programs like NVIDIA's AI tools streamline processes, such as school attendance or automating library borrowing and return without librarian involvement. Additionally, *students' head-up frequency, frequency of mobile phone usage and smile frequency are monitored and analyzed during class to obtain relevant data* (Huang, Saleh, & Liu, 2023, p. 212). Teachers and parents gain the opportunity to understand students' difficulties in developing soft skills and provide timely support.

Professor Eugenia Smyrnova-Trybulska, from the University of Silesia in Katowice added further insights regarding E-learning and the enhancement of soft skills within contemporary educational models in the era of AI.

In context, relations of E-Learning and AI can be emphasized:

- *Adaptive Learning:* AI-driven adaptive learning systems personalize the educational experience by tailoring content to individual student needs. This approach has been shown to improve engagement, retention, and academic performance (Gligorea et al., 2023).
- *Interactive Platforms:* AI enhances e-learning platforms by providing interactive and immersive experiences. Tools like virtual tutors and AI-driven feedback systems help students learn more effectively (Gligorea et al., 2023).

In the context of Enhancing Soft Skills can be noted:

- *AI Tools for Soft Skills:* AI tools, such as ChatGPT, are being used to develop soft skills like communication, problem-solving, and teamwork. These tools

provide real-time feedback and simulate real-world scenarios (González-Rico & Lluch Sintes, 2024).

- *One-to-One Tutoring:* Combining AI with personalized tutoring can significantly enhance the development of soft skills. This hybrid approach ensures that students receive both the technological benefits of AI and the human touch of personalized guidance (González-Rico & Lluch Sintes, 2024).

In the context of Contemporary Models of Education can be noted:

- *Blended Learning:* This model combines traditional classroom methods with online learning, leveraging AI to provide a more flexible and personalized learning experience (Shiohira, 2021).
- *Lifelong Learning:* AI supports lifelong learning by offering continuous education opportunities tailored to individual career paths and personal interests (Shiohira, 2021).

Among the main methods concerning using E-learning for enhancing soft skills in the context of contemporary models of education elaboration in the era of artificial intelligence could be emphasized:

- *Interactive Modules:* These include scenarios, role-playing, and simulations that mimic real-life situations, helping learners practice and develop their soft skills in a safe environment.
- *Gamification:* Incorporating game elements like points, badges, and leaderboards to make learning more engaging and competitive (Hart, 2019).
- *Microlearning:* Delivering content in small, manageable chunks that can be easily absorbed and applied, often through videos, quizzes, and interactive activities.
- *Blended Learning*: Combining online digital media with traditional face-to-face methods to provide a comprehensive learning experience.

Some Technologies are:

- *Virtual Reality (VR) and Augmented Reality (AR):* These technologies create immersive environments where learners can practice soft skills like communication, teamwork, and leadership in realistic settings (Hart, 2019).
- *Artificial Intelligence (AI):* AI can provide personalized learning experiences by adapting content to the learner's progress and needs. It can also offer real-time feedback and support.
- *Simulations:* These allow learners to engage in complex scenarios that require critical thinking and problem-solving, helping them develop skills such as decision-making and adaptability (Talespin Team, 2023).
- *Learning Management Systems (LMS):* Platforms like Moodle, Blackboard, and Canvas facilitate the delivery, tracking, and management of e-learning courses, making it easier to implement and monitor soft skills training programs.

Some benefits are:

- *Flexibility:* Learners can access training materials anytime and anywhere, making it easier to fit learning into their schedules.

- *Engagement:* Interactive and immersive technologies make learning more engaging and enjoyable, which can lead to better retention and application of skills.
- *Scalability:* E-learning can be scaled to reach a large number of learners across different locations, making it cost-effective for organizations.

Professor Nataliia Morze added comments and presented the scheme about AI & Education. Where and How AI fits in Education? (Figure 1.).

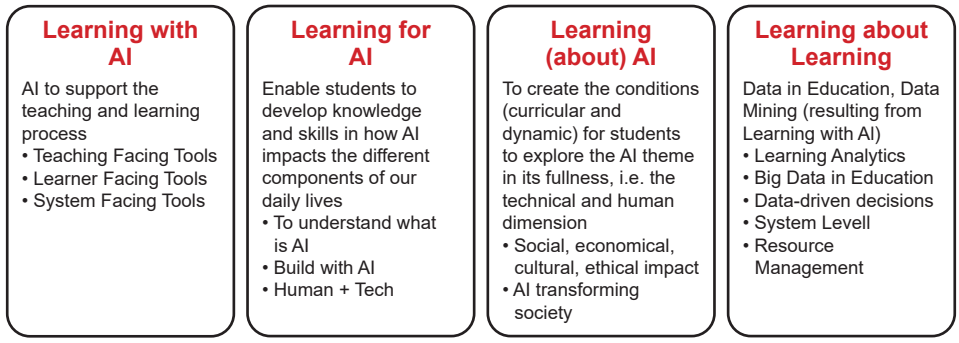


Figure 1: AI & Education. Where and How AI fits in Education?

Source: Based on AI and Education, COE (2022) – Preliminary Report.

Good Practice Examples Using AI in Education for Soft Skills Development

Professor Nian-Shing Chen, from National Taiwan Normal University, Taiwan, described the good practice examples using AI in education for soft skills development in the area of *social-emotional learning and life education*. Taiwan examples on Effects of Children's Trait Emotional Intelligence on Digital Game-Based Learning. On the meso- (national) and micro- (universities, school) level more detail is described in Yang, Quadir, & Chen, (2018); Learning Behaviour Analysis of a Ubiquitous Situated Reflective Learning System with Application to Life Science and Technology Teaching in Hwang, Chen, Chen, Lin, & Chen, (2018). Educational robots, e.g., Kebbi Air robot (Figure 2) as well as AI agents and IoT (Internet of Things) successfully used in preschool and elementary schools of Taiwan. A lot of examples are presented on the YouTube Channel (Robot Mother for Cultivating Multilingual Babies – YouTube).

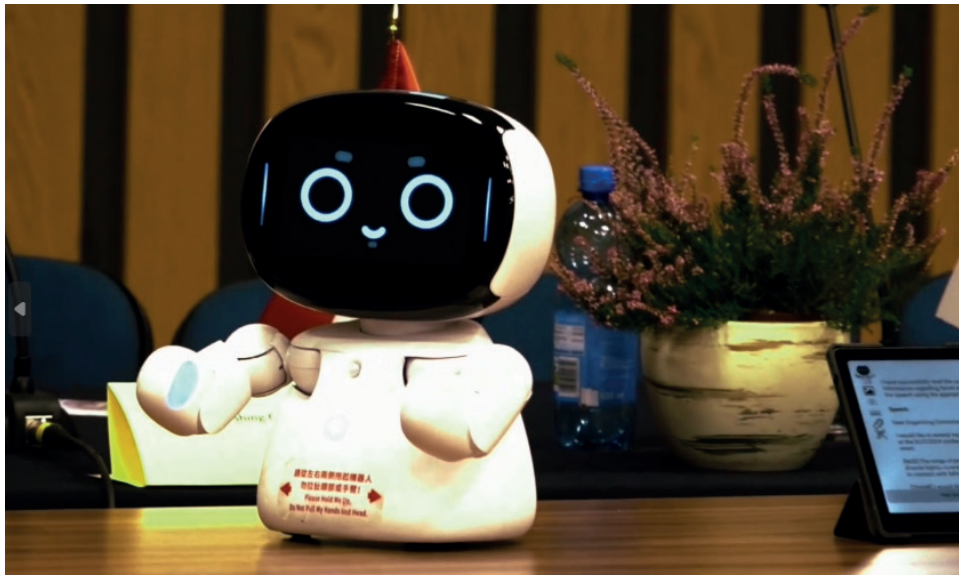


Figure 2: Kebbi Air robot

Author of the photo: Jakub Sacewicz

Professor Todorka Glushkova, Plovdiv University "Paisii Hilendarski", Bulgaria, emphasized that the use of AI in education (AIEd) aims to improve the interaction between learners and intelligent educational systems. CPSS integrates physical and virtual environments, enabling more immersive and adaptive learning. Through the use of ontologies, educational content can be structured and categorized systematically, facilitating better personalization and context-sensitive learning paths.

In today's dynamically changing situation, the transition from traditional forms of school learning to the creation of highly adaptable and personalized learning platforms is key to the success of global education goals. The development of a cyber-physical system for school education is a complex task related to considering the standard normatively defined characteristics and providing services for different groups of users. The implementation of personalized services in the cyber-physical and social space for students with special educational needs is particularly important; for students on an independent form of education; as well as working in STEM interest clubs. For these students, services and learning scenarios must consider their location in the physical world, and the characteristics of the surrounding space, and are realized through the interaction of the physical, social, and virtual worlds.

As already mentioned, a CPSS-educational platform called BLISS is being prototyped and tested in the field of secondary education in Bulgaria. BLISS is being developed as a multi-agent system, the core of which is a community of

personal assistants that interact with the other intelligent components of the platform (Todorov et al., 2019). BLISS aims to provide a personalized and dynamically adapted learning process that is tailored to educational standards on the one hand and to the location and background knowledge, desires, plans, preferences and personal characteristics of each individual student on the other. At BLISS, services are developed and prototyped for all participants in the learning process (students, teachers, school administration and parents) through purpose-built personal assistants (PAs). The behaviour of the agents is based on the dynamically changing information from the BLISS server and SchoolDiary (Krasteva et al., 2019), and any change of information is automatically perceived by all "interested" agents and personal assistants. Because we record change-sensitive content like student grades in SchoolDiary, we use blockchain technology. We store the remaining less critical information such as parent meetings, absence notes and student behaviour in a dedicated data module (DM).

The developed architectural framework of BLISS provides an opportunity for prototyping, testing and implementing various educational services related to the education of students with specific educational characteristics and the development of their social skills such as cooperation, communication, and indirect teamwork with other students through the platform's virtual infrastructure. This guarantees an individual approach to each child with specific personality characteristics and a high level of personalization in the learning process.

Prototypes of personal assistants for students in self-study and lifelong learning have been developed and implemented in the experimental school in Brezovo, Bulgaria. These assistants are intelligent agents that, through interaction with the student and according to his/her personal characteristics, provide information about educational resources and services, a suitable route to the exam hall (for students with motor difficulties (Glushkova, 2019)), and information about the results of the study, etc.

Artificial intelligence provides enormous opportunities in the implementation of adaptive training in many areas such as providing appropriate training resources, creating a personalized training process, organizing various forms of knowledge assessment, game-based training project-based and STEAM training, inclusive education and training of students with special educational needs and students with disabilities, etc. An overview of these and other opportunities is presented in Gligorea (2023).

Other Bulgarian examples on the meso- (national) and micro- (universities, school) level are described in more detail in Todorov, Krasteva, Ivanova, and Doychev (2019) and in Krasteva, Todorov, and Stoyanov (2019).

Professor Anna Ślósarz, from the University of the National Education Commission, Institute of Journalism and International Relations, Poland, presented her reflection on Topic 2 on good practice examples using AI in education for soft skills development and noted that:

1. *Primary education* is mainly for content creation, i.e. lessons and syllabus preparation, creation of texts, poems, stories, games, and summaries; personalized teaching for identifying causes of learning difficulties, and knowledge gaps to eliminate them and ludic learning to motivate students.
2. *Secondary education* is mainly for detecting plagiarism, testing and proving, providing feedback, and creation of exercises and videos.
3. *Higher education* is mainly for the usage and analysis of data, i.e. translating, obtaining information, explaining, creating pics, proving (students), syllabus and lesson preparation (Galindo-Domínguez, Losada, & Delgado, 2023, p. 10).

The teacher-written task reviews mainly focused on composition and substantive content. The AI-provided feedback, on the other hand, was more detailed and focused mainly on the correctness of grammar and vocabulary (Galindo-Domínguez, Losada, & Delgado, 2023, p. 2), because AI does not understand the way a teacher does.

Polish teachers increasingly use ChatGPT as a tool for creating lesson concepts, finding teaching materials, and verifying students' independence in completing assignments. In foreign language education, ChatGPT helps demonstrate grammar usage (e.g., Present Perfect Continuous), contextualize vocabulary, explain word meanings, identify errors in texts, propose exercises, and simulate conversational practice in target languages. (Grobelna, 2023). An experiment conducted at Stanisław Pigoń State Higher Vocational School in Krosno explored AI's role in personalizing learning. By analyzing test grades, time spent on tasks, number of attempts, and students' educational paths, the AI tailored individualized teaching content for each participant (Dębska, Kubacka, 2017). While these applications demonstrate the potential of AI in enhancing education, challenges such as data privacy, ethical use, and the risk of over-reliance on AI tools must be carefully managed.

Eugenia Smyrnova-Trybulska mentioned an example of good practice being an international project devoted to AI in education – "Future IT Professionals EDucation in Artificial Intelligence (FITPED-AI)" (grant no. 2021-1-SK01-KA220-HED-000032095), funded with support from the EC under the ERASMUS+ (www.fitped.eu, Skalka, & Valko, 2024; Smyrnova-Trybulska, Przybyła-Kasperek, Kommers, 2023; Przybyła-Kasperek, Smyrnova-Trybulska, & Kommers, 2023). The project aims to enhance digital skills and capacities by utilizing AI technology to create effective and innovative educational solutions while ensuring adherence to privacy and ethical standards (https://fitped.eu/fitped-ai/). The list of partners within the FITPED consortium is gradually growing. Universities and SMEs that have experience in the given field, and bring their own experience and perspective on solving the problem to the consortium are involved in the individual projects. The consortium of FITPED-AI (2021–2024) includes Constantine the Philosopher University in Nitra, Slovakia (coordinator); Mendel University in Brno, the Czech Republic; University of Silesia in Katowice, Poland; Vilniaus University in Vilniaus, Lithuania; Helix5, Netherland; Teacher.sk, Slovakia. September 1,2024

started the new international project devoted to GAI "Future IT Professional Education in Generative Artificial Intelligence" Project 2024-1-SK01-KA220-HED-000249044; 01. 09. 2024 Project end date: 31. 08. 2027; Constantine the Philosopher University in Nitra, Slovakia (coordinator). The project focuses on the design of methods supporting the adaptation of thinking and education in the era of generative artificial intelligence.

Some interesting examples of using AI for adaptive learning are:

1. *DreamBox Learning:* This adaptive math program adjusts the difficulty of problems based on student performance, ensuring learners are engaged and challenged at the right level (Examples of Artificial Intelligence in Education, University of San Diego).
2. *Knewton:* This platform personalizes educational content by adapting to each student's learning pace and style, providing recommendations that enhance understanding and retention (Restack, examples of Adaptive AI Systems).
3. *Realizeit:* Implemented at the University of North Carolina at Charlotte, this software analyzes learner responses to provide immediate feedback and personalized learning paths, improving student retention and achievement. (*Examples of AI-Powered Adaptive Learning in Education Let's Live a Life*).
4. *Smart Sparrow:* This platform uses AI to analyze student responses in real-time, dynamically adapting lessons to help students master concepts at their own pace. (Examples of Artificial Intelligence in Education, University of San Diego).
5. *Knewton Alta:* This platform tracks student performance across various metrics, helping teachers identify learning gaps and adjust their instructional strategies accordingly. (Examples of Artificial Intelligence in Education, University of San Diego).

Moreover, there are:

AI-Driven Personalized Feedback in Writing.

Natural Language Processing (NLP) models, especially transformer-based architectures like BERT and GPT, are being fine-tuned for educational feedback tasks. Research is focusing on providing more context-aware and actionable feedback.

Adaptive Learning for STEM with Simulated Labs.

Combining AI with simulations and game-based learning environments is gaining traction. The research is exploring how to provide more realistic and engaging learning experiences while still offering personalized support.

AI for Personalized Learning in Large Online Courses (MOOCs). AI algorithms analyze student behavior and performance data in MOOCs to provide personalized recommendations for learning resources, study schedules, and peer interactions.

AI-Based Early Intervention Systems.

AI is used to analyze student data from various sources (e.g., learning management systems, assessments, online activities) to identify students at risk of falling behind and provide timely interventions.

Affective Computing in Adaptive Learning. AI is used to detect and respond to students' emotional states during learning. This can involve analyzing facial expressions, voice patterns, and other physiological signals to adapt the learning experience and provide emotional support. The research by Maestro-Prieto, & Simon-Hurtado (2018) describes the Pedagogical Model of an Intelligent Tutoring System (ITS) for learning Computational Logic: SIAL.

The examples and the taxonomy illustrate how AI can support and enhance various aspects of the learning process, making education more personalized and effective as presented in Azevedo, et al. (2025). The taxonomy of learning with AI can be structured around Bloom's Taxonomy, which categorizes educational goals into levels of complexity and specificity. Below is presented how AI can be integrated at each level:

1. *Remembering:* AI tools like flashcard apps (e.g., Quizlet) use spaced repetition algorithms to help students memorize facts and concepts.
2. *Understanding:* AI-driven tutoring systems (e.g., Carnegie Learning) provide explanations and answer questions to ensure students grasp underlying concepts.
3. *Applying:* Adaptive learning platforms (e.g., DreamBox) present practical problems tailored to the student's current understanding, allowing them to apply knowledge in new situations.
4. *Analyzing:* AI tools (e.g., Knewton Alta) analyze student performance data to identify patterns and gaps, helping students break up complex information.
5. *Evaluating:* AI systems (e.g., Gradescope) assist in grading assignments, providing consistent and objective feedback that helps students evaluate their work.
6. *Creating:* AI-powered platforms (e.g., Smart Sparrow) enable students to design and create projects, offering real-time feedback and suggestions to enhance creativity.

Alternatively, a taxonomy of learning with AI can be structured around the different ways in which AI can support and enhance the learning process. Here is a possible framework:

AI as a Tutor: AI systems can provide personalized instruction, feedback, and guidance to students, adapting to their individual needs and learning styles.

AI as a Tool: AI tools can assist students with various learning tasks, such as writing, research, and problem-solving.

AI as a Learning Companion: AI agents can engage students in interactive learning experiences, providing support and motivation.

AI as a Data Analyst: AI can analyze large datasets of learning data to identify trends and patterns, providing insights for improving teaching and learning.

AI as a Curriculum Designer: AI can assist in the design of personalized learning paths and the development of adaptive learning materials.

AI – Perspective and Challenges Used in Education

Professor Nian-Shing Chen, from National Taiwan Normal University, Taiwan, initiated the discussion on the third topic, focusing on the perspectives and challenges of using AI in education. He highlighted key emerging trends, including adaptive learning systems that tailor educational experiences to individual learners (Chang & Yen-Yi Chen, Chen, Lu & Fang, 2016) and AI agents capable of recognizing and responding to students' emotions (Huang, Yu, Wu, Wang, & Chen, 2024; Lan & Chen, 2024). These advancements exemplify the transformative potential of AI in education. However, Professor Chen also drew attention to critical challenges, such as the need for comprehensive teacher professional development (Wang, Chen & Levy, 2010), the importance of addressing ethical concerns like privacy and data security, and the persistent issues of accessibility and resource disparities across different educational contexts.

Adding to the discussion, Professor Nataliia Morze, from Borys Grinchenko Kyiv Metropolitan University, Ukraine, emphasized that while AI offers transformative possibilities, certain considerations must be addressed to ensure its effective integration into education (Figure 4). These include:

- *Human Element*: While AI can simulate the development of soft skills, real-world practice with peers and mentors remains indispensable. Authentic human interaction is vital for nurturing emotional intelligence, leadership, and collaboration skills.
- *Ethical Use of Data***:** The extensive use of personal data by AI systems necessitates stringent attention to privacy and ethical considerations. Ensuring that these technologies are used responsibly is paramount.
- *Bias in AI Systems***:** AI systems can inadvertently introduce biases that may skew feedback and hinder the learning process. Mitigating these biases is critical to fostering equitable educational experiences.

Professor Morze concluded by underscoring that AI holds immense potential to enhance the development of soft skills through personalized learning experiences, simulation-based interactions, and real-time feedback mechanisms. However, she cautioned that these tools must complement, rather than replace, the irreplaceable value of human interaction. Maintaining a balanced approach is essential to achieving deep emotional intelligence and effective collaboration within educational environments.

Artificial intelligence has a key role in the transformation of modern education and helps provide tools for effective and accessible education, in particular, in personalized learning, allowing to create individual learning trajectories that are adapted to the needs and characteristics of each student (Aggarwal, 2024; Bayly-Castaneda, 2024).

AI tools enable the adaptation of educational materials to meet the individual needs of students, providing a more flexible learning experience. They also automate routine tasks for teachers, allowing more time for creative and engaging activities, which can improve the overall quality of education and increase student satisfaction (Rakya, 2023). Furthermore, AI facilitates effective interaction between students and teachers and supports adaptive learning for students with special needs (Nganji & Brayshaw, 2017). The use of AI provides a high level of personalization and adaptability, and contributes to increasing the involvement of students and their progress in learning (Möller, 2024; Imran, Almusharraf, Abdellatif, & Abbasova, 2024).

An adaptive and personalized learning model based on the use of AI can be effectively used to teach students with special needs (Nganji & Brayshaw, 2017), because AI can adapt educational materials to their individual needs, contributing to their effective integration into the educational process.

The use of AI can significantly increase student engagement and accelerate their learning progress (Möller, 2024). Analyzing the behaviour of students who stop studying in massive open online courses (MOOCs), scientists note that AI allows for identifying potential difficulties and can support students, which can help reduce the dropout rate (Zhang, Gao, and Zhang,2021) in such courses.

The insights provided by Professor Anna Ślósarz focus on both the opportunities and challenges associated with using AI in education, including the following:

1. *Prediction of academic performance and school dropout, analysis of student and teacher perception, development of virtual robotics, learning on generative models, implementation of AI and ML, insertion of computational thinking at all levels, strengthening the legal framework in education, efficiency of school management, social robotics intervention, computer security training, incorporation of AI in clinical education, STEM for forensic analysis and AI support in students with special educational needs (SEN)* (Forero-Corba & Negre Bennasar, 2024, p. 21).
2. Assessment transformation: podcast and presentation assignments are recommended because AI assistance in preparing them is limited – unlike essays (Alier, Garciá-Peñalvo & Camba, 2024, p. 10).
3. Learner-centred and personalized AI-supported learning is needed (Ouyang & Jiao, 2021, p. 5).

Some of the main challenges in using AI in education include:

1. Generative AI is not impartial or reliable, though it changes the information ecosystem, i.e. it can assist with fact-checking combating misinformation, and answering questions posed by students. However, it may introduce inaccuracies, deepfake videos or other misinformation, such as *hallucinations*.
2. Chatbots can control traffic on news sites and applications.
3. Publishers continue efforts to combat Big Tech, which exploits news copyrighted content and data archives for AI-model training. For example,

BBC is looking to build its own AI model and sell its vast archives to Big Tech (Newman, Fletcher, Robertson, Arguedas, & Nielsen 2024, p. 64). In contrast, a contract was conducted between OpenAI and the Ringier Axel Springer media company, the owner of the most popular tabloid newspaper in Poland "Fakt", the political weekly "Newsweek," the largest information portal "Onet", and, in Germany, tabloids like "Bild" and "Die Welt", as well as "Politico" and "Business Insider". Springer will supply ChatGPT with selected news to train ChatGPT on current events (Newman, Fletcher, Robertson, Arguedas & Nielsen 2024, p. 64). As a result, Springer's point of view may dominate ChatGPT, deepening existing biases.

4. Prohibitions on certain uses of AI: The European Parliament has prohibited using AI to determine the emotional state of a student or employee (European Parliament, 2024, p. 44), and *the placing on the market, the putting into service for this specific purpose, or the use of AI systems to infer emotions of a natural person in the areas of workplace and education institutions* (European Parliament 2024, Art. 5 d). Similarly prohibited are manipulations on children, social scoring, and facial recognition (ibid.).
5. Detecting students' unacceptable behaviour during tests using AI is risky, as it can lead to students being denied employment. Malfunctioning systems can unjustifiably violate the right to education, and perpetuate unequal treatment, and discrimination (European Parliament 2024, p. 56).
6. The teacher must verify AI's assessment of students' learning progress and their allocation to different levels of education (European Parliament, 2024, Annex III). However, there are individual and cultural differences that AI may not classify appropriately, and it may deepen the educational gap.
7. AI *is an integral component of an emerging surveillance society* (Linderoth, Hultén & Stenliden, 2024, p. 10). Therefore, the European Commission is requesting information on generative AI risks from Bing, Google Search, Facebook, Instagram, Snapchat, TikTok, YouTube and X (European Commission Press Release, 2024). School is not a place for economic growth, political influences or a testing ground for AI. Teachers are not facilitators of technology. Software and algorithms should not influence policymakers and legislative processes according to *neoliberal visions of the future of AIEd* (Linderoth, Hultén & Stenliden, 2024, p. 14).

Professor Małgorzata Przybyła-Kasperek, from the University of Silesia in Katowice, Institute of Computer Science, Poland, emphasized several perspectives on using AI in education:

- *Support for Educators*

AI can be used for Personalized Learning Experiences. AI systems analyse student performance in real-time, adjusting the difficulty and type of content presented. Applications like DuoLingo exemplify this.

AI also provides personalized feedback on assignments and assessments. Tools like Grammarly offer tailored suggestions for writing improvement, helping students refine their communication skills while learning from their mistakes.

By analysing data on student engagement, AI can introduce diverse learning modalities–videos, interactive simulations, or gamified elements–to maintain student interest. This variety not only sustains attention but also fosters adaptability as students learn to approach problems from different angles.

Gamification incorporates game-like elements into educational contexts to enhance engagement and motivation. For example, in the FITPED project (Skalka et al., 2021; McKay, Asquith & Smyrnova-Trybulska, 2022) a system called Priscilla was created, where students earn coins for correct answers and can use them for tips or to tackle difficult questions. This approach introduces fun and competition to learning. Gamified learning often includes challenges that require critical thinking and collaboration. Tools like Kahoot! also enable teachers to create engaging quizzes that actively involve students and promote teamwork as they discuss answers in groups.

AI technologies can significantly enhance the support provided to educators, allowing them to focus more on teaching while improving educational outcomes. For example, AI can automate administrative tasks, grading, and basic tutoring, allowing educators to focus on more complex teaching challenges or offer support to a larger number of students. By analysing data trends, teachers can identify students who may need additional support or intervention, allowing for timely and targeted assistance. This capability fosters a proactive approach to education and improving overall student outcomes.

- *Data Privacy and Security*

The integration of AI in education raises significant concerns regarding data privacy and security due to the sensitive nature of student information being collected and analysed (Issa, Kommers & Isaias, 2015). Ensuring that students and parents understand what data is being collected and how it will be used is crucial for maintaining trust. Transparency about data practices is very important. Educational institutions must develop clear policies that outline what data is being collected, how it is used, and who has access to it. This information should be shared with students and parents in straightforward language, enabling them to make informed decisions about their participation in AI-enabled activities. Building trust with students and parents requires full transparency about data practices. Schools should obtain informed consent for data collection and processing, explaining the purposes of data usage and any potential risks. This includes communicating the benefits of AI, as well as the measures taken to mitigate privacy concerns. Protecting student data requires secure storage practices and strict access control measures. Institutions should utilize encryption, secure data centres, and multi-factor authentication to safeguard sensitive information. Additionally, access to data should be limited to authorized personnel and regulated through role-based permissions.

- *Need for Teacher Training*

Training should start with the basics, helping educators grasp AI concepts, terminology, and foundational principles (Tammets & Ley, 2023). This knowledge allows teachers to recognize AI's capabilities and limitations, providing context for its use in various subjects and activities. Understanding AI basics also helps educators communicate more effectively with students, fostering a critical and informed perspective on AI.

Teachers should receive hands-on training on integrating AI tools into their existing curriculum. This can include personalized learning platforms, automated grading systems, and AI-driven tools that help create interactive learning experiences. Training should showcase how AI can enhance lesson plans, streamline administrative tasks, and support differentiated instruction tailored to individual student needs.

Given the rapid evolution of AI technologies, it is essential to provide up-to-date training. Teachers need access to resources and professional development opportunities that keep them updated on new tools, best practices, and emerging trends in AI. Online courses, workshops, webinars, and collaborative teacher networks can be valuable sources of ongoing support and knowledge exchange (Przybyła-Kasperek et al., 2023). Teachers equipped with AI knowledge can foster AI literacy among their students, preparing them for the future where AI plays a significant role in various fields. It is also essential that training programs educate teachers about data privacy regulations (such as GDPR or FERPA) and ethical concerns like bias in AI algorithms, surveillance, and the potential impact on students' digital well-being. By understanding these issues, teachers can make informed decisions and advocate for student rights in digital spaces.

Doctor Miroslav Hruby, from the University of Defence in Brno, the Czech Republic, discussed the appropriate place and role of AI in contemporary education. He stressed that AI is undoubtedly one of the important milestones in the development of contemporary technologically based civilization. It is a technology that can enrich education, but it also has the potential to undermine it. A modern human being is the product of a development spanning millions of years, and the real effects of rapidly implemented changes in education may not be immediately apparent.

For instance, one of the modern approaches to teaching in recent years has been the use of mobile phones for preschool children and the youngest pupils. The emergence of dependence on these devices can also be documented with the help of modern medical imaging devices that register changes in brain tissue. At the same time, the number of child patients in the offices of child psychologists and psychiatrists is increasing.

The goal of education should be the formation of well-rounded, physically and mentally developed personalities. At an early age, upbringing and education are traditionally the tasks of the child's parents. Can this education and training be provided by AI-based robots? What will the psychological effects be on these children?

Education using the formulation of the student's questions answered by AI is possible, but is this method suitable for all students? Is the submission of intelligent students to an AI-based technical system acceptable? Can an AI-based technical system test intelligent persons so effectively that it can determine how to proceed in their education?

A technical system based on AI can contribute to the education of students, but human subordination to such a system must never occur.

Education, especially university education, requires a certain degree of freedom. The student should be provided with suggested paths to achieve the learning goals but must retain the freedom to choose their preferred paths. A student's behavior during his/her studies is his/her private matter. Relevant data cannot be collected and processed without the student's knowledge. AI-based systems that monitor a student's behaviour during his/her studies can create a very uncomfortable study environment and undermine the student's personality.

Soon, AI-based systems will undoubtedly improve, but their superiority to people is unacceptable. Further research on the use of AI in education with the possibility of significant application is strongly needed. AI systems could initially focus on educating individuals with lower IQs who are easier to assess. Such systems based on AI could provide them with an education that facilitates their integration into society. Simultaneously, methodologies for implementing AI as partners to teachers and students should be formulated and recommended for discussion. These approaches should be tailored to the specifics of various subjects and the ages of children, pupils and students.

Professor Eugenia Smyrnova-Trybulska emphasized several perspectives and benefits of using AI in education. They include the following: *Personalized Learning:* AI can tailor educational experiences to individual students' needs (*Autonomous University of Lisbon – Private for Excellence*), helping them learn at their own pace and style. For example, adaptive learning platforms like DreamBox and Knewton adjust content based on student performance (Ji Hyun Yu et al., 2024). *Efficient Administrative Tasks:* AI can automate administrative tasks such as grading and scheduling, allowing educators to focus more on teaching (*AI for Goods & Services. Expert analysis, news, trends on AI*). Tools like Gradescope use AI to assist with grading assignments (Artificial Intelligence and Future of Teaching and Learning: Insights and Recommendations, 2023).

Enhanced Tutoring Systems: AI-powered tutoring systems, such as Carnegie Learning, provide students with additional support outside the classroom, offering explanations and practice problems tailored to their needs (Ji Hyun Yu et al., 2024).

Simultaneously there are some challenges to using AI in education, such as *Ethical Concerns:* The use of AI in education raises ethical issues, including data privacy, bias in AI algorithms, and the digital divide. Ensuring that AI systems are fair and transparent is crucial (Ji Hyun Yu et al., 2024). *Teacher Training:*

Educators need proper training to effectively integrate AI tools into their teaching practices. This requires ongoing professional development and support.

(Artificial Intelligence and Future of Teaching and Learning: Insights and Recommendations, 2023). *Cost and Accessibility:* Implementing AI technologies can be expensive, and not all schools have the resources to afford them. This can exacerbate existing inequalities in education (Ji Hyun Yu et al., 2024).

Professor Stefan Gubo, from J. Selye University, Faculty of Economics and Informatics, Komárno, Slovakia, emphasized that according to the Artificial Intelligence Index Report 2023 by Maslej et al., (2023), the number of newly reported ethics incidents and controversies in the AI, Algorithmic, and Automation Incidents and Controversies (AIAAIC) database was 26 times greater in 2021 than in 2012, as shown in Figure 3.

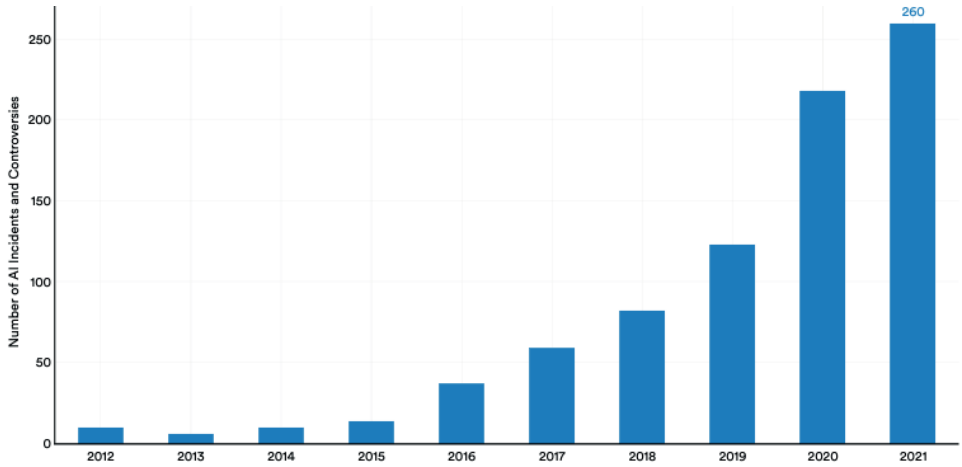


Figure 3: Number of ethics incidents related to AI

S o u r c e: Maslej et al (2023, p. 133). (Licensed under Attribution-NoDerivatives 4.0 International)

In recent years, although several AI ethical initiatives have emerged (e.g., UNESCO's Recommendation on the ethics of artificial intelligence), yet only a few guidelines address the specific issues raised by AI in education. Exceptions include the European Commission's Ethics guidelines for Trustworthy AI (AI HLEG, 2019), UNESCO's ChatGPT and Artificial Intelligence in Higher Education: Quick Start Guide (Sabzalieva & Valentini, 2023), and also the forthcoming UNESCO IESALC Manual on AI in Higher Education, which will include recommendations on implementing AI in line with the ethical principles set out in the UNESCO Recommendation, and tailored guidance for higher education stakeholders on adapting the UNESCO guidance on AI and education. Kamalov et al., (2023) emphasize the importance of carefully adopting AI in schools and universities as there is a real danger that the involved partners are not fully aware of them.

Among the main trends in AI in education are:
Explainable AI (XAI): There is a growing focus on making AI systems more transparent and understandable. Explainable AI helps educators and students understand how AI makes decisions which can build trust and improve educational outcomes (Singh et al., 2024). *AI in Educational Policy:* Policymakers are increasingly considering AI's role in education, focusing on creating guidelines and frameworks to ensure the ethical and effective use of AI technologies (Luan et al., 2020). *Global Collaboration:* Educational institutions worldwide are collaborating to share AI resources and best practices, aiming to create more equitable and effective educational systems (Ji Hyun Yu et al., 2024).

Conclusions

Professor Nian-Shing Chen, from National Taiwan Normal University, Taiwan, synthesized the discussions and reflections presented during the roundtable, emphasizing the multifaceted impact of AI on education and its potential to revolutionize the learning experience. The integration of AI into educational settings offers profound opportunities for enhancing soft skills, personalizing learning, and fostering more inclusive and contextualized learning environments. However, these advancements also introduce significant challenges that require thoughtful and strategic solutions.

The key points include the potential of AI and robots to transform education by automating routine tasks, providing real-time feedback, and enabling adaptive and experiential learning. These technologies can enhance student engagement and address individual differences, thereby creating a more equitable educational experience. However, successfully implementing AI in education requires tackling key issues like protecting privacy, ensuring ethical use, and preventing resource gaps from worsening existing inequalities. From a pedagogical perspective, the design and application of AI agents must prioritize enhancing both cognitive and affective domains of learning. Educational technologies must not only support knowledge acquisition but also cultivate critical soft skills such as collaboration, problem-solving, and adaptability. Achieving this balance involves integrating experiential learning approaches, such as hands-on practices, role-playing scenarios, and interactive discussions, into AI-driven educational systems.

Furthermore, the critical role of educators must be recognized. AI is not a substitute for teachers but a tool to amplify their effectiveness. Providing adequate professional development and training for educators is essential to equip them with the skills and confidence to harness AI effectively. This includes fostering AI

literacy, understanding ethical implications, and promoting a culture of lifelong learning among teachers.

Finally, a collaborative approach is essential for the successful integration of AI in education. Policymakers, researchers, educators, and technology developers must work together to address challenges and leverage the opportunities presented by AI. This involves establishing clear ethical guidelines, investing in equitable access to AI tools, and continuously evaluating the impact of these technologies on learning outcomes.

Professor Nataliia Morze further emphasized the revolutionary potential of AI in education, particularly its ability to create personalized, efficient, and inclusive learning environments. It offers significant benefits in terms of automating tasks, providing real-time feedback, and supporting students with diverse needs. However, challenges related to equity, privacy, bias, and the ethics of AI-driven decision-making must be addressed for the technology to be truly transformative.

For AI to succeed in education, there must be:

- Adequate training for teachers,
- Focus on equity and accessibility,
- Ethical considerations and strong data protection mechanisms,
- Commitment to maintaining human interaction and creativity in learning.

The participants concluded that addressing the challenges of AI in education requires a holistic approach, considering formal-legal, ethical, technological, psychological, didactic, and social aspects. Broad international research is essential to explore these dimensions.

Additionally, while children and young people already use AI in various ways, it is crucial to direct and teach them how to use these technologies correctly and safely. Only by fostering a balanced, inclusive, and ethical framework can education systems truly harness AI's potential to improve learning outcomes.

References

39 Examples of Artificial Intelligence in Education. University of San Diego. Retrieved 16 November 2025 from https://onlinedegrees.sandiego.edu/artificial-intelligence-education/.

Aggarwal, D. (2024). Exploring the Scope of Artificial Intelligence (AI) for Lifelong Education through Personalised & Adaptive Learning. *Journal of Artificial Intelligence, Machine Learning and Neural Network*, 4(1), 21–26. https://doi.org.10.55529/jaimlnn.41.21.26.

AI for Goods & Services: Expert analysis, news and trends on Artificial Intelligence. AI for social good. Retrieved 16 November 2025 from https://aiforsocialgood.ca/.

AI HLEG. *Ethics Guidelines for Trustworthy AI* (2019). Brussels. Available online: https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai (accessed on 13 November 2024).

Alier, M., Garciá-Peñalvo, F-J., & Camba, J.D. (2024). Generative Artificial Intelligence in Education: From Deceptive to Disruptive. *International Journal of Interactive Multimedia and Artificial Intelligence. Special Issue of Generative Artificial Intelligence in Education*, *8(*5), 1–14. https://doi.org.10.9781/ijimai.2024.02.011.

Artificial Intelligence and Education: A Critical View Through the Lens Of Human Rights, Democracy and the Rule of Law Post-Conference Summary DGII/EDU//AI (2023). 03 English – Or. English Strasbourg, 17 March 2023. https://rm.coe.int/artificial-intelligence-and-education-post-conference-summary/1680aae327.

Autonomous University of Lisbon – Private for Excellence. https://autonoma.pt/; https://autonoma.pt/en/conference-integrating-ai-in-the-teaching-learning-process-education-4-0-best-practices-in-the-use-of-artificial-intelligence.

Azevedo, R. et al. (2025). A Taxonomy for Enhancing Metacognitive Adaptivity and Personalization in Serious Games Using Multimodal Trace Data. In: Plass, J.L., Ochoa, X. (eds) Serious Games. JCSG 2024. Lecture Notes in Computer Science, vol 15259. Springer, Cham. https://doi.org/10.1007/978-3-031-74138-8_3.

Bayly-Castaneda K., Ramirez-Montoya M.-S., & Morita-Alexander A. (2024). Crafting personalized learning paths with AI for lifelong learning: a systematic literature review, *Frontier Education*, 9, Aug. 2024. https://doi.org/10.3389/feduc.2024.1424386.

Chang, Y.-H., & Chen, Y.-Y., Chen, N.-S., Lu., Y.T., & Fang, R.-Y., (2016). Yet another adaptive learning management system based on Felder and Silverman's learning styles and Mashup. *Eurasia Journal of Mathematics, Science & Technology Education,* 2016, 12(5), 1273–1285. https://doi.org/10.12973/eurasia.2016.1512a.

Chiang, Y. V., Chang, M., & Chen, N.-S. (2024). Can generative AI help realize the shift from an outcome-oriented to a process-outcome-balanced educational practice? *Educational Technology & Society,* 27(2), 347–385. https://doi.org/10.30191/ETS.202404_27(2).TP04.

Clark, E. (2024). *The Importance of 'Soft-Skills' for Professional Practice in the 21st Century.* https://www.naps.edu.au/blog/the-importance-of-soft-skills-for-professional-practice-in-the-21st-century.

Danao, M. (2024). *11 Essential Soft Skills In 2024 (With Examples).* https://www.forbes.com/advisor/business/soft-skills-examples/.

Dębska, B., & Kubacka, A. (2017). Ocena wyników procesu kształcenia zdalnego z wykorzystaniem narzędzi sztucznej inteligencji [Evaluation of the results of the distance learning process using artificial intelligence tools.]. *EduAkcja. Magazyn Edukacji Elektronicznej*, *14*, 46–57. eISSN 2081-870X.

European Commission Press Release. (2024.03.14). *Commission sends requests for information on generative AI risks to 6 Very Large Online Platforms and 2 Very Large Online Search Engines under the Digital Services Act*. Retrieved April 1, 2024, from https://digital-strategy.ec.europa.eu/en/news/commission-sends-requestsinformation-generative-ai-risks-6-very-large-online-platforms-and-2-very.

European Parliament. (2024). *Proposal for Regulation of the European Parliament and the Council laying down harmonized rules on Artificial Intelligence (Artificial Intelligence Act) and amending certain union legislative acts. Corrigendum version*. Retrieved April 25, 2024, from https://www.europarl.europa.eu/doceo/document/TA-9- 2024-0138-FNL-COR01_EN.pdf.

Examples of AI-Powered Adaptive Learning in Education Let's Live a Life. https://www.letslivealife.com/post/examples-of-ai-powered-adaptive-learning-in-education.

Forero-Corba, W., & Bennasar, F.N., (2024). Techniques and applications of Machine Learning and Artificial Intelligence in education: a systematic review. *RIED – Revista Iberoamericana de Educación a Distancia*, *27*(1), 1–35. https://doi.org/10.5944/ried.27.1.37491.

Galindo-Domínguez, H., Delgado, N., Losada, D., & Etxabe J.-M. (2023). An analysis of the use of artificial intelligence in education in Spain: The in-service teacher's perspective. *Journal of Digital Learning in Teacher Education*, *40*(1). https://doi.org.10.1080/21532974.2023.2284726.

Gligorea, I., Cioca, M., Oancea, R., Gorski, A.-T., Gorski, H., & Tudorache, P. (2023). Adaptive Learning Using Artificial Intelligence in e-Learning: A Literature Review. *Education Sciences*. 2023; 13(12): 1216. https://doi.org/10.3390/educsci13121216.

Glushkova, T., Valchev, E., & Krasteva, I. (2024). Personalization of Lifelong Learning in School Educational Platform, In Proceedings *International Conference on Information Technologies (InfoTech),* Sofia, Bulgaria, 2024, (pp. 1–4). http://dx.doi.org/10.1109/InfoTech63258.2024.10701358.

Glushkova, T., Stoyanov, S., Krasteva, I., & Tabakova-Komsalova, V. (2019). Intelligent school educational environment for distance and blended learning, In E. Smyrnova-Trybulska (ed.) *E-learning and STEM Education. Series on E-learning. Vol. 11.* Katowice–Cieszyn: Studio Noa for University of Silesia. ISSN: 2451-3644 (print edition), ISSN 2451-3652 (digital edition), ISBN 978-83-66055-12-4, (pp. 125–138). https://doi.org/10.34916/el.2019.11.

Glushkova, T., Stoyanov, S., Popchev, I. (2019). Internet of Things Platform Supporting Mobility of Disabled Learners. *International Journal Bioautomation.* 23(3), 355–368. https://doi.org/10.7546/ijba.2019.23.3.000590.

González-Rico, P., & Lluch Sintes, M. (2024). Empowering Soft Skills through Artificial Intelligence and Personalised Mentoring. *Education Sciences*. 2024; 14(7):699. https://doi.org/10.3390/educsci14070699.

Grobelna, B. (2023). Sztuczna inteligencja w nauczaniu języka angielskiego. ChatGPT jako narzędzie wspomagające oraz inteligentna pomoc w edukacji językowej [Artificial Intelligence in English Language Teaching. ChatGPT as a Supporting Tool and Intelligent Aid in Language Education]. *Języki Obce w Szkole,* 2023, *2,* 87–93. https://doi.org.10.47050/jows.2023.2.87-93.

Hart, D. (May 27, 2019). Soft Skills Training: Trends in Digital Learning and Emerging Technologies. Training and Industry. https://trainingindustry.com/articles/leadership/soft-skills-training-trends-in-digital-learning-and-emerging-technologies/.

https://www.nschen.net, the personal website of prof. Nian-Shing Chen.

Huang, C., Yu, J., Wu, F., Wang, Y., & Chen, N.-S., (2024). Uncovering emotion sequence patterns in different interaction groups using deep learning and sequential pattern mining. *Journal of Computer Assisted Learning.* https://doi.org/10.1111/jcal.12977.

Huang, J., Saleh, S., & Liu, Y. (2021). A Review on Artificial Intelligence in Education. *Academic Journal of Interdisciplinary Studies*, *10*(3), 206–217. https://doi.org/10.36941/ajis-2021-0077.

Hwang, G.-J., & Chen, N.-S. (2023). Editorial Position Paper: Exploring the Potential of Generative Artificial Intelligence in Education: Applications, Challenges, and Future Research Directions. Educational Technology & Society, 26(2), I–XVIII. https://doi.org/10.30191/ETS.202304_26(2).0014.

Hwang, W.-Y., Chen, H.-R., Chen, N.-S., Lin, L.-K., & Chen, J.-W. (2018). Learning Behaviour Analysis of a Ubiquitous Situated Reflective Learning System with Application to Life Science and Technology Teaching. *Journal of Educational Technology & Society*, *21*(2), 137–149. http://www.jstor.org/stable/26388388.

Imran M., Almusharraf N., Abdellatif M. S., & Abbasova M. Y., (2024). Artificial Intelligence in Higher Education: Enhancing Learning Systems and Transforming Educational Paradigms, *International Journal of Interactive Mobile Technologies (iJIM)*, 18(18), pp. 34–48, Sep. 2024. https://doi.org/10.3991/ijim.v18i18.49143.

Issa, T., Kommers, P., & Isaias, P. T. (2015). Security and Privacy of Online Technologies. *Pacific Asia Journal of the Association for Information Systems*, *7(*4), 1. https://doi.org/10.17705/1pais.07400.

Kamalov, F., Calonge, D. S., & Gurrib, I. (2023). New Era of Artificial Intelligence in Education: Towards a Sustainable Multifaceted Revolution. *Sustainability*, 15, 12451. https://doi.org/10.3390/su151612451.

Krasteva, I., Todorov, J., Stoyanov, S. (2019) Intelligent school education space, *Education and Technologies*, 10/2019, issue 1, ISSN 1314-1791, 120–126. https://doi.org/http://doi.org/10.26883/2010.191.1489.

Lan, Y.-J., & Chen, N.-S. (2024). Teachers' agency in the era of LLM and generative AI: Designing pedagogical AI agents. *Educational Technology & Society, 27(*1), I–XVIII. https://doi.org/10.30191/ETS.202401_27(1).PP01.

Linderoth, C., Hultén, M., & Stenliden, L. (2024). Competing visions of artificial intelligence in education – A heuristic analysis on sociotechnical imaginaries and problematizations in policy guidelines. *Policy Futures in Education, 0*, 1–17. https://doi.org/10.1177/14782103241228900.

Luan, H., Geczy, P., Lai. H., Gobert. J., Yang, S.J.H., Ogata, H, Baltes, J., Guerra, R., Li, P. & Tsai, C.-C. (2020). Challenges and Future Directions of Big Data and Artificial Intelligence in Education. *Frontiers in Psychology* 11:580820. https://doi.org/10.3389/fpsyg.2020.580820.

Maestro-Prieto, J. A. & Simon-Hurtado, A. (2018). The pedagogical model of SIAL: an adaptive and open-ended intelligent tutoring system for first order logic. In *Proceedings of the 23rd Annual ACM Conference on Innovation and Technology in Computer Science Education (ITiCSE 2018). Association for Computing Machinery*, New York, NY, USA, 21–26. https://doi.org/10.1145/3197091.3197100.

Maslej, N., Fattorini, L., Brynjolfsson, E., Etchemendy, J., Ligett, K., Lyons, T., Manyika, J., Ngo, H., Niebles, J.C., & Parli, V. (2023). *The AI Index 2023 Annual Report*. Stanford, CA: Stanford University, AI Index Steering Committee, Institute for Human-Centered AI.

McKay, E., Asquith, K., Smyrnova-Trybulska, E. (2022). Priscilla Evaluation Pilot Study: A Rasch Measurement Analysis. In E. Smyrnova-Trybulska, P. Kommers, M., Drlík, J. Skalka (eds.), *Microlearning. New Approaches to a More Effective Higher Education,* Cham: Springer Nature International Publishing. https://doi.org/10.1007/978-3-031-13359-6_7.

Melnichuk, T. (2022). *Top Five Soft Skills That Every Employee Needs In the 21st Century* (https://www.forbes.com/councils/forbeshumanresourcescouncil/2022/07/06/top-five-soft-skills-that-every-employee-needs-in-the-21st-century/).

Möller M. et al., (2024). *Revolutionising Distance Learning: A Comparative Study of Learning Progress with AI-Driven Tutoring,* 2024. https://doi.org/10.48550/ARXIV.2403.14642.

Newman, N., Fletcher, R., Robertson C.T., Arguedas, A.R., & Nielsen R.K. (2024). *Reuters Institute Digital News Report 2024*, Reuters Institute for the Study of Journalism. https://doi.org.10.60625/risj-vy6n-4v57.

Nganji J. T. & Brayshaw M., (2017). Disability-aware adaptive and personalised learning for students with multiple disabilities, *The International Journal of Information and Learning Technology*, 34(4), 307–321. https://doi.org/10.1108/IJILT-08-2016-0027.

OpenAI (2024) ChatGPT [online]. Available from: https://chat.openai.com/ [Accessed 1 September 2024].

Ouyang, F., & Jiao, P. (2021). Artificial Intelligence in Education: The Three Paradigms. *Computers and Education: Artificial Intelligence*, *2*, 1–6. https://doi.org/10.1016/j.caeai.2021.100020.

Przybyła-Kasperek, M., Chromiński, K., Smyrnova-Trybulska, E., Morze, N., & Bazarbayeva, A. (2023). Importance, Popularity and Elements of Educational Platforms – A Study of the Opinions of Students from Poland, Ukraine and Kazakhstan. *International Journal of Research in E-learning,* 9(2), 1–29. https://doi.org/10.31261/IJREL.2023.9.2.09.

Przybyła-Kasperek, M., Smyrnova-Trybulska, E., & Kommers, P. (2023). Factors Enhancing Students' Views on Artificial Intelligence. *International Journal of Research in E-Learning*, 1–42. https://doi.org/10.31261/IJREL.2023.9.2.03.

Rakya, Z. H., (2023) Exploring the Impact of Artificial Intelligence (AI) on Learner-Instructor Interaction in Online Learning (Literature Review)', *International Journal of Emerging Multidisciplinaries: Computer Science & Artificial Intelligence*, *2(*1), Dec. https://doi.org/10.54938/ijemdcsai.2023.02.1.236.

Restack. Examples of Adaptive AI Systems. https://www.restack.io/p/adaptive-learning-systems-answer-examples-adaptive-ai-cat-ai.

Robot Mother for Cultivating Multilingual Babies – YouTube, Lab's YouTube channel.

Sabzalieva, E., & Valentini, A. (2023). *ChatGPT and Artificial Intelligence in higher education: quick start guide*. UNESCO International Institute for Higher Education in Latin America and the Caribbean.

Shiohira, K. (2021). Understanding the impact of artificial intelligence on skills development UNESCO 2021, ISBN 978-92-3-100446-9.

Singh, T., Dutta, S., Vyas, S., & Rocha, Á. (Eds.) (2024). Explainable AI for Education: Recent Trends and Challenges. Series *Information Systems Engineering and Management* Springer Cham ISSN 3004-958X Hardcover ISBN 978-3-031-72409-1 (2025).

Skalka, J. & Valko, M. (2024) Rapid Guessing Behavior Detection in Microlearning: Insights Into Student Performance, Engagement, and Response Accuracy, in *IEEE Access*, vol. 12, pp. 157996–158024, 2024. https://doi.org/10.1109/ACCESS.2024.3485505.

Skalka, J., Drlik, D., Benko, L., Kapusta, J., Rodríguez del Pino, J.C., Smyrnova-Trybulska, E., Stolinska, A., Svec, P., & Turcinek, P. (2021). Conceptual Framework for Programming Skills Development Based on Microlearning and Automated Source Code Evaluation in Virtual Learning Environment. Sustainability 13(6), ISSN:2071-1050. https://doi.org/10.3390/su13063293; https://www.mdpi.com/2071-1050/13/6/3293.

Smyrnova-Trybulska, E., Przybyła-Kasperek, M., Kommers, P. (2023). Educational, Social and Ethical Aspects of AI in the Opinion of It And Pedagogy Students – a Case Study In P. Kommers, I.A. Sanches, P. Isaias, E-Society. *Conference Proceedings, International Conference E-LEARNING,* March 11–13, 2023, Lisbon, IADIS Press, (pp. 171–178), ISBN 978-989-8704-47-4.

Soft Skills: The Competitive Edge. US Department of Labor Office of Disability Employment Policy. https://www.dol.gov/agencies/odep/publications/fact-sheets/soft-skills-the-competitive-edge (Retraited on 07.11.2024).

Stoyanova-Doycheva, A., Madanska, S., Grancharova-Hristova, M., Glushkova, T., & Cholakov, G., (2022). Development of Ontologies in Different Domains for a Test Generation Environment. 8th International Conference on Higher Education Advances (HEAd'22). http://dx.doi.org/10.4995/HEAd22.2022.14205.

Szczeszek, K., Smelkowska, A., Karbownik, A., & Roszak, M. (2023). *Game based learning*. In *The Big Bok of Online Education for academic and other teaching professionals*, ed. I. Mokwa-Tarnowska. Gdańsk: Gdańsk University of Technology, (pp. 104–114). https://www.etechproject.com/the-big-book-of-online-education.

Talespin Team (September 29, 2023) Interactive Soft Skills Training: A Comprehensive Guide. https://www.talespin.com/reading/interactive-soft-skills-training-a-comprehensive-guide.

Tammets, K., & Ley, T. (2023). Integrating AI tools in teacher professional learning: a conceptual model and illustrative case. *Frontiers in Artificial Intelligence*, 6, 1255089. https://doi.org/10.3389/frai.2023.1255089.

Todorov, J., Krasteva, I., Ivanova, V., & Doychev, E. (2019) BLISS-A CPSS-like Application for Lifelong Learning. In *Proceedings of the 2019 IEEE International Symposium on INnovations in Intelligent SysTems and Applications (INISTA),* Sofia, Bulgaria, 3–5 July 2019; (pp. 1–5). http://doi.org/10.1109/INISTA.2019.8778363.

Toskova, A., & Penchev, G. (2021). Intelligent game recommendation system. In AIP Conference Proceedings 2333(1). AIP Publishing. https://doi.org/10.1063/5.0042063.

U.S. Department of Education, Office of Educational Technology, Artificial Intelligence and Future of Teaching and Learning: Insights and Recommendations, Washington, DC, 2023. Retrieved 16 November 2025 from https://www.ed.gov/sites/ed/files/documents/ai-report/ai-report.pdf.

Wang, Y., Chen, N.-S., & Levy, M. (2010). Teacher training in a synchronous cyber face-to-face classroom: characterizing and supporting the online teachers' learning process. *Computer Assisted Language Learning*, *23*(4), 277–293. https://doi.org/10.1080/09588221.2010.493523.

Yang, J. C., Quadir, B., & Chen, N. S. (2018). Effects of Children's Trait Emotional Intelligence on Digital Game-Based Learning. *International Journal of Human–Computer Interaction*, *35*(4–5), 374–383. https://doi.org/10.1080/10447318.2018.1543088.

Yu, J.H., Chauhan, D., Iqbal, R.A. et al. (2024) Mapping academic perspectives on AI in education: trends, challenges, and sentiments in educational research (2018–2024). *Education Technology Research Development* (2024). https://doi.org/10.1007/s11423-024-10425-2.

Zhang J., Gao M., & Zhang J., (2021) The Learning Behaviours of Dropouts in MOOCs: A Collective Attention Network Perspective, *Computers & Education*, 167, p. 104189, Jul. 2021. https://doi.org/10.1016/j.compedu.2021.104189.

Nian-Shing Chen, Eugenia Smyrnova-Trybulska, Nataliia Morze, Anna Ślósarz, Todorka Glushkova, Małgorzata Przybyła-Kasperek, Miroslav Hrubý, Štefan Gubo

Edukacja w erze AI, rozwijanie umiejętności, wyzwania i perspektywy – kontekst międzynarodowy i doświadczenia krajowe

S t r e s z c z e n i e

W artykule przeanalizowano refleksje ekspertów z różnych krajów w dziedzinie AI w edukacji, którzy uczestniczyli w debacie okrągłego stołu „E-learning i rozwijanie umiejętności miękkich: współczesne modele edukacji w erze sztucznej inteligencji". Program obejmował trzy tematy: 1) E-learning i rozwijanie umiejętności miękkich: współczesne modele edukacji w erze sztucznej inteligencji; 2) Przykłady dobrych praktyk wykorzystania AI w edukacji do rozwoju umiejętności miękkich; 3) AI – perspektywy i wyzwania związane z jej wykorzystaniem w edukacji. Wśród niektórych wniosków z debaty okrągłego stołu znajdują się: integracja AI i robotów może usprawnić rozwój umiejętności miękkich i zrewolucjonizować edukację poprzez tworzenie spersonalizowanych, wydajnych i inkluzyjnych środowisk edukacyjnych. AI oferuje korzyści, takie jak automatyzacja zadań, informacje zwrotne w czasie rzeczywistym i wsparcie dla różnych potrzeb. Należy jednak zająć się wyzwaniami, takimi jak równość, prywatność, stronniczość i kwestie etyczne. Sukces wymaga odpowiedniego przeszkolenia nauczycieli, skupienia się na równości i dostępności, rozważań etycznych, silnej ochrony danych oraz utrzymania interakcji międzyludzkich i kreatywności. Poprzez rozważne podejście do tych wyzwań systemy edukacyjne mogą w pełni wykorzystać potencjał AI w celu poprawy wyników nauczania.

S ł o w a k l u c z o w e: sztuczna inteligencja (AI), edukacja, roboty, e-learning, umiejętności miękkie, współczesne modele

Nian-Shing Chen, Eugenia Smyrnova-Trybulska, Nataliia Morze, Anna Ślósarz, Todorka Glushkova, Małgorzata Przybyła-Kasperek, Miroslav Hrubý, Štefan Gubo

Educación en la era de la IA, potenciación de competencias, retos y perspectivas – Contexto internacional y experiencia nacional

Resumen

El artículo analiza las principales reflexiones presentadas por expertos de diferentes países en el área de IA en educación, quienes participaron en la mesa redonda "E-Learning y potenciación de las competencias blandas: modelos contemporáneos de educación en la era de la inteligencia artificial". La agenda incluyó tres temas: 1) E-learning y potenciación de las competencias blandas: modelos contemporáneos de educación en la era de la inteligencia artificial; 2) Ejemplos de buenas prácticas en el uso de la IA en educación para el desarrollo de competencias blandas; 3) IA – perspectivas y retos de su uso en educación. Entre algunas conclusiones de la mesa redonda se encuentran: la integración de la IA y los robots puede potenciar el desarrollo de las competencias blandas y revolucionar la educación al crear entornos de aprendizaje personalizados, eficientes e inclusivos. La IA ofrece beneficios como la automatización de tareas, la retroalimentación en tiempo real y el apoyo a diversas necesidades. Sin embargo, se deben abordar desafíos como la equidad, la privacidad, los sesgos y las preocupaciones éticas. El éxito requiere una formación docente adecuada, un enfoque en la equidad y la accesibilidad, consideraciones éticas, una fuerte protección de datos y el mantenimiento de la interacción y la creatividad humanas. Si se abordan estos desafíos de forma reflexiva, los sistemas educativos pueden aprovechar al máximo el potencial de la IA para mejorar los resultados del aprendizaje.

Palabras clave: inteligencia artificial (IA), educación, robots, aprendizaje electrónico, habilidades blandas, modelos contemporáneos

Нянь-Шин Чен, Евгения Смирнова-Трыбульска, Наталия Морзе, Анна Шлюсаж, Тодорка Глушкова, Малгожата Пшибыла-Касперек, Мирослав Хрубы, Штефан Губо

Образование в эпоху ИИ, развитие навыков, проблемы и перспективы – международный контекст и национальный опыт

Аннотация

В статье проанализированы основные размышления, представленные экспертами из разных стран в области ИИ в образовании, которые приняли участие в круглом столе «Электронное обучение и повышение гибких навыков: современные модели образования в эпоху искусственного интеллекта». Повестка дня включала три темы: 1) Электронное обучение и повышение гибких навыков: современные модели образования в эпоху искусственного интеллекта; 2) Примеры передовой практики использования ИИ в образовании для развития гибких навыков; 3) ИИ – перспективы и проблемы его использования в образовании. Среди некоторых выводов круглого стола: интеграция ИИ и роботов может улучшить развитие гибких навыков и произвести революцию в образовании за счет создания персонализированных, эффективных и инклюзивных учебных сред. ИИ предлагает такие преимущества, как автоматизация задач, обратная связь в реальном времени и поддержка различных потребностей.

Однако необходимо решать такие проблемы, как равенство, конфиденциальность, предвзятость и этические проблемы. Успех требует адекватной подготовки учителей, акцента на равенстве и доступности, этических соображений, надежной защиты данных и поддержания человеческого взаимодействия и креативности. Вдумчиво решая эти проблемы, образовательные системы могут в полной мере использовать потенциал ИИ для улучшения результатов обучения.

К л ю ч е в ы е с л о в а: искусственный интеллект (ИИ), образование, роботы, электронное обучение, гибкие навыки, современные модели

International Journal of Research in E-learning
Vol. 10 (2), 2024, pp. 1–18

DOI 10.31261/IJREL.2024.10.2.07

Tomasz Kopczyński
University of Silesia in Katowice
https://orcid.org/0000-0002-8573-282X

The Use of Artificial Intelligence in Didactics and Academic Research: A Pilot Study Among Academic Lecturers in Poland

Abstract

This article presents the results of a pilot study on the use of artificial intelligence (AI) in didactics and academic work among academic lecturers in Poland. The main objective was to identify the level of experience, barriers, and training needs related to AI among university lecturers. The study was conducted using a survey method (CAWI) on a sample of 120 academic lecturers from various higher education institutions. The analysis revealed that most participants have limited experience in using AI tools. The primary barriers include a lack of adequate training, insufficient time to learn new technologies, and inadequate technical support at the institution. Faculty members with higher academic titles and those who use AI tools less frequently display greater training needs. Academics from science and technical fields use AI more often compared to those from other disciplines. The results indicate the necessity of investing in training programs and technological support for academic lecturers to enhance the effective use of AI in education. Preferences regarding AI tools are strongly tied to their financial accessibility, suggesting a need to promote free or partially free tools. The findings can serve as a basis for developing strategies to support AI implementation in higher education, contributing to improved teaching quality and research efficiency.

K e y w o r d s: artificial intelligence, higher education, training needs, technological barriers, academic lecturers

Introduction

The introduction of artificial intelligence (AI) and modern technologies in higher education is gaining prominence. AI has the potential to revolutionize these areas by offering new tools and opportunities for both educators and students. In education, AI is used for personalized learning, automated assessment, and virtual assistant support, allowing for more efficient management of time and resources (Ouyang et al., 2022). Additionally, studies indicate that modern tools like Padlet can significantly support didactic and administrative processes by tailoring educational materials to the individual needs of students (Kopczyński & Szpyt, 2020). Smyrnova-Trybulska (2021) emphasizes the importance of lecturer development within comparative studies, which is crucial for understanding the impact of modern technologies on all levels of lecturer development, not just within academia.

A review of the literature indicates that the use of AI in higher education has significantly increased in recent years. Research by Ouyang and colleagues (2022) shows that since 2016, the number of publications on AI applications in higher education has grown considerably, particularly in the context of personalized learning and didactic support. AI is employed across various academic fields, from the natural sciences to the humanities, with a focus on enhancing the effectiveness of teaching and learning (Ouyang et al., 2022).

Studies by Kuleto et al., (2021) suggest that AI can greatly contribute to optimizing both didactic and administrative processes in higher education. Intelligent Tutoring Systems (ITS) and big data analysis tools enable precise adaptation of educational materials to students' individual needs, leading to improved educational outcomes (Kuleto et al., 2021).

In the research context, AI is used to support studies through the automation of data analysis and modeling. For example, machine learning algorithms can be applied to analyze biological research results, enabling faster discovery of new relationships and patterns (Duan, Edwards, & Dwivedi, 2019). Furthermore, AI optimizes time management for researchers by automating administrative tasks, allowing them to focus on the more creative aspects of research (Duan et al., 2019).

In summary, the literature highlights the extensive applications of AI in education and research, with the potential to significantly improve the efficiency and quality of didactic and research processes. However, it is essential to consider ethical aspects and develop standards for assessing the effectiveness of these technologies to ensure their sustainable development and implementation (Guilherme, 2019; Cardona et al., 2023).

Research Objective: Why This Study Is Important

The current pace of artificial intelligence (AI) implementation varies significantly across different economic sectors. In the private sector, especially in technology companies, AI is being rapidly adopted, leading to increased operational efficiency, innovation, and competitive advantage (Allioui & Mourdi, 2023). A prime example is the widespread use of AI in data analysis, business process automation, and personalized customer services (Allioui & Mourdi, 2023).

In contrast, the implementation of AI in universities and state-funded institutions is progressing much more slowly. This slower pace may be due to budget constraints, bureaucratic processes, and a lack of adequate technological infrastructure and AI specialists (Chen et al., 2024). Furthermore, educational institutions often face longer decision-making cycles and the need to adapt new technologies to existing educational and research structures (Ouyang et al., 2022).

Conducting research on the use of AI among academic lecturers is essential for understanding the current challenges and barriers, as well as for developing strategies to support the effective integration of AI into education and research. This will make it possible to identify best practices and tools that can facilitate digital transformation within the academic sector, ultimately contributing to improved teaching quality and research efficiency (Benavides et al., 2020).

Based on the above literature review, the following hypotheses have been proposed:

Hypothesis 1: The current experience of academic lecturers in using AI in higher education is largely limited or minimal. It is assumed that the majority of academic faculty members have little or limited experience with AI tools in their work. This hypothesis is based on preliminary pilot data indicating a low level of AI use in the teaching process.

Hypothesis 2: Training needs in the area of AI may be higher among faculty members holding senior academic titles, regardless of age, who rarely use AI tools in their teaching work. It is assumed that faculty members who use AI tools less frequently, regardless of age group, display greater training needs in AI usage in academic teaching. This hypothesis suggests that sporadic AI tool use results from a need for further education and training in this area.

Hypothesis 3: The use of AI tools in teaching is related to the age group and academic discipline represented by academic staff. It is assumed that faculty members from science and technical fields use AI tools more frequently in their teaching and research compared to faculty from other disciplines.

Hypothesis 4: The purpose of using AI in academic work affects the choice of AI tools, distinguishing between general-purpose tools, such as ChatGPT 3.5, Copilot, and Gemini, and specialized tools, such as Grammarly, Tome, and ResearchRabbit. It is assumed that faculty members who aim to use AI for specific purposes, such as

developing texts, lectures, or presentations, prefer narrowly-focused and specialized tools suited to these specific applications, rather than general AI assistants.
Hypothesis 5: Faculty members prefer tools that are free or partially free over entirely paid solutions. It is assumed that faculty members in Poland, without access to additional funding for building their own AI-based resources with advanced paid tools, will be more likely to select free or partially free solutions in surveys.

Literature Review on the Hypotheses

The literature on this topic shows a consensus regarding the limited experience of academic lecturers in utilizing AI. The studies conducted by the World Economic Forum (2023) and UNESCO (2023) indicate that, although awareness of tools like ChatGPT is high, the actual use of these technologies in teaching remains low. The report from the U.S. Department of Education (2023) suggests that while many lecturers are familiar with the basic functions of AI tools (Cardona et al., 2023), they lack advanced skills to integrate these tools into daily teaching practices (Cardona, et al., 2023; Chen, et al., 2022).

Faculty members who use AI tools less frequently show higher training needs, regardless of their age. Research indicates that infrequent use of AI tools among senior faculty members mainly results from a lack of previous technological education and limited access to training (World Economic Forum, 2023; Chen, 2023). These educators need support in the practical application of AI to improve teaching efficiency and time management (Chen, 2023).

Studies reveal that younger faculty members and those representing STEM fields are more likely to use AI tools. For instance, educators in technical and engineering disciplines use AI for modeling, simulations, and data analysis, whereas humanities faculty members use these tools less frequently (Cardona et al., 2023; Labadze et al., 2023).

The choice of AI tools depends on specific educational objectives. Lecturers who use AI for preparing teaching materials often select tools like Grammarly or Research Rabbit, whereas general-purpose tools like ChatGPT are utilized for a broader range of tasks, such as content generation or responding to student inquiries (Labadze et al., 2023).

Faculty members prefer AI tools that are free or partially free, given the limited budgets of institutions for educational technologies. The lack of funding for advanced AI tools is a primary reason why lecturers rely on free solutions (Cardona, et al., 2023).

Methodology

The study involved 150 academic lecturers from various higher education institutions in Poland, of which 30 surveys were incomplete and unsuitable for further analysis. Participant recruitment was conducted using a random sampling method. The participants were selected from university staff who expressed interest in participating after receiving an invitation sent electronically via the CAWI (computer-assisted web interview) method, ensuring complete anonymity. These invitations were sent to email addresses from a database maintained by a company that archives public records. The recruitment process included information about the study's objectives, its anonymity, and the option to withdraw at any stage without giving a reason. Respecting the time and convenience of respondents, the survey was designed to take no longer than 15 minutes to complete (Baker, et al., 2016).

The sample selection was based on the random selection of participants from an available database of academic lecturers. The sample structure was intended to reflect the demographic and professional characteristics of the entire population. It should also be noted that hypothesis testing in this study relied heavily on correlational methods, which justified the selection of a sufficiently large sample to ensure adequate statistical power (Cohen, 2013), allowing for the detection of statistically significant relationships.

Sample Characteristics

Assuming a significance level of $\alpha = 0.05$ and moderate effect sizes, a sample size of 120 provides statistical power of approximately 0.80, consistent with empirical research recommendations (Cohen, 2013). Adequate statistical power is essential for detecting significant relationships between variables. The research sample consisted of 120 academic lecturers, including 62 women (51.7%) and 58 men (48.3%). The mean age of participants was 47.5 years (SD = 10.2), with the youngest participant aged 29 and the oldest 68. The age distribution of participants is shown in Table 1 and Figure 1:

Table 1
Age Distribution of Participants

Age Group	Number of Participants	Percentage (%)
29–39 years	30	25.0
40–49 years	38	31.7
50–59 years	35	29.2
60–68 years	17	14.2
Total	120	100.0

S o u r c e: Own elaboration.

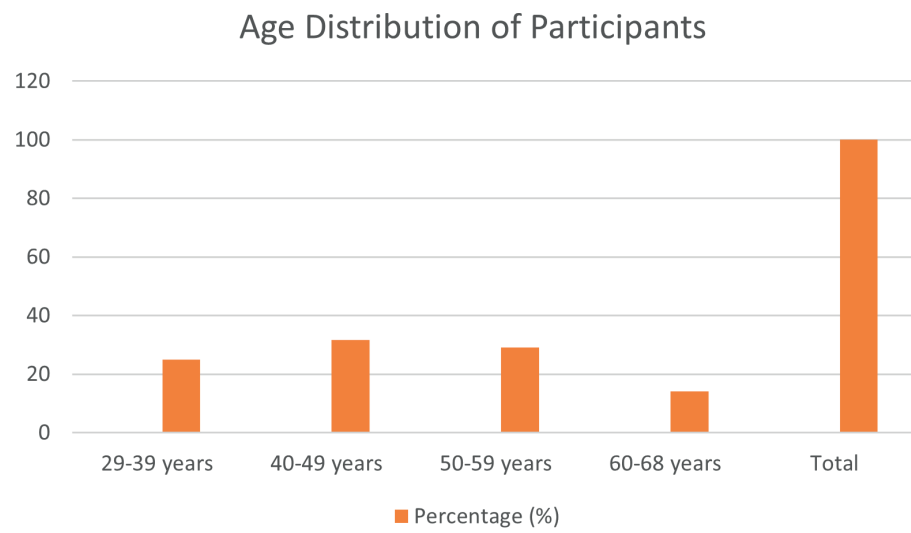


Figure 1. Age Distribution of Participants

S o u r c e: Own elaboration.

The study participants held various academic positions, as presented in Table 2 below.

Table 2
Academic Positions of Participants

Academic Position	Number of Participants	Percentage (%)
Assistant	20	16.7
Adjunct	50	41.7
Associate Professor	30	25.0
Full Professor	20	16.7
Total	120	100.0

S o u r c e: Own elaboration.

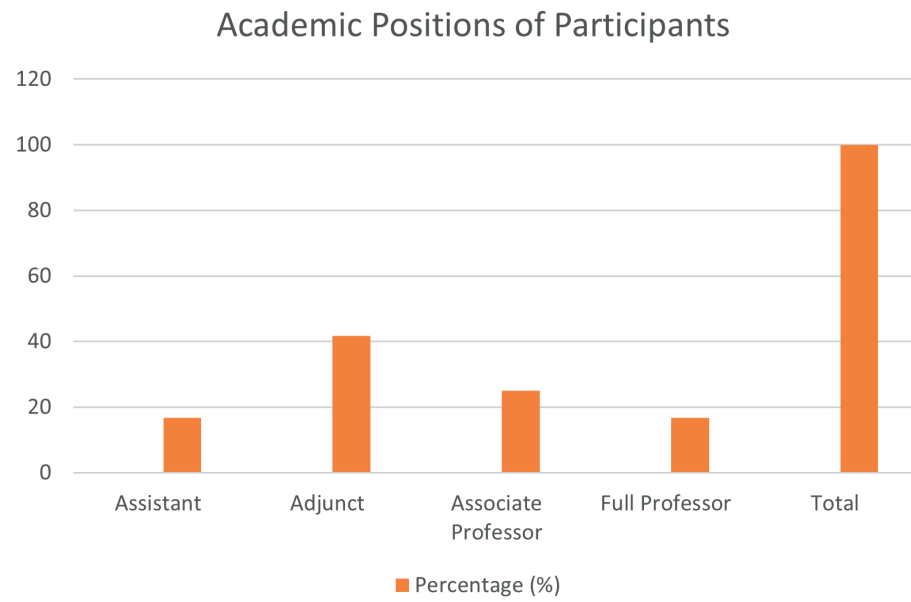


Figure 2. Academic Positions of Participants

Source: Own elaboration.

The surveyed academic lecturers represented various scientific fields, with the highest number in science and engineering and the fewest in medical sciences, as shown in Table 3.

Table 3
Scientific Fields of Participants

Scientific Field	Number of Participants	Percentage (%)
Science and Engineering	40	33.3
Humanities	30	25.0
Social Sciences	25	20.8
Natural Sciences	15	12.5
Medical Sciences	10	8.3
Total	120	100.0

Source: Own elaboration.

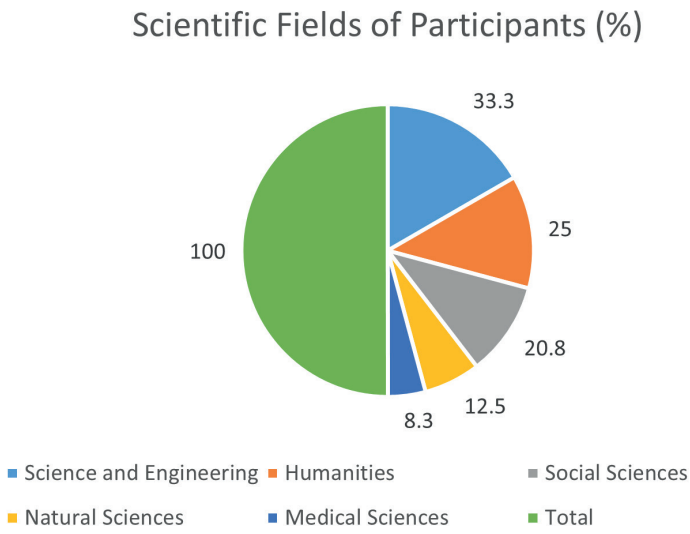


Figure 3. Scientific Fields of Participants

S o u r c e: Own elaboration.

According to the survey data, participants' experience with AI tools varied; however, the majority reported either no experience or only basic experience with AI. None of the respondents identified their proficiency level as very advanced, as shown in Table 4:

Table 4
Levels of Experience with Artificial Intelligence

Experience Level	Number of Participants	Percentage (%)
No Experience (1)	48	40
Basic Experience (2)	36	30
Intermediate Experience (3)	24	20
Advanced Experience (4)	12	10
Very Advanced Experience (5)	0	0
Total	120	100

S o u r c e: Own elaboration.

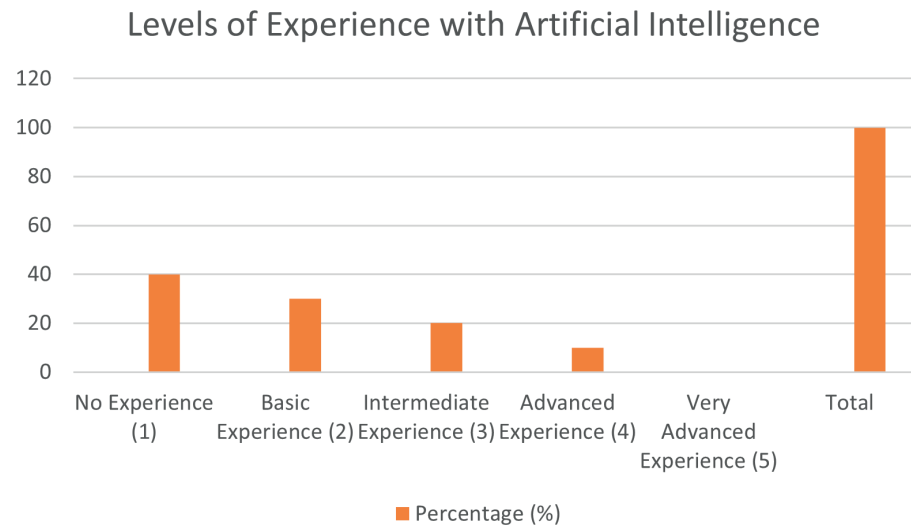


Figure 4. Levels of Experience with Artificial Intelligence

Source: Own elaboration.

Research Procedure

The study was conducted using CAWI online surveys, which were available to participants for one month. The surveys included questions on demographics, AI experience, and training needs related to AI. Both closed and open-ended questions were employed to gain a comprehensive view and allow participants to freely express their opinions. The collected data were analyzed using descriptive statistics and tests for differences between age groups and academic positions. The analysis aimed to identify major trends and differences in AI experience and training needs among academic lecturers.

Objective and Structure of the Questionnaire

The questionnaire used in the study was designed to assess the experiences, attitudes, and training needs of academic lecturers regarding the use of artificial intelligence (AI) in their work. It included both closed and open-ended questions divided into several sections, aimed at collecting demographic data, current

levels of AI use, barriers to implementation, and preferences for future training. The questionnaire was divided into six sections: Section 1 focused on demographic information; Section 2: AI Experience; Section 3: Barriers to AI Use; Section 4: Training Needs; Section 5: Preferences regarding paid and free software. The final Section 6 contained open-ended questions that allowed participants to express their opinions and suggestions on the use of AI in their work.

Results of the Study

The collected responses were analyzed using both statistical and qualitative methods. The analysis aimed to verify research hypotheses 1–5. Likert scales were analyzed in terms of mean values and distributions, while open-ended responses were coded and categorized to identify main themes and patterns. The study included 120 academic lecturers who rated their experience with AI tools on a Likert scale from 1 to 5. The average AI experience score was $\mu = 2.35$, indicating a low level of familiarity with this technology.

The standard deviation (SD) was 0.89, showing moderate variability in responses. These results confirm Hypothesis 1, that academic lecturers' experience with AI in didactics is largely limited. Mean values for the identified barriers to AI use in didactics were also rated on a Likert scale from 1 to 5, as presented in Table 5, with the following results: "I believe the lack of appropriate training is a significant problem in my didactic work": $\mu = 3.87$, SD = 1.02; "I agree that lack of time to learn new technologies hinders the use of AI tools": $\mu = 3.72$, SD = 1.15; "I believe the lack of technical support at the university is a significant barrier to using AI tools": $\mu = 3.45$, SD = 1.21. The greatest barrier proved to be the lack of adequate training, with a mean rating of 3.87 and a standard deviation of 1.02, indicating an urgent need to increase the availability and quality of training. The second significant barrier was the lack of time for learning new technologies, with a mean of 3.72 and a standard deviation of 1.15, suggesting that time management is a widespread issue. The third barrier was the lack of technical support at the university, rated at 3.45 with a standard deviation of 1.21, indicating a need for improved technical infrastructure. Overall, these findings underscore the need for investments in training, time management, and technical support to effectively integrate AI into the didactic process.

Table 5
Mean Values of AI Experience

Variable	Mean (μ)	Standard Deviation (SD)
AI Experience	2.35	0.89
Frequency of AI Use	1.92	0.78
Lack of Appropriate Training	3.87	1.02
Lack of Time for AI Learning	3.72	1.15
Lack of Technical Support	3.45	1.21

S o u r c e: Own elaboration.

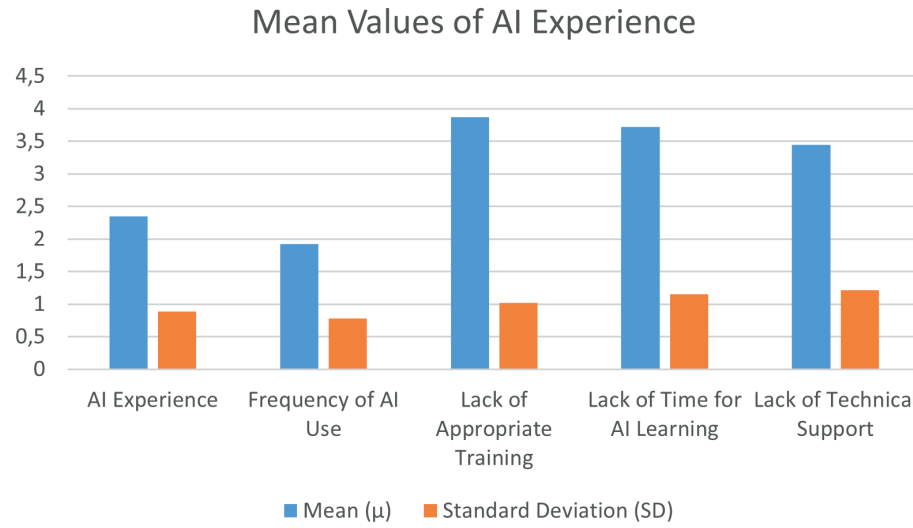


Figure 5. Mean Values of AI Experience

S o u r c e: Own elaboration.

High mean values in these categories indicate that lecturers experience significant barriers in implementing AI, which may explain the limited use of these technologies and supports the assumptions of Hypothesis 1. The frequency of AI use was rated on a scale from 1 (never) to 5 (daily). The mean frequency score was μ = 1.92, SD = 0.78. Low mean values indicate infrequent use of AI in daily teaching activities, further supporting the assumptions of Hypotheses 1 and 2. Preferences regarding software choices were rated on a scale from 1 (prefer paid tools) to 3 (prefer free tools): "I prefer free tools": μ = 2.78, SD = 0.43; "I prefer partially free tools": μ = 2.55, SD = 0.49; "I prefer paid tools": μ = 1.67, SD = 0.61. High mean values for preferences toward free and partially free tools indicate that faculty members prefer tools that do not incur additional costs, confirming Hypothesis 5.

The study found that academic lecturers have limited experience with AI tools, with major barriers being the lack of appropriate training, lack of time, and lack of technical support. Senior faculty members showed higher training needs, confirming Hypothesis 2. Moreover, faculty members under 40 and those from scientific fields were more frequent users of AI tools, supporting Hypothesis 3. Preferences for AI tools showed a clear inclination towards free or partially free tools, consistent with Hypothesis 5. Additionally, the study of preferences regarding types of AI tools revealed that lecturers choose tools based on specific didactic goals, supporting Hypothesis 4. These findings suggest that increased access to training and technical support could significantly improve the use of AI tools in academic teaching.

The results from Pearson correlation tests indicated statistically significant relationships between variables. A moderate negative correlation was found between academic degree and AI knowledge ($r = –0.45$, $p < 0.01$), suggesting that faculty with higher academic ranks may use AI tools less frequently. Additionally, the correlation between age and frequency of AI use was also negative and moderate ($r = –0.38$, $p < 0.01$), indicating that older faculty members use AI less frequently. These findings support Hypothesis 2, suggesting that older faculty members exhibit greater training needs in AI utilization.

To identify factors influencing AI use, a multiple regression analysis was conducted. The results indicate that age, scientific field, and level of AI experience are significant predictors of AI usage frequency ($F(3, 116) = 25.63$, $p < 0.001$, $R^2 = 0.40$). Age had a negative impact on AI use ($\beta = –0.29$, $p < 0.01$), confirming Hypothesis 3 that senior faculty members use AI less frequently. Scientific field had a positive effect, especially among faculty in scientific and technical disciplines ($\beta = 0.35$, $p < 0.001$), supporting Hypothesis 3 that faculty representatives in these fields use AI more frequently. Level of AI experience also had a positive effect on AI usage frequency ($\beta = 0.41$, $p < 0.001$), suggesting that greater experience translates into more frequent use of these tools.

Table 6
Pearson Correlation and Multiple Regression Analysis Results

Variable	r/Beta (β)	p-value	Interpretation
Academic Degree and AI Knowledge	–0.45	< 0.01	Moderate, negative correlation
Age and Frequency of AI Use	–0.38	< 0.01	Moderate, negative correlation
Age	–0.29	< 0.01	Negative effect on AI use
Scientific Field (Technical Disciplines)	0.35	< 0.001	Positive effect on AI use
Level of AI Experience	0.41	< 0.001	Positive effect on AI use

S o u r c e: Own elaboration.

To compare differences between groups, independent samples t-tests were conducted: The comparison of faculty age groups showed that those under 40 years of age reported higher average AI use ($\mu = 2.65$, $SD = 0.70$) compared to those over 50 years ($\mu = 1.75$, $SD = 0.80$), $t(118) = 5.45$, $p < 0.001$, suggesting that faculty members under 40 use AI tools more frequently in their teaching than those over 50.

Conclusions

The results of this study indicate limited experience among academic lecturers in using artificial intelligence (AI) in didactics. The mean AI experience score of $\mu = 2.35$ and low frequency of tool use ($\mu = 1.92$) confirm Hypothesis 1, suggesting that most faculty members have minimal or limited experience in this field. These findings are consistent with previous studies indicating a low level of AI technology integration in higher education (Mercader, 2020). Correlations between age and AI use frequency ($r = –0.38$) and academic rank and AI knowledge ($r = –0.45$) suggest that faculty with higher academic ranks and those who use AI tools less frequently exhibit greater training needs. Regression analysis results indicate that age, academic field, and level of AI experience are significant predictors of AI usage frequency. Younger faculty members and those in technical fields use AI tools more frequently, supporting Hypothesis 3.

Significance of the Findings

The study's findings have important practical implications for academic teaching and research. Faculty members' limited experience with AI and identified barriers, such as lack of adequate training and technical support, suggest the need for investment in training programs and technical support for faculty (Chen, 2020). Increasing the availability of training and technical support could significantly enhance the integration of AI tools in the teaching process, leading to more effective teaching and improved educational outcomes. The preference for free and partially free tools suggests a need to develop and promote accessible AI tools that do not impose additional costs on faculty. This approach would enable the broad application of these technologies, even in institutions with limited budgets (Cardona et al., 2023).

Study Limitations

Despite the valuable insights provided by this study, certain limitations may affect the interpretation of results. First, the research sample consisted of 120 academic lecturers, which may limit the generalizability of results to the entire academic population in Poland. Second, the study relied on self-assessment by participants, which may introduce biases associated with subjective evaluation of one's skills and experience, as it was not compared against an objective competency test. Furthermore, the study focused primarily on Polish higher education institutions, so the data collected may not reflect the diversity of results present in an international context. This article presents only selected findings, focusing on aspects that were statistically significant for testing the research hypotheses.

Omission of some data was due to several important reasons:

1. Lack of statistical significance: Statistical analysis indicated that some data did not show significant correlations with the examined variables. For example, preferences regarding the format of training (workshops, online courses, etc.,) did not differ significantly between groups with varying levels of AI experience. Therefore, these results were excluded from the article to focus on more relevant associations.
2. Low response rate for open-ended questions: Qualitative questions intended to gather opinions and suggestions often have lower response rates compared to closed-ended questions. In this study, a substantial portion of respondents did not answer open-ended questions, precluding a reliable qualitative analysis.
3. Limited article length: Scientific publications generally have word limits, necessitating selective reporting of findings. Consequently, the author decided to focus on statistically significant data directly related to the research hypotheses.
4. Potential for further research: Although insufficient for a complete analysis within this article, the qualitative data collected represents valuable material for future research. Qualitative analysis of academic lecturers' opinions and needs could be the subject of a separate article, providing a deeper understanding of the studied phenomenon.

This article serves as an initial exploration of the issue of AI use in academic teaching. Focusing on statistically significant quantitative data enabled verification of the research hypotheses and the identification of directions for further action. Future research, incorporating qualitative analysis and a broader scope of data, may contribute to a more comprehensive understanding of the needs and challenges associated with AI implementation in academic education.

Suggestions for Future Research

Future research in this area should include larger and more diverse samples to better understand the phenomenon in an international context. Additionally, longitudinal studies would be valuable for assessing changes in the experiences and attitudes of academic lecturers toward AI over time. Research could also focus on a detailed analysis of the effectiveness of various training programs and the identification of best practices in integrating AI tools into academic teaching. An interesting approach would be to compare academic lecturers with another group of professionals in intellectual or office-based roles, such as managerial staff, to provide a more comprehensive picture of AI usage levels and scopes.

Another possible step could involve analyzing specific cases of AI use across different scientific fields to identify the unique needs and challenges associated with implementing these technologies in various didactic contexts. Future research could examine how AI influences students' educational outcomes and satisfaction with the learning process. It could also compare the results of groups taught by faculty applying AI tools with those taught by faculty that does not use such tools.

References

Allioui, H., & Mourdi, Y. (2023). Unleashing the potential of AI: Investigating cutting-edge technologies that are transforming businesses. *International Journal of Computer Engineering and Data Science, 3*(2), 1–12. https://www.ijceds.com/ijceds/article/view/59.

Baker, R. S., Martin, T., & Rossi, L. M. (2016). Educational data mining and learning analytics. In J. A. C. Lockwood (Ed.), *The Wiley handbook of cognition and assessment: Frameworks, methodologies, and applications* (pp. 379–396). https://onlinelibrary.wiley.com/doi/abs/10.1002/9781118956588.ch16.

Bates, T., Cobo, C., Mariño, O., & Wheeler, S. (2020). Can artificial intelligence transform higher education? *International Journal of Educational Technology in Higher Education, 17,* 1–12. https://doi.org/10.1186/s41239-020-00218-x.

Benavides, L. M. C., Tamayo Arias, J. A., Arango Serna, M. D., Branch Bedoya, J. W., & Burgos, D. (2020). Digital transformation in higher education institutions: A systematic literature review. *Sensors, 20*(11), 3291. https://doi.org/10.3390/s20113291.

Cardona, M. A., Rodríguez, R. J., & Ishmael, K. (2023). Artificial intelligence and the future of teaching and learning: Insights and recommendations. *Education Next.* https://policycommons.net/artifacts/3854312/ai-report/4660267/.

Chen, C. (2023). AI will transform teaching and learning. Let's get it right. *Stanford Institute for Human-Centered Artificial Intelligence.* https://hai.stanford.edu/news/ai-will-transform-teaching-and-learning-lets-get-it-right.

Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *IEEE Access, 8,* 75264–75278. https://doi.org/10.1109/ACCESS.2020.2988510.

Chen, T., Gascó-Hernandez, M., & Esteve, M. (2024). The adoption and implementation of artificial intelligence chatbots in public organizations: Evidence from US state governments. *The American Review of Public Administration, 54*(3), 255–270. https://doi.org/10.1177/02750740231200522.

Chen, X., Zou, D., Xie, H., Cheng, G., & Liu, C. (2022). Two decades of artificial intelligence in education. *Educational Technology & Society, 25*(1), 28–47. https://scholars.ln.edu.hk/ws/portalfiles/portal/41220986/25_1_03.pdf.

Cohen, J. (2013). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates. https://doi.org/10.4324/9780203771587.

Duan, Y., Edwards, J. S., & Dwivedi, Y. K. (2019). Artificial intelligence for decision making in the era of big data–evolution, challenges and research agenda. *International Journal of Information Management, 48,* 63–71. https://doi.org/10.1016/j.ijinfomgt.2019.01.021.

Guilherme, A. (2019). AI and education: The importance of teacher and student relations. *AI & Society, 34*(1), 47–54. https://doi.org/10.1007/s00146-017-0693-8.

Kopczyński, T., & Szpyt, K. (2020). Padlet as a modern form of e-learning in the context of Sugata Mitra's research: A new model of education. *International Journal of Research in E-learning, 6*(2), 45–58. https://doi.org/10.34739/ijrel.2020.06.02.04.

Kuleto, V., Ilić, M., Dumangiu, M., Ranković, M., Martins, O. M., Păun, D., & Mihoreanu, L. (2021). Exploring opportunities and challenges of artificial intelligence and machine learning in higher education institutions. *Sustainability, 13*(18), 10424. https://doi.org/10.3390/su131810424.

Labadze, L., Grigolia, M., & Machaidze, L. (2023). Role of AI chatbots in education: Systematic literature review. *International Journal of Educational Technology in Higher Education, 20*(1), 56. https://doi.org/10.1186/s41239-023-00426-1.

Mercader, C. (2020). Explanatory model of barriers to integration of digital technologies in higher education institutions. *Education and Information Technologies, 25*(6), 5133–5147. https://doi.org/10.1007/s10639-020-10222-3.

Ouyang, F., Zheng, L., & Jiao, P. (2022). Artificial intelligence in online higher education: A systematic review of empirical research from 2011 to 2020. *Education and Information Technologies, 27*(6), 7893–7925. https://doi.org/10.1007/s10639-022-10925-9.

Smyrnova-Trybulska, E. (2021). Development of prospective preschool and primary school teachers in the area of ICT use in education. e-mentor, 3(90), 32–42. https://doi.org/10.15219/em90.1520.

UNESCO. (2023). Artificial intelligence in education. https://www.unesco.org/.

World Economic Forum. (2023). How AI can transform education for students and teachers. https://www.weforum.org/.

Tomasz Kopczyński

Wykorzystanie sztucznej inteligencji w dydaktyce i pracy naukowej: badanie pilotażowe wśród nauczycieli akademickich w Polsce

Streszczenie

Artykuł przedstawia wyniki pilotażowego badania dotyczącego wykorzystania sztucznej inteligencji (SI) w dydaktyce i pracy naukowej wśród nauczycieli akademickich w Polsce. Celem głównym badania było zidentyfikowanie poziomu doświadczenia, barier oraz potrzeb szkoleniowych związanych z SI wśród nauczycieli akademickich. Badanie przeprowadzono metodą ankietową

(CAWI) na próbie 120 nauczycieli z różnych uczelni wyższych. Analiza wyników ujawniła, że większość uczestników posiada ograniczone doświadczenie w korzystaniu z narzędzi SI. Główne bariery obejmują brak odpowiedniego szkolenia, brak czasu na naukę nowych technologii oraz brak wsparcia technicznego na uczelni. Wykładowcy posiadający wyższe tytuły naukowe oraz rzadziej korzystający z narzędzi SI wykazują większe potrzeby szkoleniowe. Wykładowcy z nauk ścisłych i technicznych częściej korzystają z SI w porównaniu do wykładowców z innych dyscyplin. Wyniki wskazują na konieczność inwestowania w programy szkoleniowe oraz wsparcie technologiczne dla kadry akademickiej, aby zwiększyć efektywność wykorzystania SI w dydaktyce. Preferencje dotyczące narzędzi SI są silnie związane z ich dostępnością finansową, co wskazuje na potrzebę promowania narzędzi bezpłatnych lub częściowo bezpłatnych. Wnioski z badania mogą stanowić podstawę do opracowania strategii wspierających wdrażanie SI w edukacji wyższej, przyczyniając się do poprawy jakości kształcenia oraz efektywności badawczej.

S ł o w a k l u c z o w e: SI (sztuczna inteligencja), edukacja wyższa, potrzeby szkoleniowe, bariery technologiczne, kadra akademicka

Tomasz Kopczyński

El uso de la inteligencia artificial en la didáctica y el trabajo académico: un estudio piloto entre el personal docente en Polonia

R e s u m e n

Este artículo presenta los resultados de un estudio piloto sobre el uso de la inteligencia artificial (IA) en la didáctica y el trabajo académico entre el personal docente en Polonia. El objetivo principal del estudio fue identificar el nivel de experiencia, las barreras y las necesidades formativas relacionadas con la IA entre los docentes universitarios. El estudio se llevó a cabo mediante un método de encuesta (CAWI) en una muestra de 120 profesores de diversas instituciones de educación superior. El análisis de los resultados reveló que la mayoría de los participantes tiene una experiencia limitada en el uso de herramientas de IA. Las principales barreras incluyen la falta de formación adecuada, la falta de tiempo para aprender nuevas tecnologías y la falta de apoyo técnico en las universidades. Los docentes con títulos académicos superiores y aquellos que utilizan herramientas de IA con menor frecuencia muestran mayores necesidades de formación. Los profesores de disciplinas científicas y técnicas utilizan la IA con mayor frecuencia en comparación con los docentes de otras áreas. Los resultados destacan la necesidad de invertir en programas de formación y apoyo tecnológico para el personal docente universitario, con el fin de mejorar la eficacia en el uso de la IA en la didáctica. Las preferencias en cuanto a herramientas de IA están fuertemente vinculadas a su accesibilidad económica, lo que subraya la importancia de promover herramientas gratuitas o parcialmente gratuitas. Las conclusiones de este estudio pueden servir como base para desarrollar estrategias que respalden la implementación de la IA en la educación superior, contribuyendo a mejorar la calidad de la enseñanza y la eficacia de la investigación.

P a l a b r a s c l a v e: IA (inteligencia artificial), educación superior, necesidades de formación, barreras tecnológicas, personal docente universitario

Tomasz Kopczyński

Томаш Копчиньски

Использование искусственного интеллекта в дидактике и научной работе: пилотное исследование среди преподавателей вузов в Польше

Аннотация

В данной статье представлены результаты пилотного исследования, посвящённого использованию искусственного интеллекта (ИИ) в дидактике и научной работе среди преподавателей вузов в Польше. Основной целью исследования было выявление уровня опыта, барьеров и потребностей в обучении, связанных с использованием ИИ, среди университетских преподавателей. Исследование было проведено методом анкетирования (CAWI) на выборке из 120 преподавателей различных высших учебных заведений. Анализ результатов показал, что большинство участников имеют ограниченный опыт использования инструментов ИИ. Основные барьеры включают недостаток соответствующего обучения, нехватку времени на освоение новых технологий и отсутствие технической поддержки в университетах. Преподаватели с высокими научными званиями и те, кто реже пользуется инструментами ИИ, испытывают большую потребность в обучении. Преподаватели естественнонаучных и технических дисциплин чаще используют ИИ по сравнению с коллегами из других областей. Результаты исследования подчёркивают необходимость инвестирования в программы обучения и техническую поддержку преподавательского состава, чтобы повысить эффективность использования ИИ в образовательном процессе. Предпочтения в выборе инструментов ИИ тесно связаны с их финансовой доступностью, что указывает на важность продвижения бесплатных или частично бесплатных решений. Выводы исследования могут служить основой для разработки стратегий поддержки внедрения ИИ в высшем образовании, способствуя улучшению качества преподавания и эффективности научной деятельности.

Ключевые слова: ИИ (искусственный интеллект), высшее образование, потребности в обучении, технологические барьеры, преподавательский состав

International Journal of Research in E-learning
Vol. 10 (2), 2024, pp. 1–19

DOI 10.31261/IJREL.2024.10.2.05

Harshita Bhatnagar
Vidya Bhawan Rural Institute, Affiliated to MLSU, India
https://orcid.org/0000-0002-2882-2554

Technology Empowering Women of India

Abstract

This study is an attempt to determine major impact of technology on women's empowerment in present era. To determine the impact of technology, it is important to know the awareness level and the adoption rate of technology among Indian women. This study will also help in finding out various problems/challenges faced by women and new insights gained by women while using technology. This will also support Indian government in making favourable policies and innovative schemes for women to provide more technology driven power. The structured questionnaire is designed and circulated to 120 women of semi urban areas of Udaipur district, Rajasthan, based on convenience sampling. 83% of the total questionnaire distributed are found complete for research purpose. Data analysis reveals that after technology in any form it is mostly used by educated women who are between the age of 25–50, and are house makers. The majority of women have purchased new devices such as smartphones, desktop computer/laptop and tablets for different reasons for doing work from home, entertainment, travel, learning, trading, etc. It is visible from the study that the majority of women have no or insufficient knowledge about ethical guidelines/code of ethics regarding cyber security. Unfortunately, women restrict themselves to use technology because of severe technical issues, lack of privacy, gender discrimination and digital divide. Other reasons such as domestic issues, overburden of responsibility, low literacy rates, non-participation in decision making, etc., are few other reasons behind a lower adoption of technology by women. These factors are responsible for smaller interaction of women with the technology and thereby creating stumbling block in empowering women digitally. Strong support of family members, government, policy maker and educational institutions can encourage women empowerment.

There is an urge to devise and implement various awareness e-training and support programs for women all over the nation. Strengthening norms for cyber security will add more power and innovation to technology use. Economic and psychological impact of Demonetisation and pandemic COVID-19 have brought tremendous changes to the lives of common man. The new prefix "e" to each and every word has new meaning "empowering entire earth electronically". Hence, empowering women has become the top priority of each and every nation.

K e y w o r d s: Digital Divide, Women Empowerment, technology change, Digital Inclusion of Women, Training, cyber security and ethics, Nari Shakti

Introduction

Education is the best medium to give wings to our dreams. It let us live intelligently and far better than others. In the 21st century, web technology is the major means of information and entertainment for each and every one across the globe. Today, every task right from the basic physical needs to luxury needs, is dependent on this technology. The main sources of information and entertainment such as television, newspaper and telephones have been replaced by web technology. An ample number of software and applications are available to provide myriad services at your doorstep. All this is possible with Information and Communication Technologies (ICTs). It is referred to as the varied collection of technological gear and resources which are used to communicate. They are also used to generate, distribute, collect and administer information (Sarkar, 2012). Today technology has compelled all of us to add "digital" as a prefix to the word literacy, that is, digital literacy. A digital literate man is the one who not only knows to read and write, but also an expert user of computer.

Digital literacy is the ability, skills and behaviour used to operate digital devices such as smartphones, tablets, laptops and desktop PCs, etc. Digital literacy and computer literacy are interrelated concepts. In Indian context, National Digital Literacy Mission (NDLM), quotes digital literacy as 'the ability of individuals and communities to understand and use digital technologies for meaningful actions within life situations'. Eshet (2004) has proposed a new conceptual framework for the concept of digital literacy, incorporating five types of literacy: (a) photo-visual literacy; (b) reproduction literacy; (c) information literacy; (d) branching literacy; and (e) socio-emotional literacy. Eshet also defines digital literacy to "involve more than the mere ability to use software or operate a digital device; and a large variety of complex cognitive, motor, sociological, and emotional skills, which users need in order to function effectively in digital environments".

The adoption of technology is raising in Tripura, but women face disparities in access to and utilization of technology. Factors such as a lack of awareness, limited resources, and cultural norms can prevent women from fully embracing digital tools and ICT. Bridging this gap is essential to ensuring women have equal opportunities to leverage technology for their education, employment, and empowerment (Debbarma & Chinnadurai, 2023).The power and transformational potential of Internet access and use is not equally distributed.

To build a digital inclusive society in India women empowerment and digital divide is crucial. In order to bring societal transformation digital empowerment of women and girls of all age and categories is essential. The advancement of ICT has brought changes in the societies across the globe, but unfortunately not in India due to cultural and demographic factors. A woman is the soul of the family as well as nation. Her dreams, thoughts, opinions are as important as that of men. But the unequal access of Internet use among men and women across the globe restrict women to spread their wings.

In a developing country like India, technology usage is continuously widening the gap not only between men and women, but also between urban and rural, educated and illiterate, rich and poor people. Rural and tribal people are amongst the most disadvantaged segments of society and are often exploited due to their illiteracy and concomitant lack of awareness. They are deprived of development processes that were initiated and intended for their advancement, prosperity and security (Nedungadi et. al., 2018). So in order to eliminate or minimize the gap and to become self-reliant, it is essential for each and every citizen to become a netizen -digitally literate. Digital India Program has played a vital role in bridging the gender gap and empowering women in rural areas. Additionally, the study uncovers a trend towards mobile-based services over computer-based services, signaling a shift in technology utilization patterns. This emphasizes the need to prioritize mobile technology and improve connectivity in rural areas to ensure wider access to digital platforms (Sindakis & Showkat, 2024).

Another challenge is lack of complete knowledge; skills, training and awareness, due to which women are becoming victims of unethical cyber behaviour. This calls for a need to teach and promote cyber ethics at every level of computer usage, i.e. from a novice user to a skilled user. Cyber ethics refers to the code of responsible behaviour on the Internet (Purohit, Bharti& Joshji, 2015). Similarly, cyber security is another important issue for women. The important thing in digital literacy is about how to maintain privacy in the online world (Marini, Hanum, Sulistiyo, 2019). It is important to understand different types of cybercrime such as online theft through credit cards, fake sites, frauds via links on email, etc. Secure browsing is also a part of digital literacy. Hence, it is important to make women aware of using strong passwords, not clicking on embedded links, not sharing OTPs and passwords, of safe access of social networking sites, reliability of websites, etc.

In India, stereotype thoughts are also common among educated families too. Similarly orthodox culture and traditions more commonly exist in our Indian families. Unfortunately, women are torched under the name of culture. Autonomy is considered as modernization in the respect of women. Whenever mentality will not change the country's men and women, women cannot be upgraded in the country (Devi, 2023). Women in Udaipur have made laudable progress in various fields, yet societal norms and cultural practices often confine them to traditional roles within the family and community. Technology plays an important role in breaking the shackles for their holistic development by creation of equitable and progressive environment. This study is an attempt to show how technology is empowering women and to what extent.

Research Focus

Women empowerment plays a crucial role in the overall development of any society besides positively impacting the daily lives of women. The winds of radical change in the fields of employment and information technology have brought a wide range of opportunities for women in India and across the globe (Dhanamalar et. al., 2020). Indian women are making their significant place into various fields such as business, health, IT, agriculture, and so on. But still, many housewives/ mothers/girls having extraordinary talents are not able to become entrepreneurs or not able to generate extra income for their family due to the lack of information and platform. In India, there still exists a gender digital divide, too.. Thus, the main idea behind digital literacy is to empower women so that they can effectively use digital media to make their dreams come true. It will give new opportunities, self-confidence, independence, status and support to each other. Though, there has been a significant increase in the number of Internet users over the years but still there exists a wide gap between the Internet usage among men and women. Digital literacy need for urban female students (Purohit, Bharti & Josji, 2015) consists of:

- Knowledge of cyber security and safe browsing especially in case of social networking and online transactions,
- Knowledge of various digital courses related to subject area of study,
- Knowledge of advanced software (SPSS, AMOS, etc.),
- Knowledge about social and professional networking,
- Online job and career enhancement opportunities.

Being digitally literate, women can make better decisions, saves time, get more options, financial planning, enhance learning, expose talent, access information about health, safety, sanitation, etc.

Methodology of Research

General Background of Research

This study is very relevant in the current context and will be helpful in determining the awareness and adoption of technology by women of semi urban regions of Udaipur district. It will also help in exploring the new avenues and challenges faced by women while interacting with digital platforms. A descriptive method of research is followed here to study the objectives of the study.

Research Questions and Hypothesis

The tremendous advancements in technology across the world have turned out to be the core issue of various researches all over the world. Sudden emergence of the COVID-19 pandemic and demonetisation have created a wide range of technology around us. Each and every activity is led by technology. The research was guided by the following research objectives:

To study the demographic profile of women using technology,

To study the level of digital inclusion among women of India,

To study the impact of using technology (screen time) on level of knowledge,

To determine the relationship between knowledge level and decision making power among women with respect to cyber security and ethics regarding use of technology.

To study the various problems faced and new insights gained by the women while using technology.

Hypothesis Development

In order to conduct a controlled experiment and empirical study the following null hypothesis has been developed:

H1: There is no relationship between screen time and knowledge level among women.

H2: There is no relationship between decision making and knowledge level among women.

Sample of Research

The survey was conducted for 3 months in year 2023 in order to collect the primary data using the structured questionnaire seeking different types of information on technology adoption and awareness among women. It was designed and distributed after going through extensive literature review which really helped in developing better understanding that women can be empowered by leveraging technology and for gaining maximum benefits. The sample consists of 120 females from diverse backgrounds of Udaipur City selected on the basis of convenience sampling. The questionnaire was distributed to 120 women but the response rate

was 83% (100 questionnaires returned and found complete for the study). The data collected through questionnaire are coded, tabulated and analysed thoroughly to draw the conclusions and recommendations. Various books, newspapers, journals, government reports and websites have been referred to to enrich this study.

Limitation of Study

Each and every woman is unique. It is not fair to apply the same approach to different women. Their unique mindset, opinions, beliefs, aspiration, etc., differentiate one from another. The present study has the following limitations:

1. The responses for the study have been solicited from women residing in Udaipur District, Rajasthan state only.
2. The present study is based upon primary data. So, the study may suffer from the elements of bias.
3. Women of Rajasthan are still found shy in nature which is clearly a barrier in extracting information from them. In spite of that a lot of information has been collected.

Data Analysis and Interpretation

1. Respondent's personal profile

Demographic information is the very first part of the questionnaire. Table 1 provides a complete information of 100 respondents based on their literacy level, age and present working status.

Table 1
Respondent's personal profile

Demographics	*Measures*	*Percentage*
Literacy level	School Pass	14
	Undergraduate	46
	Postgraduate and above	40
Age	Below 25	20
	25–50	54
	Above 50	26
Occupation	Private Job	38
	Great House makers	42
	Business women	5
	Public Sector Job	15

S o u r c e: own work.

It is seen that out of total 100 female respondents, 40% females are post graduates and above, and majority of females (54%) belongs to the age group of 25–50 years. Most of the females are great house makers (42%) or in a private job (38%). The complete demographic profile of respondents is found diversified and sufficient for mapping the background of the women participating in this study.

2. Operating skill and expertise among respondents

Certain skill sets are required for using new technological advancements. Table 2 depicts the expertise level in operating Internet either from a computer system or smartphones. Many females (28%) use Internet for accessing search engine (Google) only on Computer/ Laptop. On the other hand, the majority of females have an expert hand on Smartphones (38%). It is also found that 8% of females are not able to operate computer, but can use smartphones/tablets for their day to day need. Overall, 100% females use Internet services either on desktop/Laptop or Smartphones/tablets.

Table 2
Level of operating skills and expertise for using Internet

S. No.	Level of expertise	Expert Skills	Medium Skills	Fewer Skills	Can use Google only	Never Used
1	Computer/Laptops Operating skills	21	18	25	28	8
2.	Smartphones/tablets	38	27	26	9	0

S o u r c e: own work.

Table 3
Operating skills are acquired by

S. No.	Operating Skills Acquired Through	Percentage
1	Professional Computer course/training	42
2	Self-learning/with some ones help	58

S o u r c e: own work.

For leveraging technology adoption, it is essential to learn skills to operate computer systems and for using Internet safely. Table 3 shows that only 42% respondents have learned computer through some professional centres and 79% respondents use Internet facilities by self-practice or with the help of colleagues, family or friends.

3. Gadgets used for accessing Internet

Table 4
Gadgets used by respondents

S. No.	Gadgets	Percentage
1	Smartphones	100
2	Desktop	52
3	Laptop	41
4	Tablet	18

S o u r c e: own work.

All female respondents use smart phones for accessing Internet, and use of tablets is found very low (18%), While 52% Respondents are using desktop and 41% are using laptop (41%) for accessing Internet for their work or entertainment.

4. Purchase of any new digital device in last 5 year

It is found that 96 % respondents have purchased either new smart phones, desktops laptops, or tablets in recent years. This data show that female are now getting more aware of technology and using the technology for their different needs such as entertainment, online classes, banking, shopping, work from home, etc. Simultaneously, women also started exploring the use of technology as a new avenue to relive their interest such as online teaching, blogging, creating content, cooking classes and lot more. Aggressive use of technology in each sector is compelling everyone to buy and use these digital devices.

5. Screen time of the respondents daily

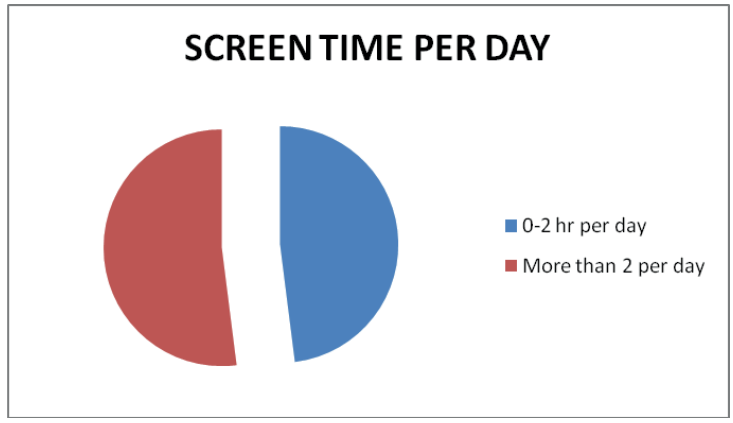


Figure 1. Chart showing everyday screen time of the respondents

S o u r c e: own work.

It is clear from the graph that 48% of female respondents use Internet for less than 2 hours a day. Drastic shift is noticed after demonetisation and the Covid-19. People switch from offline to online mode which may be due to hygiene, comfort and cashless transactions. Now, everyone shows interest in online classes, work from home, e-banking transactions, entertainment (OTT) and online shopping (Amazon, Flipkart, Myntra, Meesho, etc.,), etc. This is a strong indication of adoption of technology by women.

6. Use of Internet

Today, in this smart era, women are getting smart and independent by adopting technology at fast pace in their day-to-day life. Internet has become part and parcel of their life starting from cooking, house making, learning, shopping, entertainment, travel or any other thing. Table 5 shows that today, women use Internet for different purposes such as learning through online classes for them as well as for kids, work from home, travel, reading, trading, cooking, general purpose, OTT platforms, banking app, shopping applications, etc.

Table 5
Use of Internet for different purpose

S. No	Use of Internet	Percentage
1	Pursuing online classes (for themselves and for their kids' education)	26
2	Work from home	18
3	General Information through search engine	79
4	Email	42
5	Social Networking (FB, WhatsApp, etc.)	84
6	Entertainment (Games, Movies, etc.)	68
7	Internet Banking /Bill Payment	38
8	Trading	24
9	Reading News and Books	38
10	Academic purpose (Attending online Conference /Seminars, etc.)	16
11	Online Shopping	74
12	Travel	16

Source: own work.

It is found that highest numbers of women use technology for accessing social media platforms (84%) or searching information about general questions or queries through search engines (79%). Online shopping and entertainment is also common among women whereas travel bookings, trading and working from home are still less popular among women. Usually females hesitate to use Internet banking due to security reason or lack of education (Bhatnagar, 2014).

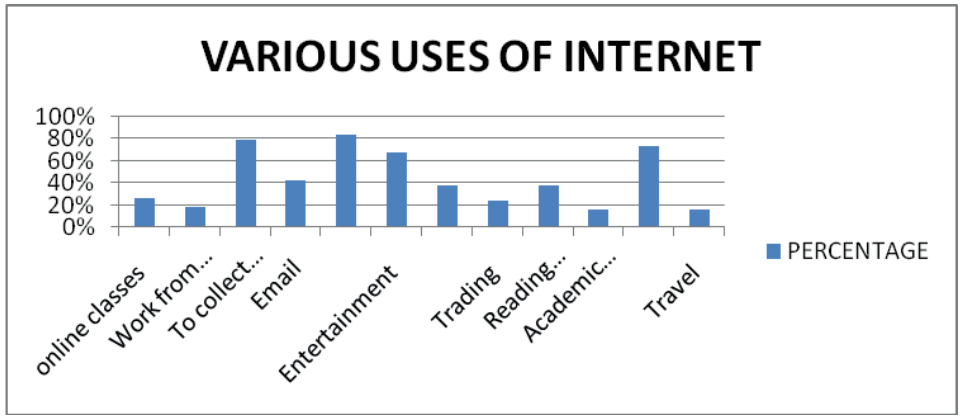


Figure 2. Chart showing various uses of Internet by women

S o u r c e: own work.

7. Major search engines used for information search

Most of the respondents use Google (85%) for browsing information on the web. Yahoo, Bing and other search engines are not popular among females. Few use multiple search engines depending upon the speed and network. Very few women use Bing and other search engines such as DuckDuckGo, Wiki.com, etc.

Table 6
Search engine for browsing information

Search Engine	Frequency
Only Google	85%
Only Yahoo	21%
Only Bing	6%
Other	3%
Multiple	20%

S o u r c e: own work.

8. Knowledge level about cyber security, frauds and ethics

Today our life is revolving around technology. To avail absolute advantage of web technologies it is very important to have sufficient knowledge of cyber security. Most females have very little knowledge about various cyber frauds and only 13% women are confident about their knowledge on cyber security and ethics. 40% women still do not have knowledge about cyber security, cyber laws, ethics, frauds and regulation.

Table 7
Level of knowledge about cyber security, fraud and ethics

Level of Knowledge	Percentage
Sufficient /Complete	13
Very Little knowledge	47
No knowledge	40

S o u r c e: own work.

Cybercrime is a major challenge not only in India, but across the world. Lack of basic knowledge about cyber security, software piracy, hacking, fake content, cyber bullying, digital scams, etc., is responsible for an increasing number of cyber frauds yearly.
In order to understand the relationship between the level of knowledge and screen time we will apply Chi-Square test. The hypothesis framed is the following:

H_1: There is no relationship between screen time and knowledge level among women

Table 8
Knowledge level and screen time

Level of Knowledge	Less Than 2 Hr	More Than 2 Hr	Chi-Square	Df	Result
Sufficient	8	5	1.166	2	Not significant
Little	21	26			
No	19	21			
Total	48	52			

S o u r c e: own work.

Data encapsulated in Table 8 shows the impact of screen time on the level of knowledge of the women. The results of Chi-Square test (values = 1.166, df = 2, $p < .05$) shows that there is no significant difference in the level of knowledge among women based on their screen time. The difference is not statistically important.

Table 9
Cyber Security

Knowledge of Cyber Security	Sometimes or Once	Never
Have you ever shared your password or OTP to anyone?	46	54
Have you ever clicked on links embedded in emails	58	42
Have you gone through any online fraud?	32	58

S o u r c e: own work.

Table 9 depicts that many women (46%) have shared their OTP and passwords with any third party. It is surprising to know that 58% of women have clicked on embedded links in emails for the sake of some gift or money. 32% of women have faced online frauds such as receiving wrong product, money transfer from bank account, hacking of social media account, no response from supplier, etc.

9. Women decision making power

Table 10
Decision making

Decision Making Power	Yes	No
Do you make your own decision regarding online transaction, shopping or travel, etc.,	44	56
Do you consult your husband, parents or brother before making any online transactions?	56	44

S o u r c e: own work.

Rajasthan is a patriarchy state where most of the decisions are taken by a father or a brother. Table 10 is provides the evidence in support of patriarchy. 56% of females still consult their husband, parents or brother before making any online transactions. This may be due to lack of involvement of women in decision making, permission issues, little knowledge and lack of confidence among women.

H_2: There is no relationship between decision making and knowledge level among women

Table 11
Knowledge level and screen time

Level of Knowledge	Self- Decision	Decision After Consultation	Chi-Square	Df	Result
Sufficient	10	3	14.8343	2	significant
Less	25	22			
No	9	31			
Total	44	56			

S o u r c e: own work.

Data encapsulated in Table 11 shows the impact of the level of knowledge on decision making power of women. The results of Chi-Square test (values = 14.8343, df = 2, $p < .05$) shows that there is a significant difference in the decision making of women based on their level of knowledge. The significant difference is obvious

because rational decisions are always based on knowledge. In this case, women also take decisions on the basis of their level of knowledge.

10. Technical issues faced while using browsing Internet

Table 12
Technical issues while using Internet

Problems Faced	Number	Percentage
Transaction failed due to network breakdown	78	48
Difficulty to judge relevant and reliable information	46	46
Access permission Issues/ Cookies	80	80
Overloaded Information	39	39
Lack of skill sets	34	34

S o u r c e: own work.

Lot of people face various difficulties while browsing, such as slow speed, network breakdown, permission issues, language barrier, overloaded information, etc. Table 12 depicts various technical issues while using Internet. Nearly 80% of respondents face problems of cookies/access permission issues and 78% say that most of the time transaction get failed due to network error/issues. Other problems faced by women are difficult to judge the relevant and reliable information overloaded information on web page and lack of their own skill set to use technology.

11. Challenges faced while using technology/Internet

Table 13
Challenges faced while using technology / Internet

Challenges Faced While Using Technology	Percentage
Language problem	48
Responsibility and domestic issues	61
Economic conditions	48
Lack of confidence	33
Lack of clarity and awareness	23
Lack of guidance and support	44
Complex nature of technology	51
Lack of security and cyber laws	29
Lack of privacy	34

S o u r c e: own work.

Major challenges faced by women are the burden of responsibility and domestic issues (61%), a complex nature of technology (51%), economic conditions (48%), lack of cyber security, rules and regulations. Other barrier hindering female interaction with technology are lack of support system and guidance, lack of clarity and awareness of certain technological concepts, lack of confidence, lack of privacy, etc. These challenges create obstacles in the path of empowering women digitally.

Results of Research and Discussions

A woman is the foundation of any country. Without her transformation it is impossible to dream about transformation of any country like India. The results of this study are as follows:

1. Out of 100 respondents 46% of women have a UG degree, 54% are between the age of 25-50, and 42% are great house makers while the rest are in job or business. The complete demographic profile of respondents is sufficient to understand the background of the respondents. All respondents use Internet services either on desktop/Laptop or Smartphone/tablets. This shows that technology has now become the building block of our life. For leveraging technology adoption, it is essential to have some skills to operate computer systems, laptops and smart phones safely. A considerable number of respondents have done professional computer courses/training while the majority use computer/ smart phones by self- learning. This can be the reason behind the lack of expert skills and knowledge regarding cyber security, frauds and ethics, etc.
2. Smart phones are omnipresent today. 100% of respondents use smart phones for accessing Internet and use of tablets is found very rare. Hence, the increasing dependence of women on smart phones may be due to various reasons such as high portability, touch screen feature and user friendly and interactive interface.
3. It is found that 96% of respondents have purchased either new smart phones, desktops, laptops, tablets in past five years. This may be due to the need of time to avail online classes, banking, shopping, work from home, etc., which compels them to buy and use the digital devices. Simultaneously, women have started exploring technology as a new avenue to relive their interest such as online teaching, blogging, creating content, cooking classes and lot more.
4. It is found that the normal screen time is now between 2 to 4 hours. This may be due to abundance of various applications for earning, social media networking, learning, banking, entertainment, travel and shopping, etc. Previously, Internet was mostly used for social networking and entertainment. Now the use of Internet is far more than online classes, work, banking, travel, reading books, attending seminars and conferences worldwide and trading, etc., which is a good indicator of adoption of technology by women thereby empowering themselves.

5. Most of the respondents use common search engines such as Google and Yahoo for browsing information on the web. This shows that respondents are not aware of other options available for information search.
6. Most of the females have very little knowledge about various cyber frauds and only 13% of women are confident about their knowledge on cyber security and ethics. They are not at all aware of not sharing OTP and passwords with any third party, not clicking on embedded links in emails, hacking of social media account, etc.
7. 56% of females still consult their husband, parents or brother before making any online transactions. This may be again due to lack of involvement of women in decision making, permission issues, little knowledge and confidence among women. Greater numbers of women face difficulties while browsing such as slow speed, network breakdown, permission issues, language barrier, overloaded information, etc. Data show that 80 % of respondents face the problem of cookies/access permission issues and 78% say that transaction got failed due to network issues. Major challenges faced by women while using technology are lot of responsibility and domestic issues (61%), complex nature of technology (51%), lack of cyber security, rules and regulations. Other barrier hindering female interest in using technology are lack of support system and guidance, lack of clarity and awareness about certain technological concepts, lack of confidence, etc.

Conclusions

After the COVID-19 pandemic demonetisation, the use of ubiquitous digital devices such as smart phones, desktop computers/laptops by young girls and women has increased tremendously because of the digitalization and e-commerce, which is a good indicator of the digital inclusion of women. The study shows that the time spent by women on digital devices for accessing various social media platforms, banking, travel, education, trading, etc., does not have a significant impact on enhancement of knowledge level, but the level of knowledge has a significant effect on decision making power of women. Unfortunately, gender discrimination, technical issues, domestic issues, overburden of responsibility, low literacy rates, non-participation in decision making, etc., are prevalent in Indian society. These are the challenges which create barriers for women in establishing a better interaction with technology and thereby creating a stumbling block in empowering women digitally. But, the strong support of family members, government, SDGs, policy makers, funders and educational institutions can encourage women to empower themselves. Next major step towards more empowerment can be the need to devise

and implement various awareness e-training schedules, participation and support programs. There is an urge to also frame code of ethics and norms for enhancing and strengthening cyber security.

Recommendations

Today, when cyber frauds are prevalent in our life, motivating people to adopt digital technology is not sufficient. In fact, it is also important to provide digital education to everybody to protect their hard earned money and content. Hence, there is an impulsive need of forming comprehensive policy and regulations in India regarding cyber security. Empowering women digitally and overcoming digital divide is a need of an hour. The government and policy makers should take into consideration the matter of improvement in digital learning among women and empowering them by devising strong cyber security laws, and designing digital awareness programs for women.

References

Bhatnagar, H. & Rao, N. S. (2014). Internet banking with special reference to females. Saaransh RKG Journal of Management, 4 (1), 0975–4601.

Bhattacharya, I. & Sharma, K. (2007). India in the knowledge economy–an electronic paradigm. International journal of educational management, 21(6), 543–568.

Debbarma, A. & Chinnadurai, A. S. (2023). Empowering Women through Digital Literacy and Access to ICT in Tripura. Research Journal of Advanced Engineering and Science, 9(1), 5–9, 2455–9024.

Devi, V. (2023). Prospects of Digital Literacy of Women: Special Reference to Chitrakoot District, Uttar Pradesh, India. *International Journal of Social Sciences Arts & Humanities*, 66-71, (ISSN 2321-4147. https://doi.org/ 10.13140/RG.2.2.30770.38080.

Dhanamalar, M., Preethi, S., & Yuvashree, S. (2020). Impact of digitization on women's empowerment: A study of rural and urban regions in India. Journal of International Women's Studies, 21(5), 107–112. Available at: https://vc.bridgew.edu/jiws/vol21/iss5/11.

Eshet, Y. (2004). Digital literacy: A conceptual framework for survival skills in the digital era. Journal of educational multimedia and hypermedia, 13(1), 93–106, 1055–8896.

Marini, S., Hanum, F., & Sulistiyo, A. (2020, February). Digital literacy: Empowering Indonesian women in overcoming digital divide. In 2nd International Conference on Social Science and Character Educations (ICoSSCE 2019) (pp. 137–141). Atlantis Press. https://doi.org/10.2991/assehr.k.200130.029.

Nedungadi, P. P., Menon, R., Gutjahr, G., Erickson, L., & Raman, R. (2018). Towards an inclusive digital literacy framework for digital India. *Education + Training*, *60*(6), 516–528.

Purohit, H., Bharti, N., & Josji, A. (2015). Partnering for promotion of Digital Literacy among women in Rajasthan through Bhartiya Model of Digital Literacy. Available at SSRN2665736.
Sarkar, S. (2012). The role of information and communication technology (ICT) in higher education for the 21st century. Science, 1(1), 30–41. ISSN 2277-9566.
Sindakis, S. & Showkat, G. (2024). The digital revolution in India: bridging the gap in rural technology adoption. Journal of Innovation and Entrepreneurship, 13(1), 29. https://doi.org/10.1186/s13731-024-00380-w.
Sugiyarti, E., Jasmi, K.A., Basiron, B., Huda, M., Shankar, K., & Maseleno, A. (2018). Decision support system of scholarship grantee selection using data mining. International Journal of Pure and Applied Mathematics, 119(15), 2239–2249.
Bridging the gender divide. (n.d.). ITU. Retrieved June 3, 2024, from:
https://www.itu.int/en/mediacentre/backgrounders/Pages/bridging-the-gender-divide.aspx#:~:text=Of%20the%20estimated%202.7%20billion,compared%20with%2057%25%20of%20women.
https://digitalindia.gov.in/content/vision-and-vision-areas.
http://www.ictacademy.in/pages/Digital-Empowerment.aspx.

Harshita Bhatnagar

Technologia wzmacniająca pozycję kobiet w Indiach

S t r e s z c z e n i e

Cel: Celem badania jest próba określenia głównego wpływu technologii na wzmocnienie pozycji kobiet w obecnych czasach. Aby określić wpływ technologii, ważne jest poznanie poziomu świadomości i stopnia przyjęcia technologii wśród indyjskich kobiet. Badanie to pomoże także w poznaniu różnych problemów//wyzwań stojących przed kobietami oraz nowych spostrzeżeń, jakie zdobywają podczas korzystania z technologii. Będzie to również wspierać rząd Indii w opracowywaniu korzystnej polityki i innowacyjnych programów dla kobiet, aby zapewnić kobietom większą władzę opartą na technologii. Projekt – ustrukturyzowany kwestionariusz został zaprojektowany i rozesłany do 120 kobiet z półmiejskich obszarów dystryktu Udaipur w Radżastanie w oparciu o próbkowanie dla wygody. Wyniki – 83% (100) to odsetek odpowiedzi, które uznano za kompletne do celów badawczych. Analiza danych pokazuje, że z technologii w jakiejkolwiek formie korzystają najczęściej wykształcone kobiety w wieku 25–50 lat, zajmujące się domem. Najwięcej kobiet zakupiło nowe urządzenia, takie jak smartfony, komputer stacjonarny/laptop i tablety z różnych powodów, głównie w celu pracy w domu, rozrywki, podróżowania, nauki, handlu itp. Z badania wynika, że najwięcej kobiet nie ma żadnej wiedzy lub ma niewystarczającą wiedzę na ten temat wytyczne etyczne/kodeks etyczny dotyczący cyberbezpieczeństwa. Niestety kobiety ograniczają się do korzystania z technologii ze względu na poważne problemy techniczne, brak prywatności, dyskryminację ze względu na płeć i przepaść cyfrową. Inne przyczyny, takie jak problemy domowe, nadmierne obciążenie obowiązkami, niski poziom umiejętności czytania i pisania, brak udziału w podejmowaniu decyzji itp., to kilka innych powodów mniejszego wykorzystania technologii przez kobiety. Czynniki te odpowiadają za mniejszą interakcję kobiet z technologią, co stanowi przeszkodę we wzmacnianiu pozycji kobiet w środowisku cyfrowym. Wartość – Silne wsparcie ze strony członków rodziny, rządu, decydentów i instytucji edukacyjnych może wzmocnić pozycję kobiet. Istnieje potrzeba opracowania i wdrożenia różnych programów e-szkoleń uświadamiających i wsparcia dla kobiet na całym świecie. Wzmocnienie norm dotyczących bezpieczeństwa cybernetycznego zwiększy możliwości i innowacyjność wykorzystania technologii. Demonetyzacja i pandemia COVID-19 przełamał różne kajdany ciemności

i wniósł nowe światło do naszego życia. Nowy przedrostek „e" w każdym słowie ma nowe znaczenie „elektronicznie wzmacniając całą ziemię". Dlatego wzmacnianie pozycji kobiet stało się najwyższym priorytetem każdego narodu.

S ł o w a k l u c z o w e: przepaść cyfrowa, wzmocnienie pozycji kobiet, zmiana technologii, cyfrowe włączenie kobiet, szkolenia, bezpieczeństwo cybernetyczne i etyka, Nari Shakti

Harshita Bhatnagar

La tecnología empodera a las mujeres de la India

R e s u m e n

Propósito: este estudio es un intento de determinar el impacto principal de la tecnología en el empoderamiento de las mujeres en la era actual. Para determinar el impacto de la tecnología es importante conocer el nivel de conciencia y la tasa de adopción de tecnología entre las mujeres indias. Este estudio también ayudará a descubrir diversos problemas/desafíos que enfrentan las mujeres y los nuevos conocimientos que obtienen al utilizar la tecnología. Esto también ayudará al gobierno indio a formular políticas favorables y esquemas innovadores para que las mujeres proporcionen más poder impulsado por la tecnología. Diseño: se diseña un cuestionario estructurado y se distribuye entre 120 mujeres de áreas semiurbanas del distrito de Udaipur, Rajasthan, según un muestreo de conveniencia. Hallazgos: 83% (100) es la tasa de respuesta y se consideró completa para fines de investigación. El análisis de datos revela que cualquier tipo de tecnología es utilizada principalmente por mujeres educadas que tienen entre 25 y 50 años y son amas de casa. La mayoría de las mujeres han comprado nuevos dispositivos, como teléfonos inteligentes, computadoras de escritorio/portátiles y tabletas, por diferentes motivos, principalmente para trabajar desde casa, entretenimiento, viajes, aprendizaje, comercio, etc. Del estudio se desprende que la mayoría de las mujeres no tienen conocimientos suficientes sobre lineamientos éticos / código de ética en materia de ciberseguridad. Lamentablemente, las mujeres se limitan a utilizar la tecnología debido a graves problemas técnicos, falta de privacidad, discriminación de género y brecha digital. Otras razones, como cuestiones domésticas, sobrecarga de responsabilidades, bajas tasas de alfabetización, no participación en la toma de decisiones, etc., son algunas otras razones detrás de una menor adopción de tecnología por parte de las mujeres. Estos factores son responsables de una menor interacción de las mujeres con la tecnología y, por lo tanto, crean obstáculos para el empoderamiento digital de las mujeres. Valor: un fuerte apoyo conjunto de los miembros de la familia, el gobierno, los formuladores de políticas y las instituciones educativas puede fomentar el empoderamiento de las mujeres. Existe la necesidad de diseñar e implementar diversos programas de apoyo y capacitación electrónica para la sensibilización de todas las mujeres. Fortalecer las normas de seguridad cibernética agregará más poder e innovación al uso de la tecnología. Desmonetización y pandemia La COVID-19 ha roto varias cadenas de oscuridad y ha traído nuevos rayos de sol a nuestras vidas. El nuevo prefijo "e" para todas y cada una de las palabras tiene un nuevo significado: "potenciar electrónicamente a toda la Tierra". Por lo tanto, empoderar a las mujeres se ha convertido en la máxima prioridad de todas y cada una de las naciones.

P a l a b r a s c l a v e: Brecha digital, Empoderamiento de las mujeres, cambio tecnológico, Inclusión digital de las mujeres, Capacitación, ciberseguridad y ética, Nari Shakti

Technology Empowering Women of India

Харшита Бхатнагар

Технологии расширяют возможности женщин Индии

Аннотация

Цель. Это исследование представляет собой попытку определить основное влияние технологий на расширение прав и возможностей женщин в современную эпоху. Чтобы определить влияние технологий, важно знать уровень осведомленности и скорость внедрения технологий среди индийских женщин. Это исследование также поможет выявить различные проблемы/проблемы, с которыми сталкиваются женщины, и новые знания, полученные ими при использовании технологий. Это также поможет индийскому правительству разработать благоприятную политику и инновационные схемы для женщин, чтобы обеспечить больше власти, основанной на технологиях. Дизайн. Структурированная анкета разработана и распространена среди 120 женщин полугородских районов округа Удайпур, Раджастхан, на основе удобной выборки. Результаты: 83% (100) представляют собой процент ответов и признаны полными для исследовательских целей. Анализ данных показывает, что технологиями в любой форме в основном пользуются образованные женщины в возрасте от 25 до 50 лет, которые занимаются домашним хозяйством. Максимум женщин приобрели новые устройства, такие как смартфоны, настольные компьютеры/ноутбуки и планшеты, по разным причинам, в основном для работы на дому, развлечений, путешествий, обучения, торговли и т. д. Из исследования видно, что большинство женщин не имеют или имеют недостаточные знания о этические руководящие принципы/кодекс этики в отношении кибербезопасности. К сожалению, женщины ограничивают себя в использовании технологий из-за серьезных технических проблем, отсутствия конфиденциальности, гендерной дискриминации и цифрового разрыва. Другие причины, такие как бытовые проблемы, чрезмерная ответственность, низкий уровень грамотности, неучастие в принятии решений и т. д., являются лишь немногими другими причинами меньшего внедрения технологий женщинами. Эти факторы ответственны за меньшее взаимодействие женщин с технологиями и тем самым создают камень преткновения в расширении прав и возможностей женщин в цифровых технологиях. Ценность. Сильная поддержка членов семьи, правительства, политиков и образовательных учреждений вместе может способствовать расширению прав и возможностей женщин. Существует потребность в разработке и реализации различных программ электронного обучения и поддержки женщин со всего мира. Укрепление норм кибербезопасности добавит больше возможностей и инноваций в использование технологий. Демонетизация и пандемия COVID-19 разорвали различные оковы тьмы и принесли новый свет в нашу жизнь. Новый префикс «е» к каждому слову имеет новое значение «расширение электронных возможностей всей Земли». Таким образом, расширение прав и возможностей женщин стало главным приоритетом каждой страны.

Ключевые слова: цифровой разрыв, расширение прав и возможностей женщин, технологические изменения, цифровое включение женщин, обучение, кибербезопасность и этика, Нари Шакти

International Journal of Research in E-learning
Vol. 10 (2), 2024, pp. 1–27

DOI 10.31261/IJREL.2024.10.2.01

Natalia Maria Ruman
University of Silesia Faculty of Arts and Sciences on Education
https://orcid.org/0000-0002-7127-7651

Zdenek Mruzek
Albrechtova Stredni Szkoła in Český Těšín
https://orcid.org/0000-0001-7015-867X

Challenges for Youth Resulting from the Internet Use a Reflection on the Example of Two Secondary Schools: in Pszczyna and in Český Těšín

Abstract

The Internet these days has endless possibilities. It is used in virtually every human activity. The purpose of this article is not to demonize the Internet, but to examine various dimensions of how young people function in the virtual world. The goal is also to determine what the negative consequences students face and what positive results come from the use of this technology. The first part will be the presentation of the most important news in the field of new media, and, in particular, the characteristics of the Internet. Issues related to various aspects of the Internet use will be addressed – from the psychological mechanisms of the Internet use by young people, through media education and the chellanges of various online activities to the socio-practical phenomena occurring in the digital world. The knowledge gained through the theoretical part will form the basis for conducting empirical research. The purpose of the research will be to determine the importance of computer and Internet use in the lives of secondary school students. The results of this research, discussed together with their elaboration and the presentation of ways to counteract the threats and methods of a positive use of the Internet, can be a valuable source of knowledge, useful both in the pedagogical work of those involved in education and for parents, since they are most responsible for the education of their children in the use of media.

K e y w o r d s: Internet, computer use, cyberbullying, youth media use

Introduction

The Internet "is the fabric of our lives. If information processing technology were to be considered today's equivalent of what electricity was in the industrial age, then the Internet, because of its ability to transmit the power of information to all spheres of human activity, could be likened to both an electric grid and an electric motor." This is how well-known media scholar, Manuel Castells, describes the importance of the Internet network. It is hard not to agree with these words, given that the Internet has become not only a tool used by 2,3 billion people in the world (or about 33% of the world's total population), but also a tool that determines the organization of important enterprises of economic, social, political and cultural dimensions. Navigating in the areas of the Internet, it "creates almost unlimited opportunities to acquire various types of information, shapes a number of psychophysical functions: reflexes, motor coordination, ability to focus attention. In addition, it develops knowledge and interests. It allows people to make new contacts." (Castells, 2003, pp. 23–24).

The computer is an attractive tool, which is due to a number of factors, including the fact that barring unexpected failures – it is always ready to work; it provides the opportunity to return to the same content repeatedly. It also gives a sense of influence over what is going on; it helps in effective learning; for players who win with the computer and gives a sense of increased satisfaction. On the other hand, for those who lose, it does not cause a sense of great defeat; it allows to relieve stress and emotions; it facilitates communication; it allows to satisfy some needs that are difficult to satisfy in real life.(Augustynek, 2010, pp. 8–9; Techmańska, 2019, p. 246).

Computers and the Internet are also tools for work, and no one needs to be convinced that they definitely facilitate work in almost all fields. Computers also help people with disabilities. Of course, the use of these devices and media can be associated with a number of negative consequences, among which are Internet crime, excessive fascination with the Internet, verbal aggression, the destructive impact of computer games on the psyche of their users, as well as health problems resulting from excessive time spent in front of a computer screen (Kamieniecki et. al., 2017, pp. 31–34).

As Ryszard Tadeusiewicz points out, "for psychologists dealing with personality issues, it is obvious that the personality traits of an Internet user are revealed, among other things, in the form of the ways he/she uses the Internet. It can also be thought that certain psychological traits make people more inclined to use

the network, while others are more conducive to shying away from using the Internet. This is also related to gender, age, education. The psychological profile and personality traits of a particular person also have a lot to say here. Moreover, the relationship between the Internet and the psyche can be two-way. On the one hand, a particular person's psychological silhouette may determine whether and how he or she uses the Web, but on the other hand, it can also be expected that Web use, especially long and intensive use, affects the psyche, although it is not yet known exactly how." (Tadeusiewicz, 2002, pp. 18–19; Angielczyk, 2019, p. 58).

A symptom of Internet abuse, in the life of an individual, that is closely related to the perspective of cognitive-behavioral psychology is FOMO (fear of missing out). This is the fear of "falling out of the loop," that is, the feeling that something very important will be missed if we "disconnect from the network" for a while. The most vulnerable to the harmful effects of psychological mechanisms of computer and Internet use are children and adolescents, especially those who use it regularly from an early age. As early as two-year-old children demand to be allowed to use the computer – they want to press keyboard keys, put on headphones, watch photos or videos on the computer. This activity requires the help of parents, but the child, observing adults at the computer, on his/her own initiative insists on it (Laska, 2006, pp. 105–106; Skoczylas, 2023, pp. 118–119). The principles instilled in a child will have a direct impact on their future use of the Internet. The Internet is becoming their source of knowledge on all sorts of issues. Young people make numerous friends on the Internet, are very active on social networks, upload their photos to the web without restraint, express all kinds of opinions without restraint. At this time, a virtual self-creation is as important (or sometimes more important) than others' perceptions in the real world. Comparing oneself and one's ordinary life with the colorful world created on the Internet can make young people feel depressed and worthless (Chocholska & Osipczuk, 2009, pp. 33–34).

Functioning in virtual reality is furthermore related to the form of culture we can observe in today's society. Zbyszko Melosik pointed out the connection between a popular culture seen as a factor of socialization and growing up in a media society. Modern culture is largely characterized by consumerism, immediacy, the rapid pace of change, the disappearance of great ideals, the cult of the body, youth and sexuality, appearances and schematicity. These features of culture are compounded by the media, which promote a certain pattern of life despite the fact that people seem to be individual and diverse individuals (Melosik, 2000, p. 41; Witek, 2018, p. 40).

Almost every member of society strives for social success – having a good job, prosperity, position. "Social messages – propagated by the mass media – proclaim that "you cannot be a failure." In doing so, there are two basic contexts for success. The first is determined by the pursuit of power, position (standing) and money, the second by so-called popular fame." This means that there is only one fundamental path to happiness. Getting too deeply involved in ideas or ambitious activities

is received with disapproval. Melosik also introduced the concept of "instant culture," which refers to the habit and necessity of living a life of "immediacy" typical of our times." According to the author, the "rule of immediacy" also prevails on the Internet – "any message can be entered instantly, and there is also the possibility of free movement through information, cultures and societies (…). The prism of immediacy in modern culture has a huge impact on the identity and lifestyle of young people. Modern youth expects immediacy, they don't want to and cannot wait." This is why children raised from birth in a culture shaped by the media, and to a large extent by new media, are extremely susceptible to all its negative influences. This is exploited by marketing and advertising specialists, TV producers, manufacturers of movies, games, music, equipment. Even the youngest children want to own branded products, to be "up to date" and in line with current fashion (Melosik, 2008, pp. 98–102).

Therefore, it is worth looking at the psychological mechanisms that occur during the use of computers, computer games and the Internet. According to neuroscientists, how children absorb and process media content depends on various factors – their own experiences, specific circumstances, cognitive maturity, social environment or cultural placement. "The perception and processing of images is a complex process in which many factors must be taken into account. (…) The impact of images on the viewer is tremendously relativized for this reason, as both children and adults perceive the images differently. (…) Only images that have some significant meaning will embed themselves in the brain and be permanently stored in it." (Hotltkamp, 2010, p. 48; Jastrzębska, 2020, p. 97).

Whether a particular image is important to a child may depend on whether the child assimilates it alone or in a group, personal interests, age and maturity. Which images will be absorbed by children and adolescents, how their brains will process them, and whether this will trigger negative behavior is therefore not obvious or simple to pin down (Griffiths, 2004, p. 43). Children born after 1980 are even referred to as digital natives, meaning people characterized by growing up surrounded by media and the ability to use many of them simultaneously (Forma, 2006, pp. 66–67; Jopek & Kinda, 2019, pp. 78–80).

It is extremely important in the modern world to educate audiences in the proper use of means of communication, to make them aware of the mechanisms of the media, and, in particular, to inform them about the dangers of their improper use. The urgent need to educate for the reception of the media, that is, in today's terms, the need to conduct media education was taken up (even in the Church!) in the Vatican II decree Inter mirifica, issued in 1963: "The special task of these offices will be to see to it that the consciences of the faithful are properly formed in the field of the use of these means, as well as to support and guide all actions that Catholics take in this field." (Denek, 2000, p. 22).

Literature Review

Kośla wrote about cyber threats, stating that they are actions that block, distort or destroy information processed, stored or transmitted in ICT systems. He also points out that the use of these systems leads to disinformation, as the target of the attack is the information, not the system itself (Kośla, 2018, p. 18). Oleksiewicz, meanwhile, states that cyberbullying is one of the main threats to the world in the 21st century (Oleksiewicz, 2018, p. 54).

The currently increasing number of young people at risk of addiction is becoming a social problem. Media reports and appeals from the scientific community are not indifferent to the growing threats to the development of children and adolescents. Thus, questions become topical not only about the causes and determinants of these phenomena, but also about contemporary approaches and methods in a diagnostic and therapeutic practice, i.e., consequently, the question of their effectiveness in the first place. The following article is a review and is a presentation of contemporary theoretical approaches and trends in the practice of therapeutic interventions applied to children and adolescents (Kusztal & Piasecka, 2018, pp. 89–93).

Nomophobia and Phubbing are negative phenomena associated with the prevalence of smartphones and unlimited access to the Internet. Individual and social changes in behavior conditioned by the ubiquity of smartphones require an analysis of these two types of problematic Internet use. Both types of behavior are particularly prominent among teenagers. The article reveals the extent of nomophobia and phubbing among adolescents in Bosnia and Herzegovina, and the link between these phenomena and well-being and the influence of the family on the style of smartphone use among young people (Tomczyk & Selmanagic, 2022, p. 46).

To fight against the disastrous consequences of cyber addictions, young people often conduct online searches for explanations of failures and crises experienced in everyday life. They find help through running sites that offer cyber therapy. This therapy is aimed at people who, for various reasons (e.g. lack of time, shyness), do not want to have a face-to-face session with a psychotherapist. Online psychotherapy comes in many different forms (Jaroszewska, 2024, p. 5). It can be conducted via email, live video sessions (Skype), chat or text messaging (SMS). The main advantage of e-therapy is its speed focused on a short-term contact. What is more, the price is also attractive compared to therapy conducted through traditional methods. On the other hand, it has its disadvantages, such as the lack of emotional contact between the patient and psychotherapist, the impersonal relationship and the possibility of misunderstandings (Makara-Studzińska & Madej, 2017, pp. 23–24).

The Internet is not only a threat, it is primarily a communication tool for young people. The positives were presented by the authors of the article, showing Facebook as a tool for information management (Popiołek & Nierenberg, 2017, p. 96).

Adolescents form various groups on the Internet, seek out authority figures, and form friendships. Contexts and structures of relating to others: how membership in different types of groups shapes the construction of interpersonal relationships, shows an article examining youth from Portugal (Brito et. al., 2011, pp. 423–424). Young people are learning their information literacy through technology (Koltay et. al., 2011, 60). It is important to make classes or lessons more interesting with various technological innovations, as shown by the authors of the article on blended learning (Spanjers et. al., 2015, p. 61). For a discussion of gender similarities that increase students' motivation to participate in STEM, see the article titled Focusing on gender similarities increases female students' motivation to participate (Jaśko, Dukała & Szastok, 2019, pp. 474–476).

The purpose of another article was to demonstrate the importance of the effect of subjective reinforcement value when applying gamification elements in the development of mobile applications and their use in educational and health promotion work (Łosiak-Pilch, 2018, p. 202).

Risks Associated with Computer Use

Too much time spent in front of the computer leads to disorganization of the day, as well as a reduction in time that should be spent on other duties or more constructive leisure activities. In turn, the wrong time of a day for computer use affects the child, preventing him or her from taking a light, media-free rest, or interferes with the concentration necessary for learning. The range of content available on the Internet is also questionable due to its moral and social nature and its huge volume. Too much information causes chaos, confusion and, in younger children, anxiety or fear. This mix of "content of widely varying social, moral meaning, lacking a reliable cultural basis, an explosion of advertising slogans leads to the real world being perceived by the child through the prism of media images. (…) Abnormal relations between the child and the media can lead to destructive changes in the cognitive sphere of the child's personality." (Izdebska, 2008, p. 216; Siedlecka, Żukiewicz-Sobczak & Sobczuk, 2019, p. 35). In turn, watching violence leads to children acquiring "aggressive behaviors, increased levels of aggression, emotional desensitization, disturbed perception of the real role of violence in society, acquisition of impulsive and egocentric tendencies, stimulation of new aggressive behaviors, use of vulgarities." (Siemieniecki, 2012, p. 27).

It is also worth noting the importance of two other problems of improper media use. The first is a passive reception of content, which involves unreflective absorption of messages (Szpunar, 2005, p. 378; Maj, 2019, pp. 144–145). This causes intellectual laziness, indiscriminateness, inhibition of creative activity and development of imagination, creativity, absorption of vulgarisms, linguistically incorrect phrases, that is, a general negative impact on intellectual development. The second threat is negative health effects divided into ophthalmic, neurological, and orthopedic. Prolonged staring at a screen can result in myopia, conjunctivitis, burning, irritation, tearing, sudden loss of visual acuity, changes in color perception (Stunża, 2012, p. 29). In addition, the computer screen is a source of several types of radiation: ionizing, thermal, optical and electrostatic fields. Neurologically, on the other hand, excessive time spent at the computer can cause anxiety, hyperactivity, feelings of restlessness and fear, and a tendency to aggression. In turn, limiting outdoor exercise at the expense of time spent in front of a monitor causes skeletal conditions, including postural defects, decreased physical fitness, scoliosis, decreased muscle mass, obesity, neck and back pains (Ordon & Skoczylas-Krotla, 2003, pp. 142–143).

Internet use is also linked to the danger of exposure to violence and pornography. Violence on the Internet is linked to the huge availability of computer games (downloadable or online), abounding in scenes of aggression. Through computer games, each person has the opportunity to participate in scenarios from horror movies or thrillers to test their skills (Kozak, 2011, p. 34). "The computer offers an extremely attractive world, which is an extension of the area of actual play. (…) Violent computer games can provide a model of aggressive behavior here (…). However, as psychologists and sociologists emphasize, the decisive causes triggering violence lie outside the virtual world. They are to be seen in the truly experienced and psychologically unneutralized traumas from school or the family home." (Huber & Neuschaffer, 2003, pp. 50–51; Kim, 2018, p. 668).

Children and teenagers are very eager to create accounts on social networks. In fact, the principle of "if you are not on Facebook, it means you do not exist" is being beaten. The space of social networks, especially Facebook, provides an additional social area for meetings, communication and social life (Borkowska & Witkowska, 2009, p. 10). Having an account comes with several risks. First, young people are all too eager to share all kinds of information about themselves on forums. Social networks encourage the disclosure of personal information, age, school, place of residence, phone numbers, email address, instant messenger numbers, Skype. "Children and adolescents quickly forget that their data is available to the general anonymous public, and the younger a community member is, the more private information he or she reveals." (Figurska, 2012, pp. 29–30). The second aspect of the use of social networks is the posting of a huge number of photos, documenting travels, possessions, events, and often photographs showing oneself in an erotic capacity. Meanwhile, such photos can seriously harm, after

all, family, teachers, complete strangers also have access to them. Possession of a compromising photo can become the cause of many problems, not necessarily in the present, but also in the distant future, because you never know whether the photo has not been copied and is stored somewhere (Barlińska, 2009, p. 107).

Based on the above considerations, it can be concluded that the use of the Internet, especially by young or inexperienced users, should be subjected to regular monitoring and combined with prevention carried out at home and at school. Awareness of the dangers arising from the seemingly simplest forms of Internet activity can protect children and adolescents, as well as their parents, from many difficult and problematic situations.

Computer and Internet Use – in the Opinion of Surveyed Students

The subject of the research in this article is the group of students of secondary schools: in Pszczyna and Český Těšín, and their opinions on computer and Internet use. The aim of the research, in turn, is to determine the importance of computer and Internet use in the lives of adolescents.

Growing from the same Slavic roots, Poland and the Czech Republic are culturally similar. Centuries of development side by side have made us neighboring countries. Young people in Poland and the Czech Republic think alike and have similar experiences using the Internet.

The research problems formulated for the purpose of this paper have been posed, in such a way that the answers can be found in the research process. Obtaining these answers will carry out the tasks – acquiring knowledge to determine whether it is possible for contemporary teenagers to live without computers and the Internet, whether they have experienced digital violence; how important the computer and the Internet are to them and whether it is already possible to talk about the problem of Internet addiction or other problems associated with an excessive use of computers and the Internet. The analysis of our own research, will also allow us to determine what the level of media competence of adolescents is, what their awareness of safe use of the Internet is, the ability to accurately select valuable content, and to determine the attitude of parents to the amount of time their own children use the Internet. The issue of the dangers of Internet use by Polish and Czech youth was also included in the author's article in the journal Fundamentals of Education.

Material and Methods

Providing a comprehensive and factually correct answer to the formulated main research problem requires its decomposition into specific problems. In view of this, the following specific problems and corresponding specific hypotheses were identified. The research problem, which is the subject of the research undertaken, took the form of the following research questions:

RQ1: What are the most serious challenges and threats to youth cyber security distinguished?

RQ2: What are the potential problems associated with youth Internet use?

RQ3: According to the youth, what are the parents' solutions to the topic of protecting youth from the dangers of Internet access?

RQ4: What health changes do adolescents see as a result of prolonged time in front of the computer?

In response to the research questions posed, the following research hypotheses were formulated:

H1: The most serious challenges to youth cyber security are the increasing time they use the Internet and the associated strong attachment to electronic devices and excessive online activity.

H2: Potential problems for young people are hate speech, sharing images without permission, and ridicule.

H3: The only form of action taken to protect youth by parents is the intervention of taking away Internet access as a punishment for bad behavior or failure to keep one's word.

H4: Adolescents have trouble seeing changes in health and appearance as consequences of prolonged time in front of the computer.

The research confirmed the hypotheses.

Unfortunately, the youth surveyed use the Internet excessively and become potential recipients of hate speech and negative opinions, including ridicule. Parents are not prepared in schools how to talk to their children about technology use prevention. Simply acting to ban Internet use for a period of time does not help young people to understand the risks. Even health problems that affect young people are not an alarming factor.

Procedure

The presented research uses the survey method. Surveys include all types of social phenomena of importance for upbringing, as well as states of social awareness, opinions and views of specific communities, the growth of the studied phenomena, their tendencies, and their intensity (Maszke 2008, p. 157). The survey technique was used. It is a technique with a high degree of self-activity, and the role of the respondents comes down to distributing and collecting questionnaires. A survey is a standardized technique of receiving information in the process of communicating in writing without the intermediation of the examiner. In addition, the scaling method was used in the research. In the statistical literature, the Likert scale is treated as an ordinal or interval scale, and it seems that the more complex the scale, the greater the tendency to treat it as an interval scale. The advantage of this scale over simple scales is evident in the fact that individual positions on the scale are not able to significantly affect the final measurement result. These positions are supposed to balance each other, taking into account the scale being constructed, while the specific properties of the simple scale can have a great impact on the conclusions drawn from the research (Maszke 2008, p. 232). In the research for the purposes of this article, a 5-point Likert scale was used. The task of the examined person is to respond to each question and select one of the five answers: 1 – I completely agree; 2 – rather yes; 3 – I have no opinion; 4 – I tend to disagree; 5 – I completely disagree.

The Internet Threats Questionnaire consisted of 10 statements containing an estimated scale with a five-point Likert scale. The tool consisted of one part, which was related to knowledge and skills, and also referred to the implementation and reflection of preventive measures in everyday life.

The article uses the results of both the quantitative and qualitative parts of the survey, conducted from September 2023 to May 2024 among adolescents aged 15–19 in two secondary schools – Powiatowy Zespół Szkół nr 2 im.Karola Miarki w Pszczynie and Albrechtová Stredni Szkola in Český Těšín.

Measures

The quantitative part involved surveying a representative sample of 1650 (1700 total questionnaires were distributed, but only 1650 returned) respondents at two institutions

This is the statistical distribution of respondents by gender of the two schools.

Here is a description of the sample of the people surveyed.

Table 1
Distribution of respondents by gender and place of residence

Category	LP	%
woman PL	364	22.06
male PL	342	20.72
woman CZ	436	26.43
male CZ	508	30.79
total	1650	100

S o u r c e: Own work.

In terms of the place of residence the group included only 87 people living in rural areas (47 from Poland and 30 from the Czech Republic) and 1563 persons (649 from Poland and 914 from Chech Republic) living in urban areas. Non-significant Chi-square test value (chi = 420,309; p = 0,159) show that the sample was fairly homogeneous in terms of place of residence. This makes further analysis of the relationship between place of residence and the dangers hidden on the Internet unnecessary. Women constituted 22.06% of the Polish group and 26.43% of the Czech group. In contrast, men in the Polish group constituted 20.72% of the population and 30.79% of the sample in the Czech group.

The research project had the following objectives:

- To determine the magnitude of prevalence and risk factors of Internet abuse among adolescents;
- To qualitatively analyze the phenomenon of Internet abuse among young people;
- To raise public awareness of the problem of Internet abuse among young people.

The first objective was to be achieved primarily through a quantitative survey research, while the second was to be achieved primarily through an extensive qualitative research based on in-depth individual interviews.

For the quantitative survey, the research procedure was as follows: The schools were informed by phone about the survey procedure and I asked for their consent to participate. To both schools, I delivered questionnaires. At each school, I myself, as the person responsible for conducting the survey, participated in conducting the survey. The questionnaires were filled out by the young people during class time (usually parenting lessons). Beforehand, the respondents were informed about the purpose of the survey and the procedure for filling out the questionnaire.

The results of the survey are shown in Table 2.

Table 2
Polish and Czech student opinions on Internet threats. Distribution of survey answers

Question		Women, Poland	% Women, Poland	Men, Poland	% Men, Poland	Women, Czech Republic	% Women, Czech Republic	Men, Czech Republic	% Men, Czech Republic	Sum in rows	% in rows	Chi square; p value
1. You use the Internet for more than 7 hours a day	Definitely yes	32.00	1.94	41.00	2.48	15.00	0.91	14.00	0.85	102.00	6.18	71.151; p<0.0001
	Rather yes	68.00	4.12	72.00	4.36	68.00	4.12	101.00	6.12	309.00	18.73	
	I don't have an opinion	22.00	1.33	31.00	1.88	30.00	1.82	52.00	3.15	135.00	8.18	
	Rather no	163.00	9.88	102.00	6.18	198.00	12.00	181.00	10.97	644.00	39.03	
	Definitely no	79.00	4.79	96.00	5.82	125.00	7.58	160.00	9.70	460.00	27.88	
	Sum	364.00	22.06	342.00	20.73	436.00	26.42	508.00	30.79	1650.00	100.00	
2. You use a strictly scientific website to help you solve your homework	Definitely yes	113.00	6.85	129.00	7.82	223.00	13.52	309.00	18.73	774.00	46.91	329.065; p<0.0001
	Rather yes	85.00	5.15	104.00	6.30	134.00	8.12	121.00	7.33	444.00	26.91	
	I don't have an opinion	26.00	1.58	75.00	4.55	46.00	2.79	67.00	4.06	214.00	12.97	
	Rather no	108.00	6.55	26.00	1.58	22.00	1.33	4.00	0.24	160.00	9.70	
	Definitely no	32.00	1.94	8.00	0.48	11.00	0.67	7.00	0.42	58.00	3.52	
	Sum	364.00	22.06	342.00	20.73	436.00	26.42	508.00	30.79	1650.00	100.00	
3. You use social networking sites to establish relationships	Definitely yes	268.00	16.24	287.00	17.39	302.00	18.30	397.00	24.06	1254.00	76.00	110. 706; p<0.001
	Rather yes	76.00	4.61	41.00	2.48	74.00	4.48	104.00	6.30	295.00	17.88	
	I don't have an opinion	11.00	0.67	2.00	0.12	38.00	2.30	6.00	0.36	57.00	3.45	
	Rather no	8.00	0.48	6.00	0.36	3.00	0.18	1.00	0.06	18.00	1.09	
	Definitely no	1.00	0.06	6.00	0.36	19.00	1.15	0.00	0.00	26.00	1.58	
	Sum	364.00	22.06	342.00	20.73	436.00	26.42	508.00	30.79	1650.00	100.00	

4. You go to erotic sites	Definitely yes	12.00	0.73	9.00	0.55	16.00	0.97	14.00	0.85	51.00	3.09	
	Rather yes	23.00	1.39	14.00	0.85	26.00	1.58	46.00	2.79	109.00	6.61	
	I don't have an opinion	33.00	2.00	24.00	1.45	51.00	3.09	52.00	3.15	160.00	9.70	25.583; p<0.020
	Rather no	62.00	3.76	78.00	4.73	96.00	5.82	125.00	7.58	361.00	21.88	
	Definitely no	234.00	14.18	217.00	13.15	247.00	14.97	271.00	16.42	969.00	58.73	
	Sum	364.00	22.06	342.00	20.73	436.00	26.42	508.00	30.79	1650.00	100.00	
5. The problem you encountered on the Internet was hate	Definitely yes	326.00	19.76	285.00	17.27	361.00	21.88	430.00	26.06	1402.00	84.97	
	Rather yes	32.00	1.94	49.00	2.97	54.00	3.27	57.00	3.45	192.00	11.64	
	I don't have an opinion	3.00	0.18	6.00	0.36	18.00	1.09	11.00	0.67	38.00	2.30	26.327; p<0.010
	Rather no	1.00	0.06	2.00	0.12	3.00	0.18	4.00	0.24	10.00	0.61	
	Definitely no	2.00	0.12	0.00	0.00	0.00	0.00	6.00	0.36	8.00	0.48	
	Sum	364.00	22.06	342.00	20.73	436.00	26.42	508.00	30.79	1650.00	100.00	
6. Your photos or videos have been posted without your consent	Definitely yes	168.00	10.18	119.00	7.21	210.00	12.73	298.00	18.06	795.00	48.18	
	Rather yes	146.00	8.85	180.00	10.91	171.00	10.36	144.00	8.73	641.00	38.85	
	I don't have an opinion	28.00	1.70	34.00	2.06	41.00	2.48	40.00	2.42	143.00	8.67	75.150; p<0.001
	Rather no	13.00	0.79	9.00	0.55	14.00	0.85	17.00	1.03	53.00	3.21	
	Definitely no	9.00	0.55	0.00	0.00	0.00	0.00	9.00	0.55	18.00	1.09	
	Sum	364.00	22.06	342.00	20.73	436.00	26.42	508.00	30.79	1650.00	100.00	
7. The biggest danger on the Internet is the inability to be anonymous	Definitely yes	286.00	17.33	237.00	14.36	214.00	12.97	250.00	15.15	987.00	59.82	
	Rather yes	57.00	3.45	72.00	4.36	125.00	7.58	203.00	12.30	457.00	27.70	
	I don't have an opinion	13.00	0.79	22.00	1.33	26.00	1.58	35.00	2.12	96.00	5.82	209.352; p<0.001
	Rather no	4.00	0.24	6.00	0.36	7.00	0.42	9.00	0.55	26.00	1.58	

	Definitely no	4.00	0.24	5.00	0.30	64.00	3.88	11.00	0.67	84.00	5.09	
	Sum	364.00	22.06	342.00	20.73	436.00	26.42	508.00	30.79	1650.00	100.00	
8. I would be able to survive 3 days without the Internet	Definitely yes	13.00	0.79	10.00	0.61	22.00	1.33	16.00	0.97	61.00	3.70	83.104; p<0.001
	Rather yes	26.00	1.58	28.00	1.70	49.00	2.97	69.00	4.18	172.00	10.42	
	I don't have an opinion	68.00	4.12	54.00	3.27	96.00	5.82	115.00	6.97	333.00	20.18	
	Rather no	102.00	6.18	123.00	7.45	186.00	11.27	129.00	7.82	540.00	32.73	
	Definitely no	155.00	9.39	127.00	7.70	83.00	5.03	179.00	10.85	544.00	32.97	
	Sum	364.00	22.06	342.00	20.73	436.00	26.42	508.00	30.79	1650.00	100.00	
9. I have noticed changes in my health or behavior due to frequent internet use	Definitely yes	130.00	7.88	114.00	6.91	111.00	6.73	102.00	6.18	457.00	27.70	154.164; p<0.001
	Rather yes	132.00	8.00	117.00	7.09	169.00	10.24	275.00	16.67	693.00	42.00	
	I don't have an opinion	72.00	4.36	60.00	3.64	34.00	2.06	52.00	3.15	218.00	13.21	
	Rather no	24.00	1.45	30.00	1.82	64.00	3.88	65.00	3.94	183.00	11.09	
	Definitely no	6.00	0.36	21.00	1.27	58.00	3.52	14.00	0.85	99.00	6.00	
	Sum	364.00	22.06	342.00	20.73	436.00	26.42	508.00	30.79	1650.00	100.00	
10. I opened a message from an unknown account at least once that caused me harm	Definitely yes	46.00	2.79	68.00	4.12	71.00	4.30	31.00	1.88	216.00	13.09	218. 959; p<0.001
	Rather yes	114.00	6.91	96.00	5.82	158.00	9.58	289.00	17.52	657.00	39.82	
	I don't have an opinion	99.00	6.00	87.00	5.27	63.00	3.82	79.00	4.79	328.00	19.88	
	Rather no	96.00	5.82	76.00	4.61	113.00	6.85	38.00	2.30	323.00	19.58	
	Definitely no	9.00	0.55	15.00	0.91	31.00	1.88	71.00	4.30	126.00	7.64	
	Sum	364.00	22.06	342.00	20.73	436.00	26.42	508.00	30.79	1650.00	100.00	

S o u r c e: Own work.

There is no description of all the answers, as they were considered irrelevant. The following questions are described.

The authors were inspired by an article presenting the potential of young people using the potential of modern IT tools by Kuźmińska-Solśnia (2006, pp. 115–119) which concerned the use of scientific websites for homework. The majority of respondents are in favor of using the Internet mainly for academic purposes, which is optimistic. It can still be cited as an interesting fact that in the second question, concerning the use of the Internet to do homework, women from Poland (1.94% of the subgroup) answered "definitely not," thus admitting that they can handle the tasks on their own without the help of artificial intelligence, while 11 women from the Czech Republic (0.67%) opted for this answer. The fifth one concerned the problems (the authors based their question after reading the article by Tokunaga (2010, pp. 277–287) on hate speech problems encountered by respondents on the Internet. To question five, encountering hatred on the Internet, respondents admitted that they had encountered this problem. The respondents in Poland and the Czech Republic answered with similar frequency in Poland and the Czech Republic, but fewer women (8.79% from Poland and 12.39% from the Czech Republic), and more men (14.33% from Poland and 11.22% from the Czech Republic). A definite yes was given by 19.76% of women from Poland and 21.88% of women from the Czech Republic. As for men, it was 17.27% from Poland and 26.06% from the Czech Republic. It can be concluded that there were definitely more problems in online communication among the respondents from the Czech Republic. Question seven shows a significant difference in the answers given by Polish and Czech women. A small number of Polish women (1.1%) believe that anonymity is a threat on the Internet, Czech women are more aware of this (14.68%). In question ten, there is a noticeable difference only in men's responses. Men from Poland were certainly warned about the danger at school (22.22% answered "rather not"), while men from the Czech Republic (only 7.48%) admit to not opening messages from unknown sources that caused harm. And it is enough to avoid connections to untrustworthy sites, in particular, not to enter IDs and passwords, make sure that the connection is encrypted when we are to provide important data, change passwords to Internet devices and applications, not to open e-mail attachments from unknown sources as they may contain viruses or harmful programs. It is advisable to read the regulations of the Internet services we use. If the computer works slowly, crashes, it does not always mean some kind of failure. In such a case check if it is not infected, make sure it has an anti-virus program, and if we fall a victim to a malicious program, we must not send a ransom to recover data, but with the help of an IT specialist, we will restore a backup copy.

From the data gathered it is very clear that the most frequently chosen answer in the entire subgroup is at the same time the most frequently chosen answer by the respondents altogether. The answers are not randomly distributed, but in each subgroup there is a significant bias towards the same kind of answer. Hence Chi square values for answers to each survey question are significant. Thus, in question one, about using the Internet more than 7 hours a day, respondents most often chose

the answer "rather not." The analysis of the first thesis is alarming because students are busy with their phones most of the day, not the real world around them. Over 25% of respondents use the Internet for more than 7 hours, which is more than they sometimes spend at school or in class.

The most common answer to the third question was "definitely yes" regarding the use of social media by young people. To the fourth question, about entering erotic sites, the respondents definitively gave a negative answer. There were only sporadic cases of such behavior. In question six, there was a "definitely yes" answer regarding experiencing an incident of posting an image without permission on the Internet of our respondents. Young people in both countries face the same problems, regarding abuse and threats on social media. The correlation of choosing the same answer by the respondents can also be seen in the eighth question, concerning the possibility of experiencing 3 days without the Internet. The respondents unanimously stressed that this is impossible (answer "definitely not" – 32.97%). This result fills us with optimism because mostly young people treat online life as something natural. This is a generation in which the Internet plays an important role like water or oxygen to breathe. Of course, always being online does not necessarily mean that the user pays maximum attention to the Internet all the time. Usually, attention is divided between several activities and "jumps", for example between doing homework and checking online news.

As for the interviews, they took place at the respondents' schools, in places where they could have a face-to-face conversation with me, the researcher, (most often it was a teacher's office). The interviews were conducted on the basis of general dispositions, which were developed jointly for all interviewees. Most questions were open-ended, and the respondents were encouraged to narrate freely. The interviews were recorded and then transcribed.

During the interview, the following questions were asked:

1. What websites do you most often browse and why do you use them? What do you use them for?
2. What problem situation have you encountered while using the Internet?
3. What is anonymity on the Internet? Comment on it, pointing out the positive and negative sides.
4. What health problems or bodily changes have you observed in yourself during long-term Internet use?
5. How do you react to aggression you encounter on the Internet?
6. What experience do you have in making friends via the Internet?

The following responses were obtained during the interviews.

1. During in-depth interviews, the survey participants responded that they often visit gaming sites, which they openly admitted to. Online therapy, which gives the client more freedom and openness, also appeared in the responses.

The respondents were also able to list other sites. Such statements appeared: Automotive – 216 (13.09%), promotional newspapers/stores – 167 (10.12%), language translators – 141 (8.54%), technological assistance (for repairs, alterations, etc.,) – 75 (4.54%).

The teens also listed the following websites they use. Here are sample statements:

- Help with writing essays, artificial intelligence is better than me after all (boy, 16, PL)
- Help in explaining how to solve homework well, giving calculations and formulas (girl, 17, PL)
- Gossip and entertainment (girl, 16, CZ)
- Sports and more sports (boy, 16, CZ)
- I like movies, especially romantic ones, Netflix is in first place for me (girl, 16, PL)
- Stock charts (boy, 16, CZ).

2. The respondents were given the opportunity to describe a problematic situation they experienced during the interview. Unfortunately, there were only the following responses:

- Pictures displayed as "on."
- Pictures that were processed for ridicule,
- Misunderstanding of the content by others
- Lack of defense and consequences for the aggressor,
- A desire to erase something, to turn back time.

When asked about the problem they encountered online, the respondents also listed the following responses:

- I played and didn't associate that so much money was taken from my dad's account for it (boy, age 16, PL)
- I sent a short video to a friend and it turned out that she sent it to everyone in the class, it was humiliating (girl, 16, PL)
- Inability to undo decisions on payments and purchases (girl, 17, CZ)
- Hate speech, insulting, name-calling (girl, 16, CZ)
- Dangerous friends, thought he was my age (boy, 16, CZ)
- I didn't even know that my friends took such pictures of me and set up a group to make fun of me (boy, 16, PL)

The above statements show the dangers faced by the respondents. It can be seen that similar dangers affect young people from Poland and the Czech Republic.

3. For those surveyed, anonymity exists on the Internet. The youth described it in this way:

- You write whatever you want, the most made-up things about a person or yourself and others believe it unfortunately (girl, age 16, PL)

- It's cool because without consequences, you are hidden under a nickname (boy, age 16, CZ)
- You can come out of the mask you wear, if someone is shy then on the Internet they can check themselves and speak out without any problem (girl, age 17, PL)
- This is the advantage of the Internet, without fear, you give vent to your emotions (boy, age 17, PL)
- Anonymity is to protect yourself, I never give my real data (girl, age 16, PL)

Unfortunately, only a few of the people quoted the above. This question probably caused the greatest difficulty for respondents.

4. The thesis concerned the changes in pathology and behavior that the respondents noticed in themselves. During the in-depth interview, we received interesting answers. They mentioned:

- Tears were pouring from my eyes,
- I don't want to sleep,
- I don't do my duties,
- I constantly think about what I have read or seen,
- I quote in my everyday life what I have heard or I try to do something in the way that was recorded.

5. In interviews conducted, Polish and Czech teenagers stressed that they often respond to electronic aggression, which takes place most often on social networks:

- I don't even report it to anyone, because it's just verbal texts, what can they do to me, one day they will finally stop writing (boy, 16, CZ)
- I get concerned, I cry, then I have to talk about it to a friend and I get over it (girl, 16, PL)
- sometimes someone doesn't know the limit of a joke and that's it, you have to let it go (boy, 17, PL)
- The fact that there is freedom of speech does not mean that we should accept everything, I report to whom I can an act of aggression against me (girl, 17, CZ)
- I have a thin line of tolerance towards evil, if you allow once, there will be more of it unfortunately (girl, 17 years old, CZ)
- I have had depressive states because of such situations, I am very emotional and approach everything in this way (girl, 16, CZ)
- I'm anxious, fussy, can't focus and see everything in black colors (girl, 16, PL)
- I wrote back even worse to the one who wrote me like that, and he detached himself (girl, 16, PL).

These are only selected statements.

6. It was also an interesting question to ask the youngsters about contacts in the real world after having made contact online. It turns out that girls have more courage

or, perhaps, hope, that the person claiming to be a friend/friend is truthful. Here is a description of some of the youth's experiences:

- Well it worked out that we had fun writing and then she proposed to meet, but it turned out that she was a bit lacking to the ideal from the photo, she was fat and that was it, that is, she lied (boy, age 17, PL)
- We played together, then in the vacations we say that together we can go maybe for a pizza and something to jump, but he did not come in time and contact even in the game stopped (boy, age 16, CZ)
- I had a difficult time with my family, so it was easier for me to write than to talk, and so I met a friend from Czechowice-Dziedzice, then my mother told me that maybe she should come to my place, that we should go out together, but when we met, her looks and style did not suit me, I could not open up like that (girl, age 16, PL)
- I wrote with my boyfriend, that Pole but lives in the Czech Republic, I wanted to meet, because so on the Internet a little weak, and he disappointed me, all the time at the meeting the nose in the phone, failure (girl, age 16, CZ)
- we met 1 year and 2 months ago, then she lied that I was older, then I confessed, now we see each other regularly, I can say that I found love on the Internet (girl, age 17, CZ)
- I have a cooking blog and I have a lot of friends who first only wrote with me, and then we met and are still friends, and with one individual I am going to his prom (girl, age 17, PL)

The results of the quantitative survey show that new contacts on the Internet are made more often by girls (174 – 63.27%) than boys (212 – 55.78%).

Based on the analysis of the survey results, it can be concluded that despite the relatively high awareness and significant level of knowledge about media education, both among parents and teachers, media education in Poland is downplayed and almost completely ignored in family upbringing and school education. There is a lack of formal subjects in this area in schools.

The study described here provided insight into this diversity and attempted to identify the complex processes that shape an individual's use of the Internet. Most young people have the ability to find information, but it should be remembered that they do not have a fully developed media awareness and culture. A large proportion declares knowledge of online safety, but this is not enough to use the Internet consciously, to distinguish a true content from the false one , or to choose the valuable ones in a flood of useless information.

The Internet and the computer are undoubtedly useful, helping to search for information and collect, store, process it like no other tools known to date. In addition, they enable cheap or free communication, which in today's society, where family members or friends are often separated by hundreds of kilometers of distance, can be invaluable. Therefore, it is hardly surprising that young people

would not want to give up access to computers and the Internet, which does not at all mean that the way they use them is correct (Morbitzer, 2006, p. 411).

Unfortunately, the respondents do not realize what further consequences in adulthood their current abuse of Internet time may cause. The most appropriate way to solve this difficult situation seems to be to organize compulsory media education as part of an already functioning school subject, such as computer science, or as part of parenting hours. Nevertheless, the program of these classes would have to be formalized, standardized for all schools.

The attempts could also be made to educate parents, for example, during school meetings between teachers and parents, i.e. the so-called "interview sessions," or by providing parents with professional studies.

Within the framework of the topic undertaken, there are still many issues to be considered and explored in empirical research. It would be possible to investigate topics in other settings – such as elementary schools and even universities (Wysocka-Narewska, 2022, p. 78; Skvortsova & Haran, 2018, p. 54–55). The collation of these data would make it possible to obtain a complete picture. It seems that addressing the topic of media education is extremely important. Technological and informational development means that the introduction of media education classes will soon become not just a positive, additional issue of school education, but a real necessity.

Conclusions

The analysis from our own research shows that Polish as well as Czech youth spend too much time on the Internet. They use the Internet as a source of entertainment, not just as a study aid. They do not see the dangers of improper use of new technologies, despite the health problems that happen to them.

The Internet has become part of the cultural everyday life of today's youth. Young people who use the Internet intensively exhibit different behavioral patterns, and there is a possibility of losing control over the intensity of Internet use. Young people most often communicate through social media. The Internet has also become a platform for young people to realize the need for self-expression. Users are often forced to literally construct an identity by building their profile. The other person is judged by how they construct their identity on the portal. The Internet has become one of the most important tools for learning and communication. The widespread use of the Internet by children and adolescents has many advantages, but, like any tool, it brings risks to which young people are particularly vulnerable (Szpunar, 2005, p. 379). The phenomena brought by the expansion of the media and access to modern technology into areas of life previously reserved for traditional broadcast-

ing were reflected upon. And attention was also paid to the level of understanding of the digital world.

Globalization creates opportunities to learn about the world, including education of different nations. The opportunities to raise awareness of the benefits and risks of mass communication are becoming almost limitless. It must become increasingly important for future generations to manage to equip themselves with the skills to use the Internet properly. The young, despite a different culture, experience the same dilemmas and problems, which are often due to under-information and lack of being equipped with technological competence.

The authors realise that this article is only a contribution to further analysis, which will be deepened to include indicators such as Internet access at home or parental education. It would certainly be appropriate to look at the cultural differences between the two countries and the relationship of these elements to technology education. This article is only meant to inspire further research, which we should extend to other countries.

Just as Chocholska and Osipczuk (2009) outlined many dangers of the new mass media for young people, the respondents from Poland and the Czech Republic equally admitted to abusing the Internet in their daily lives. Kusztal and Piasecka (2018) warns that young people will not even notice the Internet addiction that will devastate them systematically. In fact, despite noticing their deteriorating health, respondents unfortunately do not react and reduce the frequency of the Internet use.

The Internet is first and foremost a communication tool for young people, as reckoned by Popiołek and Nierenberg (2017), as well as in the analysis of the survey results obtained.

Future Lines of Research

Given these results, it is necessary to further develop and implement measures to make youth and their parents aware of the dangers deriving from the Internet. If this recommendation is followed, young people will be protected from the negative consequences of cyberbullying. This approach will take into account parents' expectations of online safety in these difficult times.

Limitations

The article presents the main areas of youth safety risks, where it is particularly important to educate them. The results of the survey on the risks associated with the use of the Internet by adolescents are presented to show what the awareness of adolescents is, regarding the safe use of the Internet, and the ability to accurately select valuable content.

The Internet is an important part of every teenager's daily life, so it is particularly important to monitor the risks associated with it and educate young people about it so that they learn the secrets of looking critically and reflectively at the content available online.

References

Angielczyk, P.Z. (2019). Homo crudelis w dobie Internetu.[Homo crudelis in the age of the Internet.] *Parezja*, *2*, 48–64. https://doi.org/10.15290/parezja.2019.12.04.

Augustynek, A. (2010). *Uzależnienia komputerowe. Diagnoza, rozpowszechnianie, terapia.*[Computer addictions. Diagnosis, dissemination, therapy.] Warszawa: Wyd. Difin. ISBN 978-83-764-1146-0.

Barlińska, J. (2009). Wpływ kontaktu zapośredniczonego przez komputer na nasilenie zachowań antyspołecznych i cyberprzemocy. [The impact of computer mediated contact on the severity of antisocial behavior and cyberbullying.] *Dziecko krzywdzone. Teoria, badania, praktyka*, [*The Abused Child. Theory, research, practice*] *1*, 107–112. ISSN 2545-3475 eISSN.

Borkowska, A, & Witkowska, M. (2009). *Media społecznościowe w szkole*. [Social media at school] Warszawa: NASK Państwowy Instytut Badawczy. ISBN 978-83-65448-03-3.

Broto, R., Waldzus, S., Sekerdej, M., & Schubert, T. (2011). The contexts and structures of relating to others: how memberships in different types of groups shape the construction of interpersonal relationships. *Journal of Social and Personal Relationships. 28*, (3), 406–432. https://doi.org/10.1177/0265407510384420.

Castells, M. (2003). *Galaktyka Internetu. Refleksje nad Internetem, biznesem i społeczeństwem*. [Galaxy of the Internet. Reflections on the Internet, business and socjety.] Poznań: Wyd. Rebis. ISBN 8373012338.

Chocholska, P. & Osipczuk, M. (2009). *Uzależnienie od komputera i Internetu u dzieci i młodzieży.* [Computer and Internet addiction in children and adolescents] Warszawa: Wyd. Hachette Livre Polska. ISBN 61907911.

Denek, K. (2000). *Aksjologiczne aspekty edukacji szkolnej*. [Axiological aspects of school education.] Toruń: Wydawnictwo Adam Marszałek. ISBN 978-83-232-2332-0.

Figurska, O. (2012). *Nadmierne korzystanie z komputera i Internetu przez dzieci i młodzież*. [Excessive computer and Internet use by children and adolescents.] Warszawa: Naukowa i Akademicka Sieć Komputerowa, Fundacja Dzieci Niczyje. ISBN 978-83-931508-6-1.

Forma, P. (2006). Znaczenie Internetu dla rozwoju dzieci i młodzieży. [The importance of the Internet for the development of children and adolescents]. Świętokrzyskie Centrum Edukacji na Odległość SCENO. Zeszyty Naukowe, [Swietokrzyskie Center for Distance Education SCENO. Scientific Journals] *2*, 64–68.

Griffiths, M. (2004). *Gry i hazard. Uzależnienia dzieci w okresie dorastania*. [Gaming and Gambling. Addictions of children during adolescence.] Gdańsk: GWP. ISBN 9788389574145.

Hotltkamp, J. (2010). *Co ogłupia nasze dzieci? Nowe media jako wyzwanie dla rodziców*. [What stuns our children? New media as a challenge for parents.] Kraków: Wyd. Salwator. ISBN 9788375802122.

Huber, F. & Neuschaffer, C. (2003). *Rodzice offline? Jak nawiązać kontakt ze skomputeryzowanym dzieckiem*. [Offline parents? How to get in touch with a computerized child.] Warszawa: Wyd. Lekarskie PZWL. ISBN 83-200-2797-7.

Izdebska, J. (2008). Media elektroniczne zagrażające współczesnemu dziecku – przejawy, przyczyny, wyzwania edukacyjne. [Electronic media threatening the modern child – manifestations, causes, educational challenges.] In S. Guz (Eds.), *Dziecko a zagrożenia współczesnego świata*. [The child and the dangers of the modern world.] Lublin: Wyd. Uniwersytetu Marii Curie-Skłodowskiej, 212–217. ISBN 978-83-2272-918-2.

Jaroszewska, I. (2024). Parents' knowledge about media education. *Social Dissertations*. *18*, 1–23. eISSN 2657-9332.

Jastrzębska, J. (2020). Internet jako miejsce nawiązywania relacji interpersonalnych. Grupy społeczne w obszarze cyberprzestrzeni. [Internet as a place to establish interpersonal relationships. Social groups in the area of cyberspace.] *Fides et Ratio 42*, (2), 92–100. https://doi.org/10.34766/fetr.v42i2.277.

Jaśko, K., Dukała, K., & Szastok, M. (2019). Focusing on gender similarities increases female students' motivation to participate. *Journal of Applied Social Psychology*. *49*, (8), 473–48. https://doi.org/10.1111/jasp.12598.

Jopek, A. & Kinda, M. (2019). Zagrożenia cybernetyczne dla młodego użytkownika sieci w perspektywie rozwoju społeczeństwa informacyjnego. [Cyber threats to the young online user in the perspective of the development of the information socjety.] *Security, Economy & Law 23*, (2), 67–85. https://doi.org/10.24356/SEL/23/4.

Kaliszewska, K. (2007). *Nadmierne używanie Internetu. Charakterystyka psychologiczna*. [Excessive use of the Internet. Psychological characteristics.] Poznań: Wyd. UAM. ISBN 8323218501.

Kamieniecki, W., Bochenek, M., & Tanaś, M., (2017). *Raport z badania „Nastolatki 3.0".* [The „Teens 3.0" survey report.] Warszawa: NASK – Instytut Badawczy. ISBN 978-83-65448-02-6.

Kim, S. et al. (2018). Cyberbullying victimization and adolescent mental health: Evidence of differential effects by sex and mental health problem type, *Journal of Youth and Adolescence 47*, (3), 660–678. https://doi.org/10.1007/s10964-017-0678-4.

Koltay, T., Krakowska, M., Landova, H., & Prókai, M. (2011). Umiejętność korzystania z informacji w krajach Grupy Wyszehradzkiej: literatura i inicjatywy. [Information literacy in Visegrad countries: literature and initiatives.]. *Education for Information*. *28*, (1), 57–76. https://doi.org/10.3233/EFI-2010-0886.

Kośla, R. (2018). Cyberterroryzm – definicja zjawiska i zagrożenie dla Polski, wystąpienie na konferencji w Bemowie, 29 XI 2002 r. [Cyberterrorism – definition of the phenomenon and the threat to Poland, speech at a conference in Bemowo, 29 XI 2002.] za: P. Jankowski, Cyberterroryzm jako współczesne zagrożenie dla administracji publicznej. [Cyberterrorism as a contemporary threat to public administration.] *Młody Jurysta* [Young Jurist.], *4*, 12–22. https://doi.org/10.21697/mj.11305.

Kozak, S. (2011). *Patologie komunikowania w Internecie. Zagrożenia i skutki dla dzieci i młodzieży*. [Pathologies of communication on the Internet. Threats and consequences for children and adolescents.] Warszawa: Wydawnictwo Delfin. ISBN 978-83-7641-388-4.

Kusztal, J. & Piasecka, M. (2018). A contemporary approach to substance abuse treatment for children and adolescents: a rview of theoretical and empirical perspectives. *Edukacja Elementarna w Teorii i Praktyce.* [Elementary Education in Theory and Practice.] *13*, (4), 85–102. https://doi.org/10.14632/eetp.2018.13.50.85.

Kuźmińska-Sołśnia, B. (2006). Nowe technologie informacyjne – szansą i zagrożeniem dla młodzieży szkolnej. [New information technologies – an opportunity and a threat for schoolchildren.] In J. Morbitzer (Eds.). *Komputer w edukacji*. [Computer in education.] (pp. 115–119). Kraków: Impuls. ISBN 83-7271-341-3.

Laska, E. I. (2006). Dzieciństwo w świecie mediów – szanse i zagrożenia (wybrane problemy). [Childhood in the world of media – opportunities and threats (selected problems).] In S. Juszczyk, I. Polewczyk (Eds.), *Dziecko w świecie wiedzy, informacji i komunikacji*. [The child in the world of knowledge, information and communication.] (pp. 105–111), Toruń: Wyd. Adam Marszałek. ISBN 83-7441-010-8.

Łosiak-Pilch, J. (2018). Gamification and subjective reinforcement value: indications for education and health promotion. *Edukacja, Technika, Informatyka*. [Education, Technology, Information Technology.] *2* (24), 201–205. https://doi.org/10.15584/eti.2018.2.27.

Maj, B. (2019). Internet jako przestrzeń edukacyjna życia młodzieży akademickiej. [Internet as an educational space in the lives of academic youth.] *Studia z Teorii Wychowania 29*, (4), 135–154. https://doi.org/10.5604/01.3001.0016.1640.

Makara-Studzińska, M. & Madej, A. (2017). Cybertherapy: a modern form of therapy. Journal of Education, Health and Sport. *7*, (7), 21–28. https://doi.org/10.5281/zenodo.821840.

Maszke, A. W. (2008). Metody i techniki badań pedagogicznych. [Methods and techniques of pedagogical research]. Rzeszów: Wyd. Uniwersytetu Rzeszowskiego. ISBN 83-7338-372-7.

Melosik, Z. (2000). Kultura instant. Paradoksy pop-tożsamości. [Instant Culture. Paradoxes of pop identity.] In M. Cylkowska-Nowak (Eds.), *Edukacja. Społeczne konsumowanie idei i rzeczywistości.* [Education. The social consumption of ideas and reality.] (pp. 34–48). Poznań: Wyd. Wolumin. ISBN 8388536052.

Melosik, Z. (2008). Kultura popularna jako czynnik socjalizacji. [Popular culture as a factor of socialization.] In Z. Kwieciński, B. Śliwerski (Eds.), *Pedagogika. Podręcznik akademicki*. [Pedagogy. Academic textbook.] t. 2. (pp. 98–102). Warszawa: PWN. ISBN 978-83-01-14133-2.

Mitchell, K. J., Finkelhor, D., Wolak, J., Ybarra, M. L., & Turner, H. (2011). Youth Internet Victimization in a Broader Victimization Context. *Journal of Adolescent Health*, *48*, 128–134. ISSN 1054-139X.

Morbitzer, J. (2006). O potrzebie i celach wychowania medialnego dzieci. [On the need and goals of media education of children.] In S. Juszczyk, I. Polewczyk (Eds.), *Dziecko w świecie wiedzy, informacji i komunikacji*. [The child in the world of knowledge, information and communication.] (pp. 409–414). Toruń: Wyd. Adam Marszałek. ISBN 83-7441-010-8.

Oleksiewicz, I. (2018). Cyberterroryzm jako realne zagrożenie dla Polski. [Cyberterrorism as a real threat to Poland.] *Rocznik Bezpieczeństwa Międzynarodowego* [International Security Yearbook.] *12*, (1), 53–67. https://doi.org/10.34862/rbm.2023.1.2.

Ordon, U. & Skoczylas-Krotla, E. (2003). Środki masowego przekazu – szansą czy zagrożeniem w procesie edukacji dziecka. [Mass media - an opportunity or a threat in the process of a child's education.] In T. Banaszkiewicz, W. Szlufik, A. Pękala (Eds.), *Z najnowszych badań nad wczesną edukacją dziecka*. [From the latest research on early childhood education.] (pp. 140–146) Częstochowa: Wyd. Wyższej Szkoły Pedagogicznej w Częstochowie. ISBN 8370989446.

Popiołek, M. & Nierenberg, B. (2017). Facebook as an information management tool: in light of the research conducted among Polish students. *Journal of Education, Culture and Society*. *2*, 89–102. https://doi.org/10.15503/jecs20172.89.102.

Siedlecka, M., Żukiewicz-Sobczak, W., & Sobczuk, S., Oddziaływanie mass mediów na kształtowanie stylu życia dzieci klas 4–6 w Bialskich Szkołach Podstawowych. [Impact of mass media on the formation of lifestyles of children in grades 4–6 in Biala Elementary Schools]. *Rozprawy Społeczne*. [Social Dissertations] *13*, (1), 34–42. ISSN 2081-6081.

Siemieniecki, B. (2012). Rzeczywistość wirtualna a edukacja. [Virtual reality and education.] In T. Lewowicki, B. Siemieniecki (Eds.), *Cyberprzestrzeń i edukacja*. [Cyberspace and education.] (pp. 28–35). Toruń: Wyd. Adam Marszałek. ISBN 978-83-7780-326-4.

Skoczylas, D. (2023). Cyberzagrożenia w cyberprzestrzeni. Cyberprzestępczość, cyberterroryzm i incydenty sieciowe. [Cyber Threats in Cyberspace. Cybercrime, cyberterrorism and network incidents.] *PRAWO W DZIAŁANIU. SPRAWY KARNE*, [LAW IN ACTION. CRIMINAL CASES.] *53*, 97–113.

Skvortsova, S. & Haran, M. (2018). Multimedialna prezentacja wykładu jako sposób percepcji, rozumienia i zapamiętywania informacji edukacyjnych przez studentów. [Multimedia lecture presentation as a way for students to perceive, understand and remember educational information.] *International Journal of Research in E-learning* Vol. 4 (2), 52–58. https://doi.org/10.31261/IJREL.

Spanjers, I., Konings, K., Leppink, J., Verstegen, D., de Jong, N., Czabanowska, K., & van Merrienboer, J. (2015). The promised land of blended learning: quizzes as a moderator. *Educational Research Review*. *15*, 59–74. https://doi.org/10.1016/j.edurev.2015.05.001.

Stunża, G. D. (2012). Edukacja medialna w podstawie programowej. [Media education in the core curriculum.] In J. Lipszyc (Eds.), *Edukacja medialna i informacyjna w Polsce – raport otwarcia. Aneks.*[Media and information education in Poland – opening report. Annex.] (pp. 27–31). Warszawa: Wyd. Narodowy Instytut Audiowizualny.

Szpunar, M. (2005). Internet jako pole poszukiwania i konstruowania własnej tożsamości. [Internet as a field of search and construction of one's own identity.] In E. Hałas, K. Konecki (Eds.), *Konstruowanie jaźni i społeczeństwa. Europejskie warianty interakcjonizmu symbolicznego*. [Constructing the self and society. European variants of symbolic interactionism] (pp. 378–403). Warszawa: Wyd. Scholar. ISBN 83-7383-144-4.

Tadeusiewicz, R. (2002). *Społeczność Internetu*. [Internet community.] Warszawa: Akademicka Oficyna Wydawnicza EXIT. ISBN 83-87674-33-8.

Tapscott, D. (2010). *Cyfrowa dorosłość. Jak pokolenie sieci zmienia nasz świat*. [Digital Adulthood. How the net generation is changing our world.] Warszawa: Wyd. Akademickie i Profesjonalne. ISBN 9788361408963.

Techmańska, B. (2019). Czy młodzi ludzie potrafią korzystać z Internetu? Uwagi i spostrzeżenia. [Can young people use the Internet? Comments and observations] *Edukacja – Technika – Informatyka*. [Education – Technology – Information Technology] *2*, (28), 245–251. https://doi.org/10.15584/eti.2019.2.36.

Tokunaga, R. S. (2010). Following you Home from school: A critical review and synthesis of research on cyberbullying victimization. *Computers in Human Behavior*, *26*, 277–287. ISSN 0747-5632.

Tomczyk, Ł. & Selmanagic, L. E. (2022). Nomophobia and phubbing: wellbeing and new media education in the family among adolescents in Bosnia and Herzegovina. *Children and Youth Services Review. 137*, 40–58. https://doi.org/10.1016/j.childyouth.2022.106489.

Więckowska, M. (2012). *Co wciąga Twoje dziecko?* [What draws your child in?] Kraków: Wydawnictwo M. ISBN 978-8375954104.

Witek, K. (2018). Przestępczość komputerowa – aspekty prawne. [Computer crime – legal aspects.] *Edukacja – Technika – Informatyka* [Education – Technology – Information Technology.] *24*, (2), 36–49. ISSN 2719-6550.

Wysocka-Narewska, M. (2022). Distance learning at the elementary school level: parents' opinions and reflections. *International Journal of Research in E-learning* (8)2, 76–81. https://doi.org/10.31261/IJREL.

Natalia M. Ruman, Zdenek Mruzek

Wyzwania młodzieży wynikające z użytkowania Internetu. Refleksja na przykładzie dwóch szkół ponadpodstawowych: w Pszczynie i w Czeskim Cieszynie

Streszczenie

Internet w obecnych czasach ma nieskończenie wiele możliwości. Używany jest praktycznie w każdej działalności człowieka. Celem niniejszego artykułu nie jest demonizowanie Internetu, ale zbadanie różnych wymiarów funkcjonowania młodzieży w wirtualnym świecie. Celem jest również

określenie z jakimi negatywnymi skutkami spotykają się uczniowie i jakie pozytywne zjawiska wynikają z korzystania z tej technologii.

Pierwsza część stanowić będzie prezentację najważniejszych wiadomości z zakresu nowych mediów, a w szczególności charakterystykę Internetu. Poruszona zostanie problematyka związana z różnymi aspektami korzystania z Internetu – począwszy od psychologicznych mechanizmów użytkowania sieci przez młodzież, poprzez edukację medialną oraz zagrożenia wynikające z różnego rodzaju działalności w sieci, do społeczno-praktycznych zjawisk zachodzących w cyfrowym świecie.

Wiedza pozyskana dzięki części teoretycznej stanowić będzie bazę dla przeprowadzenia badań empirycznych. Celem badań będzie określenie, jakie znaczenie w życiu młodzieży w wieku ponadpodstawowym ma korzystanie z komputera i Internetu. Omówione wyniki tychże badań wraz z ich opracowaniem oraz przedstawienie sposobów przeciwdziałania zagrożeniom oraz metod pozytywnego wykorzystania Internetu, może stanowić wartościowe źródło wiedzy przydatnej zarówno w pracy pedagogicznej osób związanych z oświatą, jak i użytecznej dla rodziców, gdyż to oni w największym stopniu odpowiadają za edukację swoich dzieci w zakresie użytkowania mediów.

S ł o w a k l u c z o w e: Internet, korzystanie z komputera, cyberprzemoc, użytkowanie mediów przez młodzież

Natalia M. Ruman, Zdenek Mruzek

Desafíos a los jóvenes por el uso de Internet. Una reflexión sobre el ejemplo de dos centros de enseñanza secundaria: en Pszczyna y en Český Těšín

R e s u m e n

Internet tiene hoy en día infinitas posibilidades. Se utiliza prácticamente en todas las actividades humanas. El objetivo de este artículo no es demonizar Internet, sino explorar las distintas dimensiones del funcionamiento de los jóvenes en el mundo virtual. También pretende identificar qué aspectos negativos afrontan los estudiantes y qué aspectos positivos se derivan del uso de esta tecnología.

La primera parte consistirá en una presentación de las noticias más importantes sobre los nuevos medios de comunicación y, en particular, las características de Internet. Se debatirán cuestiones relacionadas con diversos aspectos del uso de Internet: desde los mecanismos psicológicos del uso de Internet por parte de los jóvenes, pasando por la educación mediática y las amenazas derivadas de diversos tipos de actividades en línea, hasta los fenómenos socioprácticos que se producen en el mundo digital.

Los conocimientos adquiridos a través de la parte teórica constituirán la base de la investigación empírica. El objetivo de la investigación será determinar la importancia del uso del ordenador y de Internet en la vida de los jóvenes en edad de cursar la enseñanza secundaria. Los resultados de esta investigación, junto con su elaboración y presentación de formas de contrarrestar las amenazas y métodos de uso positivo de Internet, pueden constituir una valiosa fuente de conocimiento útil tanto en la labor pedagógica de los implicados en la educación como para los padres, ya que son los principales responsables de educar a sus hijos en el uso de los medios de comunicación.

P a l a b r a s c l a v e: Internet, uso del ordenador, ciberacoso, uso de los medios por los jóvenes

Наталья М. Руман, Зденек Мрузек

Вызовы для молодежи от использования Интернета. Размышления на примере двух средних школ: в Пщине и в Ческим-Тешине

Аннотация

Интернет в наши дни обладает безграничными возможностями. Он используется практически во всех сферах человеческой деятельности. Цель данной статьи - не демонизировать Интернет, а изучить различные аспекты функционирования молодых людей в виртуальном мире. Она также призвана определить, с какими негативными и какими позитивными моментами сталкиваются студенты при использовании этой технологии.

В первой части будут представлены наиболее важные новости о новых медиа и, в частности, об особенностях Интернета. В ней будут рассмотрены вопросы, связанные с различными аспектами использования Интернета - от психологических механизмов его использования молодыми людьми, медиаобразования и опасностей, связанных с различными видами деятельности в сети, до социально-практических явлений, происходящих в цифровом мире. Знания, полученные в ходе теоретической части, станут основой для проведения эмпирического исследования. Целью исследования будет определение значимости использования компьютера и Интернета в жизни молодых людей среднего школьного возраста. Результаты этого исследования, а также разработка и представление способов противодействия угрозам и методов позитивного использования Интернета могут стать ценным источником знаний, полезных как в педагогической деятельности тех, кто занимается образованием, так и для родителей, поскольку именно они несут наибольшую ответственность за просвещение своих детей в области использования средств массовой информации.

Ключевые слова: Интернет, использование компьютеров, кибербуллинг, использование СМИ молодежью

International Journal of Research in E-learning
Vol. 10 (2), 2024, pp. 1–30

DOI 10.31261/IJREL.2024.10.2.02

Daria Becker-Pestka
WSB University, Gdańsk
https://orcid.org/0000-0003-1758-5669

A Portuguese Model of E-learning for Prisoners as an Example of Successful Application of New Technologies in Education of Convicts: A Case Study

Abstract

The article presents a discussion on the application of e-learning in education of prisoners in Portugal. Today, e-learning has already become a significant complementation and extension of the current education offer. Avoiding application of modern technologies in education may lead to intensification of digital, social, educational and economic disparities in the society. There are also threats of complete digital exclusion of some social groups. One of those groups is formed by people serving their imprisonment sentences. A serious problem in offering the opportunity to benefit from e-learning to this particular group pertains to infrastructural disparities and availability of computer equipment and access to the Internet. Furthermore, considering the specificity of penitentiary institutions, security becomes an important issue as well. In Portugal, education of prisoners, including e-learning, has been focused on the context of life-long learning. Modern tools have been created and applied in education of prisoners and their learning processes. The projects, such as EPRIS@@ and Open University have been already in operation for some time. They can be an inspiration for prison staff members in other countries. The aim of the article is to show the solutions pertaining to e-learning dedicated to prisoners applied in Portugal as an example of the successful use of new technologies in education of convicts. The research methods include a case study. The techniques applied in the research include

document analysis, a free-form and question-targeted interviews. The following research problems have been formulated: What solutions in the field of e-learning dedicated to prisoners are applied in Portugal and how are they implemented? What are the objectives of the discussed projects? What does the course of the learning process look like, with the consideration of the applied tools? What problems are presented to prisoners? What are the weaknesses and strengths of the applied solutions? How is the evaluation of the learning outcomes achieved? What does the innovative character of the solutions applied in the field of e-learning dedicated to prisoners consist in? In order to collect the discussed material, the analysis of content, statistical data and interviews with educators working with prisoners have been used. The materials referred to in the article were collected in 2022, in the Institute Piaget and the Open University of Porto in Portugal.

K e y w o r d s: e-learning, new technologies, penitentiary system, Portugal, readaptation of convicts

Today we live in a digital world. People function in the reality where a highly dynamic development of modern technologies can be observed. Undoubtedly, this process cannot be stopped, as technological solutions have already been applied in almost all the fields of human life. Technological advancement brings numerous benefits. Although modern technologies pose a lot of challenges, they also inspire new ideas, they initiate changes and search for better solutions. At the same time, numerous dynamic changes in this area force people to adjust themselves and the resources that are used to such changes. People need to follow these transformations and constant improvement of their knowledge has already been included permanently in our activities. The lack of awareness and skills in the field of digital technologies involves serious consequences. It can cause social exclusion and largely limit or prevent social interactions, professional and academic development and communication. It is particularly dangerous for people who, due to their life situation, are not able to follow these changes. This social group includes people who serve their imprisonment sentences. The specificity of penitentiary institutions and imprisonment, as the isolation punishment with all its inconveniencies, result in the fact that prisoners function on the margins of the social life. However, it should be remembered that they will have to reintegrate with the society after they leave prison. Therefore, it is necessary to equip them with skills, knowledge and habits that will allow them to function in the world after the imprisonment punishment ends and it also refers to the digital space. Next to labour, cultural activities and sports, education of prisoners is one of the methods of working with prisoners. It is recommendable to benefit from the modern tools commonly used in digital world in that field as well. They will allow for preventing digital and social exclusion and will contribute to numerous social and individual

advantages. The use of modern technologies may become an important tool to prevent recidivisms among prisoners leaving their penitentiary institutions.

It should be noted that education of prisoners brings measurable social, individual and family advantages and it comes as a highly efficient means of social readaptation. It improves the value of former prisoners in the labour market, increases the risk of recidivism, helps to adapt to both the conditions of prison isolation and freedom after leaving the penitentiary institution, as it is a factor fostering self-development. It should be remembered that prisoners constitute a highly specific group of learners and that their life situation is highly disadvantageous. Due to crimes they have committed, they are put into prison isolation. While serving their imprisonment sentences, they have found themselves in the prison conditions that are unfavourable for people. Imprisonment is often related to the lack of any opportunities to provide work and to continue education and it means the high risk of recidivism (Machel, 2003, p. 21; Kędzierski, 2008, pp. 57–58; Deka, 2017, pp. 135–148; Sztuka, 2018, pp. 85–105; Kędzierski, 2017, pp. 125–138).

Prison reality is highly specific. The prison environment is closed and it is ruled by its own rights. The emphasis and belief that it can strongly affect education of convicts comes as a very important question. Implementing digital and educational resources that are attractive and adequate to prison reality, in order to support and motivate prisoners makes it possible to provide opportunities for development oriented toward their social reintegration (Moreira et al., 2017, pp. 39–47).

Education with the use of modern technologies comes as important complementation and extension of the current education offer. E-learning provides prisoners with an opportunity to achieve or improve their professional qualifications, to obtain the right to practice a profession and to improve their self-esteem. Hence, it is of particular importance, because it contributes to the minimization of the risk of marginalization after the end of the imprisonment. Furthermore, as a method based on advanced technological tools, e-learning facilitates the process of social rehabilitation, eliminates gaps in formal education, allows prisoners to improve their skills, qualifications and prevents or minimizes digital exclusion.

The use of digital technologies in penitentiary institutions is of fundamental significance to social reintegration of prisoners. Undoubtedly, it is worth developing digital skills in prisoners. Digital competences should be included in prison education, as today they are considered to be important elements in the process of social integration. Digital skills facilitate adaptation to the contexts, where on-line and off-line realities become intertwined and hybridised (UNESCO, 2022, p. 11).

The aim of the article is to present the solutions used in Portugal to provide e-learning to prisoners, as an example of successful application of new technologies in education of convicts. In Portugal, the long-life education of prisoners has been emphasized for many years. Modern tools have been implemented successfully in education of prisoners and their learning processes, however, not without any

problems and limitations. Higher education of prisoners seems to be particularly significant, hence new technologies are implemented to provide opportunities for acquiring education at that level to people serving their imprisonment sentences. Portugal runs the EPRIS@@ and Open University projects. They can be an inspiration to other countries that implement solutions based on Portuguese programmes, activities and experience.

Literature Review

Today, e-learning is understood as learning with the use of modern technologies and digital tools. It involves a didactic process implemented outside the school environment, applied to provide new quality of learning that is achieved with the use of modern technologies and ICT solutions. E-learning comes as excellent complementation to the traditional learning process, facilitating it with the use of various modern technological tools, including computers, smartphones, tablets and the Internet. The basic assumption pertaining to the use of e-learning refers to sending and delivering data remotely in the shortest possible time. As a result, it is possible to observe the improvement of knowledge and the quality of work that is being provided, the increase in productivity and the improvement of opportunities in the labour market. The social functioning of an individual also becomes improved, along with their self-awareness. Distance education is characterised by high potential, and it reflects the specificity of the modern world. The implementation of various forms of distance education involves complex and multi-aspect activities. This implementation can be difficult to carry out, and to incorporate it into the structure of the teaching entity (Woźniak et al., 2020, p. 24; Kaliszewska-Czeremska & Matejczuk, 2013, pp. 219–235; Molga, 2015, pp. 133–139; Hashim & Tasir, 2014, pp. 267–271).

It is possible to state that e-learning is a method of acquiring knowledge and skills, which becomes a new standard in training at different levels of education provided within various structures. Distance education is an element of didactics, and it represents various features that define it. It comes as a scheduled and systematic didactic project, composed of methodological preparation, presentation of the material that is going to be studied, and supervision over the process of education. Furthermore, it also involves support to people who learn without any direct contact with their teachers. New media are applied in this process, which – through the intended implementation – participate in changes taking place in learners. In terms of its tools, resources and organisation, e-learning is an attractive form of passing knowledge in the modern world (Kuźmicz 2015, p. 52; Woźniak et al., 2020, p. 27; Siemieniecka & Siemieniecki, 2019, p. 249).

E-learning is going to become almost universal in every context of education. It refers to education and training, starting from primary school to higher education institutions, from workplace learning to professional training. In such circumstances, it looks like a magic formula that changes every course into enjoyable learning experience. There are also some other factors that have to be taken into account if a successful course of e-learning is going to be conducted, as expected by students. The critical success factors of e-learning have been analyzed thoroughly by the scientific community. The results of numerous analyses have been published, often highlighting that students' ICT skills are crucial to successful e-learning (Rui & Moreira, 2008, pp. 192–199).

Distance classes can be conducted in the synchronous or asynchronous modes. The synchronous mode means that classes are organised in real time and in the direct contact between students and teachers. It means that the simultaneous Internet connection among all the participants is required. The teacher is connected via the Internet with all the students and the classes may resemble the lessons conducted in a real classroom. The class is closely supervised by the teacher who runs the lesson, and it can be conducted with the use on Internet cameras. There are numerous education platforms with incorporated tools allowing for conducting classes in the real time. Apart from education platforms, there are also platforms and software dedicated to the organisation of videoconferences. The communication between teachers and students is implemented with the use of microphones and chat windows. The asynchronous classes are characterised by time independence that teachers and students may enjoy. Organised under this mode, the classes usually involve granting students with access to education materials, courses, tasks, presentations and tests that students have to complete by the stated deadlines. Asynchronous classes are conducted without the direct contact with the teacher, hence all the materials should be made accessible at an education platform or at any other location accessible to the course participants. The teacher communicates with students by e-mail, a chat window or a discussion forum, where various themes are collected and saved (Sendur & Kościńska, 2021, pp. 36–37).

The recognition of advantages and disadvantages of e-learning plays a significant role in the process of making decisions about its implementation (or resignation from this method) by particular entities. In this article, penitentiary entities are discussed. The awareness of strengths and weaknesses of e-learning in working with prisoners does not exclude its use. However, the aspects considered by some learners to be advantageous, might turn out to be a barrier that hinders or makes the use impossible for some other learners. If there are not any formal obstacles related to the access to the indispensable infrastructure, e-learning is a highly efficient tool in the process of education.

The advantages and disadvantages of e-learning are presented in Table 1.

Table 1
The advantages and disadvantages of e-learning

Advantages	Disadvantages
• Simplified, fast and cheap access to knowledge, education and teachers; • Travelling to classes is not required; • Each student can learn in their own pace at the time convenient to them; • Freedom in terms of topic selection; a wide range of topics to select from; • A possibility to arrange a convenient class timetable and learning adequate to students' needs and possibilities; • Free access to contact the teacher; A possibility to acquire knowledge and skills not only in the field of selected topics but also in the field of modern technologies; • A lowered level of stress due to the lack of any direct contact with the teacher; • A possibility of the formal acknowledgement of graduation from the course; a possibility of obtaining a certificate confirming the acquired competences.	• Limited possibilities to acquire soft skills; • High risk of social isolation and alienation; • Deferred feedback information that may sometimes be not fully valuable; • Limitations to the possibilities and accessibility of courses and on-line training; • Limitations to the possibilities and accessibility of courses and on-line training; • Concerns expressed by people who use modern technological solutions; • Limitations to the possibilities and accessibility of courses and on-line training; • Concerns expressed by people who use modern technological solutions; • High costs of technological solutions, including hidden costs related, for example, to work overload of students and teachers; • A classroom is actually a virtual space where the teacher is not physically present; • A necessity of applying a complex process of class scheduling; • Difficulties and challenges posed to the teachers related to the preparation of the classes that - apart from the necessity of meeting the assumed didactic objectives – must be interesting to students and they must activate them; • High requirements set for the teachers in the field of their digital competences and the necessity of their systematic improvement and development.

S o u r c e: elaborated by the Author based on specialist literature (Barros & Monteiro, 2023, pp. 1–17; Hashim & Tasir, 2014, pp. 267–271; Monteiro et al., 2015, pp. 1038–1046; Moreira et al., 2017, pp. 39–47; Siemieniecka & Siemieniecki, 2019, p. 249; Woźniak et al., 2020, p. 24).

Apart from e-learning, blended learning, a mixed mode, is also applied in pedagogical practice.

It is a modern idea which embraces the strengths of both traditional classroom teaching and new technologies, combining offline and online learning processes. It includes cooperative learning; constructive learning and computer-supported learning. Blended learning needs persistent endeavour, commitment, proper budget

and extremely motivated students and teachers to achieve the expected outcomes. As it combines different modes and therefore is of complex nature, the organisation of blended learning is a hard and challenging task. Blended learning is the concept that includes framing teaching and learning processes that incorporate both face to face teaching and ICT-aided teaching. Blended learning provides direct statement, intermediate instruction, cooperative teaching and personalized computer-aided learning (Lalima et al., 2017, pp. 129–136).

It is assumed that blended learning consists in supporting the traditional learning process with virtual classes organised with the use of selected e-learning techniques and education provided via wireless mobile devices (m-learning) (Kuźmicz, 2015, p. 53).

Blended learning is highly appreciated for its flexibility, because it allows teachers to apply various solutions in teaching and learning, with the use of digital technologies, creating didactic projects both focused on students and on teachers. One of the biggest advantages of blended learning is its flexibility. It refers to numerous fields, such as time management, teaching contents, students' interaction with resources, other students and teachers. Blended learning may offer the best elements in digital and physical reality, providing integrated and really unique experience. Combined together, the two fields mentioned previously can actually generate the third resource and provide a new integrated education experience. The basic assumption of blended learning is to comprise learning by real combination of all the types of learning environment apllied in education in the particular thematic fields, including analogue and physical environment enhanced by digital technology and virtual environment (Moreira & Horta, 2020, pp. 8–9).

Research Methods and Questions

The research methods include a case study (Babbie, 2019, pp. 320–321; Strumińska-Kutra, 2012, pp. 2–16; Stake, 2009, pp. 634–628; Hammersley & Atkinson, 1995, pp. 56–63). The techniques applied in the research include free-form and question-targeted interviews and document analysis (Konecki, 2000, pp. 169–170; Fontana & Frey, 2009, pp. 90–92). The following research problems have been formulated: What are the solutions applied in Portugal in the field of e-learning dedicated to education of prisoners and how are they implemented? What are the objectives of the activities undertaken in that field? How does the education process work with the use of the discussed tools? What problems are presented to prisoners? What are the weaknesses and the strengths of the applied solutions? How are the achieved outcomes evaluated? What does the innovative character consist in as far as the application of e-learning in education of prisoners is concerned?

In order to collect the discussed materials, the analysis of the content presented in the materials uploaded on e-learning platforms has been applied, along with the statistical data and interviews with educators working with prisoners. During the interviews, the Author had an opportunity to become familiar with the EPRIS@@ Project in the presence of the team of specialists responsible for the implementation of the project. The interviewees have been currently performing tasks related to the solutions applied in education of prisoners and have been responsible for working with prisoners, activities on the Moodle platform and technical issues. The materials for the article were collected in 2022 in Porto, Portugal. There are three penitentiary units, where modern technologies have been applied in education of prisoners. The solutions applied in this field are the only activities of this type implemented in Portugal, and according to their developers – they are unique on the European scale. The surveyed group consisted of the people who initiated and implemented e-learning in education of prisoners. There were six interviewees.

There have not been any hypotheses formulated. This is typical of social scientific research of exploratory nature that is focused on the phenomena that have not been analysed so far. The approach which has been assumed fosters the cognition of the reality analysed in the article in a holistic and objective way. It is not restricted by any cognitive strategies. The scientific research is of exploratory and dynamic nature. The results obtained in the course of the research are going to be verified once again. For now, the hypothesis is viewed as a scientific rigid approach toward methodology (Lofland et al., 2009). The empirical material that was collected for this research study and a review of relevant literature cannot be used for any generalisation, but they can become a good starting point for interdisciplinary research, which may allow for searching and finding effective solutions in the area discussed in this article.

The Prison System in Portugal

The entity responsible for the operation of the prison system in Portugal is the General-Directorate of Reintegration and Prison Services – Direção-Geral de Reinserção e Serviços Prisionais (DGRSP). This is an office responsible for prevention, sentence execution, social reintegration and management of the entire penitentiary system (DGRSP, 2024; https://justica.gov.pt/).

In Portuguese prisons, the Criminal Code defines the system of criminal sanctions. It consists of a set of security and penalty rules which have been applicable for over 16 years.

This catalogue defines the main types of punishment, such as imprisonment and fine. The minimum imprisonment sentence is 1 month and the maximum is

20 years. According to the Penal Code, in some special cases prisoners may be imprisoned for 25 years. This is a limit which cannot be exceeded in any case. A fine is a penalty payment applied in relation to the regime of days. The range of fines is fixed between the minimal number of days (10) and a maximal number of days (360). A daily fine is between EUR 5 and EUR 500. Fines can be fully or partially replaced by working days. There are non-custodial sentences in the Portugal penal system. They include the following: fine, suspension of execution of the imprisonment sentence, working for the benefit for the community and admonition. The last one is a substitute penalty to a fine. Apart from that, the Freedom Security Measure is applicable. In this case, imprisonment of the suspect can be indicated. It is custodial measure carried out to apply medical treatment or security establishment for a period that may not exceed the maximum limit of the penalty corresponding to the type of crime committed, unless the crime perpetrated by the suspect is punishable by more than 8 years of imprisonment and the risk that new crimes of the same kind will be committed is so serious that the release should not be recommended. In the Portuguese system there are non-custodial security measures, such as suspension of the execution of hospitalization and freedom to proof. A penalty waiver means that the court resigns to apply a penalty if the crime is punishable by imprisonment of not more than 6 months and certain assumptions have been verified. Legal regulations also define other actions which are as well a part of a criminal sanction idea. All of them are described in details in the law documents mentioned before (DGRSP, 2024; https://justica.gov.pt/).

In the Portuguese penal system, the following principles and questions are important:

- the aim of social rehabilitation of convicts and prisoners, which is generally defined as custodial sentences;
- the principle according to which no penal sanction should result in the loss of any civil, professional or political rights;
- the principle according to which convicts sentenced to imprisonment or against whom any other safety means have been undertaken shall retain their basic legal rights, with the exclusion of limitations related to the meaning of the penal sentence and the requirements of its execution;
- the principle of priority sanctions executed within the community in which the crime has been committed or executing the imprisonment sentence;
- the principle of judicialization in application of penal measures and sanctions – intervention of social reintegration services is fully subject to judicial control of the competent judicial authorities, sentencing courts and penalty enforcing courts (DGRSP, 2024; https://justica.gov.pt/).

In the Portuguese penitentiary system, the international rules of treating prisoners are respected, including:

- Recommendation Rec(2006)2 of the Committee of Ministers to the member States on the European Prison Rules (Recomendação Rec(2006)2 – rev do

Comité de Ministros aos Estados Membros sobre as Regras Penitenciárias Europeias) constitute the obligation to provide fair treatment of prisoners (Microsoft PowerPoint – Regras Penitenciárias);

- United Nations Minimum Rules for the Treatment of Prisoners (Nelson Mandela Rules) – their main objective is to improve the situation of prisoners in the world (Regras Mínimas das Nações Unidas para o Tratamento de Reclusos; Regras de Nelson Mandela) (DGRSP, 2024; https://justica.gov.pt/).

The majority of prisons are located in the city centres. Between January 2020 and January 2021 the number of inmates decreased. The change is explained in particular by the policy of early release of detainees pursued during the fight against the proliferation of Covid-19.

There are two penitentiary institutions for women: the Tires Prison and the Santa Cruz do Bispo Prison.

Portugal is the second European country where convicts spend the most time in prison. The authority responsible for education and/or vocational training is the Ministry of Education and Higher Education (https://www.prison-insider.com; Dores et al., 2013, pp. 10–13).

The Table 2 presents some selected statistical data on the prison system in Portugal.

Table 2
The selected statistical data on the prison system in Portugal in 2022

The category to which the data refers to	Numeric data
Number of people incarcerated in Portugal	11 432
Incarceration rate per 100 000 inhabitants	111
Homicide rate per 100 000 habitants	0.8
The average length of detention	32.4 months
Budget	238 395 085
Women	6.8% of the total population of convicts
Daily meal cost per inmate	$ 3.48
Number and percentage of detainees enrolled in academic training	24.9%
Prison Staff	5 216

S o u r c e: the Author's own elaboration based on Portugal: prisons in 2022. https://www.prison-insider.com.

The Portuguese Model of E-Learning for Prisoners as an Example of the Successful Application of New Technologies in Education of Convicts. A Case Study

In Portugal, two solutions have been developed in terms of the application of e-learning in education of prisoners, namely EPRIS@ i EducOnline@Pris Digital Campus. These are innovative projects supported by scientific knowledge. They come as a result of their initiators and implementers' believes in the value of education provided to prisoners, in the context of efficient social reintegration.

EPRIS@, that is: E-learning in prison, is a comprehensive and innovative project aimed at the implementation of specific methods of learning in penitentiary institutions. The fundamental aim of these methods is to involve the target group of recipients into training developing basic skills, such as reading, writing, counting and also ICT skills. The project is dedicated to social and occupational integration of women. It is possible due to the fact that EPRIS@ includes a training component and, therefore, it allows for the promotion of the future social and occupational integration. Due to the application of the cooperation method, the project integrates scientific research and social intervention. The programme comes as a result of a partnership between the Portuguese Directorate General for Reinsertion and Prison Services and the Porto's Santa Casa da Misericordia.

The project platform looks as follows (Figure 1).

Figure 1. Website of platform of EPRIS@ Project

S o u r c e: R. Barros, non-published material; EPRIS@ Aprender Online No Feminino.

The participants of the project are women aged from 26 to 56, who serve their imprisonment sentences in Porto, in Santa Cruz Do Bispo Feminino Prison (a penitentiary institution for women). The beneficiaries of the programme have completed only nine grades of their primary schools and they do not have any high competences in reading, writing, counting or skills in the field of ICT technologies.

Santa Cruz Do Bispo Feminino Prison is one of the three penitentiary institutions that operate in Porto. The choice of the prison for women to implement the programme resulted from the practical and organisational reasons. When the project was in its initial state, the Instituto Piaget had already developed valuable contacts and started cooperation with the above-mentioned penitentiary unit. According to the mission defined in the legal regulations of the Portuguese penitentiary system – Article 2 of Decree-Law No. 215 of 28th September 2012, the General Directorate of Reintegration and Prison Services aims at the progress in criminal prevention policies, execution of sentences and measures, social reintegration and the articulated and complementary management of educational and prison protection systems, ensuring conditions compatible with human dignity and contributing to the defense of the social order and peace (Vision, mission and values) (DGRSP, 2024; https://justica.gov.pt/).

The project has been implemented since 2014. The initiator of the programme is a person who was preparing their doctoral dissertation at that time. The final outcome of the researcher's scientific work was supposed to be a programme, based on which the doctoral degree would be conferred to that person. Sadly, the work was never completed. The idea of that project was, however, continued and didactic and academic employees of the Instituto Piaget presented it in A Direção-Geral de Reinserção e Serviços Prisionais (DGRSP, https://www.justica.gov.pt). The programme was eventually abandoned and all the work and the necessary procedures were stopped. Several years later, the Ministry was looking for new innovative solutions and the programme was once again sent to undergo all the required procedures. Eventually, it was approved and its implementation was commenced under the subsequent editions.

The ultimate version of the project was developed by a team of scientists, who are now the members of a scientific research unit at the Instituto Piaget: RECI – Research in Education and Community Intervention. Their scientific studies are focused on the questions related to integration and life-long learning.

The first edition was implemented during the years 2014–2016, the second one – during the years 2016–2019 and the third one – during the years 2019–2022. The coordinator of the project since its very beginning was Ms Rita Barros of the Instituto Piaget in Porto.

The idea of the EPRIS@ Project has been aimed at connecting virtual and real conditions. The implementers refer to an assumption that prisoners are deprived of their freedom, but not of an opportunity to learn. The idea is based on the potential offered by e-learning as a didactic differentiating tool that promotes

digital integration. It refers not only to gender equality for the women who are in prison but also to their future social and occupational reintegration. The project has been focused on digital literacy through the development of skills required to use ICT technologies, which allows for the development of new methodologies and educational intervention tools adequate to prisoners.

At least 7 people are responsible for organizing the process of education in each project. The project involves educators, trainers, IT specialists. They are responsible for the implementation of the particular elements of the project and they jointly decide about its form. Before the commencement of the work on the project, they are trained and prepared to work with prisoners. As they say: to make mistakes is normal, but we still change and make an effort to avoid them.

The participatory methodology has been applied in the project. The first project was a pilot study and it was better to implement it within a smaller population. The recruitment to the current project is based on voluntary participation. Still, the decision about the participation in the programme is to be made by the manager of the penitentiary unit and voluntary application of female prisoners.

It is possible to say that EPRIS@ is a b-learning project. The largest part is implemented online, but in each module and phase of the project the participants have got time for their presentations.

The third edition of the project, which lasted to the end of 2022 was just finished. Considering the social and individual benefits for prisoners and academic research advantages for scientists, next editions are planned, which are going to be complemented with some evaluation tools.

Both the first and the second editions of EPRIS@ were funded by the Instituto Piaget in Porto. All the expenses related to the implementation of the project were covered by the above-mentioned institution. The third edition was financed in a form of a grant which allowed for the implementation of the programme activities. The cost of the project was EUR 40 000. ALTIS and IT specialists from Instituto Piaget were responsible for the IT aspects of the project implementation. They developed some specific solutions in order to ensure that prisoners did not have free access to the Internet.

Implemented under the EPRIS@ project, education with the use of the Moodle platform is implemented in three phases.

The first phase is introduction. It includes general information, such as how to study online, what e-learning is, how to be an online student, how to use the Moodle platform and some information about the subsequent part of the project. It is included in a small document. It is the Pilot Phase: “Being an Online Student” module and the Office Tools.

Having obtained access to the platform, learners familiarise themselves with its content. This part of the training comprises 25 hours. Apart from the above-mentioned content, the platform also includes such elements as a questionnaire for prisoners, which enables educators to collect material for their scientific work

articles and to collect the most important data about prisoners. It also includes a forum, where prisoners can express their doubts and opinions freely. This part also includes a news forum. Furthermore, this step contains another important element, namely: a forum of personal presentation that offers the participants and educators an opportunity to introduce themselves and to provide some personal information they want to share. It should be emphasized that this step of the course is usually prepared with the participation of female prisoners. Their suggestions and observations are taken into consideration during the development and presentation of the materials.

The photograph below (Figure 2) presents a site from the Moodle platform: How to become an Online Student.

Como se tornar Estudante Online

Figure 2. Website of the Moodle platform: How to become an Online Student

S o u r c e: materials provided by R. Barros, EPRIS@ Aprender Online No Feminino.

The second phase is similar to the first phase of the project, however, the content is complemented with the questions referring to entrepreneurship and parental skills. It is the Training Continuity Phase: it includes modules from the first phase extended by:

- Communication and Expression in Portuguese;
- Parenting and Parenting Educational Styles;
- Entrepreneurship and Job Search Techniques. (during this phase, prisoners have got a teacher. The educator shows and teaches them how to find a job and how to write a CV).

The last phase is practical. Prisoners learn sewing. This part is implemented in cooperation with various enterprises, which provide sewing machines required

for the production of clothes. The third phase consists of the first modules, Sewing Workshops I and II (Modatex) and Entrepreneurship and Job Search Techniques.

The characteristics of the particular elements of the training are presented in the diagram (Figure 3).

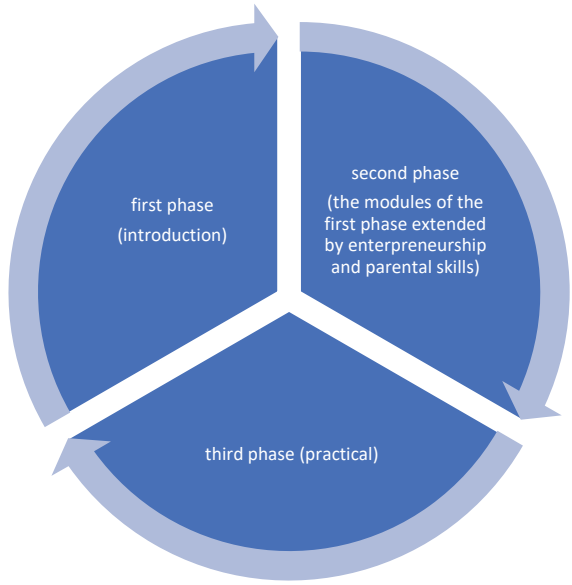


Figure 3. Elements of the training dedicated to prisoners under the framework of the EPRIS@ project

S o u r c e: the Author's own elaboration based on the collected empirical materials.

During the implementation of the EPRIS@ project, the prisoners do not have any access to the Internet. They can use the Moodle platform and download the materials for studying. There is an agenda of accessing the platform, however, it is flexible and adapted to the needs of prisoners. Prisoners can have the access in two following cases:

- when they give a presentation;
- when they ask the prison guard of technician

Prisoners have computers for their disposal but they can only use the Moodle platform with the course. When prisoners are in their cells, they have computers and they can work offline. For example inmates can prepare the presentation and do tasks to work with previously downloaded materials.

The success of the project is confirmed by the appreciation of personal and occupational benefits obtained by the participants. It is related to the fact that the team has considered individual needs and personal characteristics of the prisoners participating in the project. The results of the programme have contributed to work focused on regulations concerning the access to ICT technologies for the purposes

of distance education in prisons, which directly affects decisions made in the field of the education policy and social integration in Portugal. The applied solutions are also reflected in the policies pursued by other countries (for example, in Brazil) and they come as an inspiration for the development of their own concepts in this field.

After finishing the course and leaving prison, ex-prisoners get their certificates – diplomas. The certificates confirm that they have acquired skills and abilities to continue their education and to develop their occupational competences. After that, they may go to the specialists from CESAE: Services Center and Business Support (CESAE Digital – Desenvolvimento das Competências Digitais). In CESAE, the prisoners who have completed their courses show the relevant documents and it allows them to find a job. It is worth saying, that apart from digital resources, CESAE offers also other formative materials if the inmates want to continue their studying. The ex-prisoners obtain the professional certification.

Achieved by Rita Barros and Angelica Monteiro, the results of the scientific research on the levels of self-esteem and motivation in female prisoners participating in the training project indicate that their level of self-esteem is higher than in other research surveys. They also indicate the complementarity of the internal and external motivation for learning in prisoners. There is a correlation between the sense of self-esteem and the motivation to study. The prisoners' higher self-esteem is manifested by some better understanding of the significance of participating in on-line training and recognising external benefits that come with it. The scientists indicate that in the context of imprisonment, internal and external types of motivation do not suppress each other – quite the opposite, they become complementary. As far as the questions related to the analysed variables (age, educational competences at the start of the project, the level of education, the duration of imprisonment) are concerned, the scientists have not confirmed any relations to the sense of self-esteem. However, the Authors indicate that the longer stay in prison, the longer imprisonment sentences and the lower levels of education at the time of the apprehension of the particular prisoners can be more easily associated with the external motivation. Older prisoners had more difficulties in identifying benefits resulting from their participation in training. They also manifested some major lack in competences and commitment inhibitors. The Authors of the research study suggest that more research should be carried out with more focus on the same constructs, with larger population samples, considering the fact that a small population sample also comes as a limitation to the research. The research was focused on female prisoners, so it would be interesting to compare that sample with some male populations under the same conditions. The Authors emphasize that despite the above-mentioned limitation, the conclusions indicate the potential of on-line learning in the prison. Hence, this fact should be taken into consideration in the context of the educational policy (Barros & Monteira, 2022, pp. 837–857).

The weaknesses of this project may be observed in relation to some issues. First of all, prisoners experience moments of demotivation during the education process. Another problem is the fact that some needs expressed by prisoners are missed out in the system. It particularly refers to the lack of access to the Internet, although the prisoners need it and they would like to use it. They would also like to have more diversity. It happens that prisoners declare that they want to give up the computer training and their educators encourage them not to do it. The educators should provide systematic assistance to prisoners. If a prisoner needs help, their educator goes to the prison to provide them with assistance in using computers. In the opinions expressed by the implementers and researchers, it is possible to indicate three categories of barriers and difficulties in the implementation of the EPRIS@ project. They are presented in the diagram below (Figure 4).

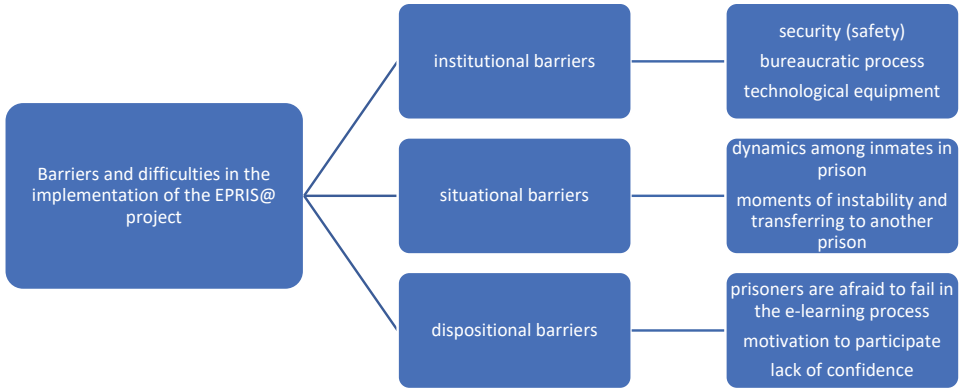


Figure 4. Barriers and difficulties in the implementation of the EPRIS@ project

S o u r c e: the Author's own elaboration.

An undeniable advantage of the EPRIS@ project is its innovative character consisting in the fact that prisoners can use computers in their cells. Another strength of the project is definitely the fact that the students can work with all the materials posted on the Moodle platform and benefit from participation, flexibility and inclusion. E-learning potential of this project offers:

- learning opportunities;
- diversification of resources;
- customisation and collaborative work.

E-learning in the field of life-long learning in the prison context and in terms of a self-concept involves:

- active learning and assuming personal responsibility for learning;
- initiative in learning and guidance for experience;
- autonomy in learning;

- confidence in the ability to carry out the new learning process with the focus on the future labor integration.

As indicated in the interviews carried out with the implementers of the EPRIS@ project, there are not any scientific surveys carried out on the further life of the ex-prisoners who have completed the programme. The implementers do not know if and to what extent the knowledge acquired by those women during the project has been used. After prisoners leave prison, the contact with the beneficiaries of the project is formally terminated. They do not undergo any further monitoring or evaluation procedures in terms of how their participation in the project has affected their ocuppational and personal life, how they use the competences they have acquired during the project in their life in freedom.

At the same time, people responsible for the implementation of the EPRIS@ observe the process continuously. They are very satisfied and surprised with the results of this project. The Project Manager says that the work produces positive results. The implementers of the EPRIS@ project have got some ideas how to improve the programme and how to change it. One of these ideas is the internalisation of the project. The educators also want to merge the EPRIS@ with other projects, such as Free Spirits ("Espíritos Livres"), which is an artistic intervention project promoted and conceived by the Terceira Pessoa Association to be implemented with inmates in the Prison Facility of Guarda (an inland region of Portugal). It is an example of how the EPRIS@ Project co-exists with other programmes. As the educators of this project declare, the project is aimed at:

- developing personal and social skills in inmates (e.g.: creativity, communication, critical thinking and resilience) through the interaction of different artistic disciplines, such as theatre, music, dance and performance;
- analysing the acceptability of the art intervention programme in the prison context;
- exploring the effectiveness of the project in promoting emotional regulation strategies and resilient coping strategies;
- analysing the potential effect of the intervention at the level of cognitive processes, namely in inhibitory control;
- identifying the benefits perceived by the professionals of the prison community at the level of personal development of inmates and the institutional atmosphere;
- presenting recommendations for the implementation of artistic intervention projects in the environment, considering the identification of barriers and facilitators underlying the context.

The project started in September 2021 and was finished in July 2022 (11 months of duration). The final conference took place in September 2022. 31 prisoners participated in the project (17 prisoners in an intervention group; 14 prisoners in a control group). 10 women and 21 men participated in the project activities (source: the Author's own elaboration based on the interviews with the project implementers).

The results of the implementation of the EPRIS@ project include, first of all, the monitoring provided by educators, advantages resulting from the participation in the training, encouraging prisoners to study, using practical aspects of knowledge, attending to the trainees' personal experience and constructing communication, sharing, knowledge, interactivity. Besides, the results of the program implementation also include: co-responsibility in training, personal self-development and using time in a valuable way, a possibility and autonomy in exploring and making one's own mistakes; time management, limitations to the access to the Internet, demotivation and anxiety, the lack of interest in certain modules, fear in handling equipment and a limited training offer.

According to the project implementers, it is possible to formulate some recommendations for the project. They include the following postulates:

- identifying the previous knowledge of the trainees, at personal, academic and professional levels;
- ensuring that the virtual learning environment offers space for collaboration and providing the monitoring of trainers;
- attending the question of the size of the learning groups;
- prioritizing the levelling of previous skills;
- involving trainees as co-authors of the training process;
- ensuring the fluency of communication among all the participants;
- ensuring that inclusion, participation and flexibility processes are always active.

As the implementers of the EPRIS@ project believe, its future is the diversification of methodologies for intervention ("peer-to-peer") and training of professionals for a possible replication of the project with the participation of women from other prisons. Combining the EPRIS@ with other projects is also an important question. These activities have been already under the implementation, as, for example, the merger with the Free Spirits and internalization of the project mentioned previously.

Concluding this part of the article, it is possible to say that in the Portuguese penitentiary system, digital education in penitentiary institutions, especially in terms of life-long learning courses and higher education, is very important. Some Portuguese scientists believe that a significant transformation has taken place in the European higher education, as a result of technical advancement and the results of the adjustment to the Bologna Process, under which education should be accessible to everyone, regardless of the reasons for social exclusion, such as imprisonment. As a result, the mass access to higher education has been provided, forcing a flexible and inclusive education offer that is focused on students (Moreira et al., 2017, pp. 39–49).

Apart from the above-mentioned EPRIS@@ project, there is another solution implemented in Portugal as an important tool of social inclusion of prisoners. Its authors and implementers have used new digital technologies and their own original tools in the fields of technology and didactic solutions to develop a unique,

pioneering and innovative digital structure, which allows prisoners to learn and to develop their competences in a way that differs from the traditional acquisition of knowledge and qualifications confirmed by a formal diploma.

At the Universidade Aberta (UAb), a Virtual Pedagogical Model (VPM) has been developed. It is a highly inclusive model. Due to its flexibility, it is possible to cater for the needs of learners who serve their imprisonment sentences. The Virtual Pedagogical Model (VPM) was constructed in 2007 and it was dedicated to learning in the virtual environment. Its main assumptions are based on some particular learning rules, such as the following: providing variety in learning, providing interaction at the levels of learner-learner, learner-teacher, learner-educational resources and content; providing education based on flexibility in terms of access to education (the priority of asynchronous communication and no imperatives or limitations in space and time); focusing education on learners, which means that learners become responsible for the active development of their own knowledge environment. The last VPM rule is education that promotes digital inclusion. It is understood as facilitating the use of digital technologies and as developing competences in the fields of analysis and production of digital information (UNESCO, 2022, p. 9).

The Virtual Pedagogical Model (VPM) at the Universidade Aberta (UAb) promotes education focused on students. Prisoner students are considered as active and responsible creators of their own knowledge. The model also fosters flexible access to education, with interaction that takes place in the time convenient to learners – and in the prison context, with non-coincidence of time and non-coincidence of space.

There is an Open University intranet platform, where prisoners have got access to all the course units and respective forums. At the end of each semester, they take their examinations physically and not virtually. The implementers of the project indicate that the beneficiaries of that model have succeeded in excellent careers due to the great effort they once made. Hence, this can change learners' lives after they leave prison.

- The educational platform of the University includes the following components:
- ON@Pris platform – a digital platform offering life-long learning courses. It constitutes the space for education and on-line training, non-formal and informal courses. It is aimed at the development of active citizenship and the increase of opportunities in the labour market;
- eLearning UAb platform – it is an Open University Digital Platform of Higher Education Courses offered in the e-learning system. It offers the possibility of acquiring scientific degrees (BA, MA and Ph.D);
- Abert's Auditorium platform – provides open-access free space offering on-line learning resources;
- Académico UA portal – provides its users with services in various fields, such as the Secretariate and Treasury. Based on the principle of self-service,

it is dedicated both to students and teachers, providing them with easy, user-friendly interface and high accessibility at any time and space (Educonline@Pris – Universidade Aberta (https://educonlinepris.uab.pt/).

The establishment and operation of the EducOnline@Pris Digital Campus is related to a belief that education plays a key role in the reintegration of prisoners, who serve their sentences in penitentiary units and it is necessary to adjust working with those people to the requirements of the current reality.

The main aim of the Campus Educonline@Prison is the promotion of education and training in the virtual environment and development of digital skills in prisoners. Started at the beginning of November 2018, the Campus virtual portal was based on two Moodle platforms. One of them provides access to the fields of study offered at the Universidade Aberta, whereas the other one provides access to activities and courses dedicated to the population of prisoners in the field of digital skills. The second platform, ON@PRIS, offers the implementation of five training sections dedicated to prisoners in the fields of citizenship and digital competences: 1) Active Citizenship and Participation; 2) Financial Literacy and Entrepreneurship; 3) Health Literacy; 4) Digital Skills for Communication and Human Relations; and 5) Digital Competence and Citizenship.

These are training activities offered in a mixed mode, with the assistance of the ON@PRIS digital platform, which integrates the EDUCONLINE@PRIS Digital Campus. These training activities are defined in an agreement signed by the Universidade Aberta (UAb) in Portugal and Direção Geral de Reinserção e Serviços Prisionais (DGRSP). The development of a virtual campus was a complicated challenge and it required a lot of commitment from the above-mentioned institutions. At the beginning of its development, the project of the Educonline@Pris Digital Campus included about 20 prisons in various regions of Portugal. However, the persons involved into its development hoped for the expansion of the virtual and digital campus in the future to include other penitentiary systems.

The EducOnline@Pris Digital Campus is dedicated to all prisoners in Portugal. Prisoners who learn at the higher education level account for a low percentage of the entire population of prisoners. A website of the virtual campus for the inmate population is presented below (Figure 5).

At the Open University prisoners can study to obtain degrees at the master's and doctoral levels. The process is exactly the same as for any other student applying to a university, with the completion of entrance examinations. The most important thing in this process is the assistance of a prison technician who helps to clarify all the doubts and to make contact with the university. Students have access to computers, but not to the Internet.

In addition to the higher education courses that the prisoners take, they also attend some short courses related to cinema and its pedagogical deconstruction, when watching films is usually followed by a discussion.

Figure 5. Website of a Virtual Campus for the inmate population

S o u r c e: Educonline@Pris – Universidade Aberta (https://www.educonlinepris.uab.pt/).

As it has been already mentioned, prisoners are not allowed to surf the Internet. They can only access the Moodle platform, however, the rules listed previously, including the rules of flexibility and digital inclusion, allow them to integrate and participate in regular classes, preventing their isolation in some digital "ghettoes". The assumptions of the project allow prisoners for a lot of independence. They can independently work and complete the required tasks within the programme courses they attend, using the resources accessible through the digital platform. The interaction is exclusively focused on conveying the knowledge. There are no interactions between prisoners and the rest of the virtual community, with teachers and the group they are assigned to. The student profiles allow them to access the communication space and interaction with the platform, however, they do not allow for any communication and integration with other people. Despite that limitation, prisoners can access a particular education programme and "closed" resources on the platform, where their work is assessed in various ways. Prisoners may take exams in their digital forms on the platform or they can take exams in the real environment of their penitentiary units, under the supervision of technicians who monitor the education process. Prisoners may take part in interactions, however only in the reference to the technology of the system, digital content and resources. Due to the security reasons, the interaction with other student prisoners and teachers is impossible. Prisoners have got access to the communication space and forums. They can read posts made by their classmates or teachers, but they are not allowed to respond to those posts or interact with their authors.

At present, it is difficult to provide a comprehensive evaluation of the outcomes of the Virtual Campus project, because it has been lasting for a short time and most students have not completed their courses under the selected education programmes. So far, the results of the programme have seemed encouraging, because they indicate a high level of educational success in numerous courses run at penitentiary units (UNESCO, 2022, pp. 11–12).

Validation

E-learning is an innovative method of transferring knowledge. It offers numerous advantages. E-learning can be an efficient, comprehensive and reliable tool applied to work with prisoners. Considering the fact that it still has got some flaws, it should be applied as the complementation of the traditional forms of education.

At the same time, it seems that education models and methods at schools and other education institutions do not undergo any revolutionary changes. The most probable changes shall be of evolutionary nature and and they will be based on the application of new tools, methods and knowledge sources. They will become complementary elements to the traditional model of education. The question whether a revolution is needed in formal education still remains open as well as the question referring to the impact exerted by media and technologies on relations between teachers and students, and many others. It should be emphasized that while thinking about new technologies and media, it is difficult to draw a clear line that separates them. Furthermore, the speed of changes and functional convergence result in the fact that tools and phenomena indicate numerous common features and they are intertwined (Frania, 2017, pp. 61–62).

Education of the future is based on three basic pillars. These are fraternity, equality of educational possibilities at an inclusive school and justice that guarantees fair and supportive treatment. The conditions mentioned above come as the fundamental elements for learning about human rights and, simultaneously, ensuring equal education opportunities to everyone, without discrimination, exclusion and suffering. The technologies applied in the educational process have to be helpful in achieving this objective. Their role is to support all studying people and children in their inclusion and to prepare them for the coexistence in a civil and social areas (Indellicato, 2020, p. 74).

It should be remembered that for those who serve their imprisonment sentences, education with the use of modern solutions, such as e-learning, comes as an opportunity to participate in the virtual world after they leave prison. It eliminates barriers to the access to knowledge, allows them to obtain formal qualifications and

provides them with a chance for successful occupational and social reintegration. E-learning is an important tool that prevents digital and social marginalisation of prisoners, who are under forced isolation, and limited interaction with other people. It eliminates barriers to the use of modern digital tools and comes as a form of encouragement to learn and use digital sources of knowledge. E-learning also allows prisoners to open for new educational experience and it may significantly affect their future education and the decision they make in relation to their education and occupational career after they leave prison. Digital skills can help prisoners to avoid recidivism. They can also allow them to exist in a digital world after leaving prison.

Some countries, such as Portugal, have developed systemic solutions in the areas where knowledge can be acquired. This allows inmates to catch up with the knowledge-based society and to follow the development of technology as far as possible in the conditions of prison isolation. It would be impossible without the systemic support of various entities and institutions and without the understanding of the essence of e-learning and its development in the process of educating prisoners. Application of e-learning in education of convicts is still a challenge for penitentiary systems. In addition to technical issues, there are problems related to the effectiveness of the education process, and thus didactic effectiveness, as well as security issues, which are particularly important in the case of the penitentiary system.

As the implementer of the Educonline@Pris project, education with the use of modern technologies dedicated to prisoners will bring numerous benefits. At the same time, the persons who develop and implement projects, such as the Virtual Campus discussed above, are aware of the difficulties that have to be faced, possible limitations and barriers that must be overcome. It is necessary to believe that the project is characterised by the vast potential in terms of re-education and social rehabilitation of prisoners who benefit from such education (UNESCO, 2022, pp. 11–12).

It is also worth noting that the digital world has already become not only our reality, but also an important question in the fields of interaction and information. Viewed from that perspective, the world has become smaller and some boundaries have disappeared. Mutual interactions are unavoidable and they are parts of our everyday life. Following the global progress of various structures and social resources, digital technologies should be incorporated into the process of education implemented in penitentiary units, in order to promote transformation of its processes and elements. It is necessary to guarantee more advantageous conditions that would allow prisoners to acquire higher education. It could be a real chance for them to achieve a necessary level of personal development and occupational qualifications that would increase their opportunities for the successful future. The simultaneous use of technologies and numerous didactic methods, including interaction of various aspects and technological and educational resources is needed

in order to promote high quality education in the Portuguese penitentiary units. Furthermore, it is also necessary to consider the use of the Internet and intranet and more assistance provided by teachers in the field of education activities in the context of a virtual classroom. It refers to the fact that e-learning is very flexible in terms of educational curricula and time management. It allows prisoners to continue their education after they leave prison or in other penitentiary units at any other place in the world (Moreira, et al., 2017, pp. 39–47).

The Portuguese experience related to education of prisoners indicates that those who study are generally motivated because they are able to predict a more attractive future for themselves if they achieve their academic diplomas. Despite this fact, however, their expectations are not very high, because they acknowledge the fact that their rehabilitation will be difficult, due to the stigma of being an ex-prisoner. The practice also shows that the education process has got many weaknesses and limitations, mostly due to the lack of facilities, educational and technological resources, and support from teachers (Moreira et al., 2017, pp. 37–51).

Applied in Portugal, the solutions in the field of e-learning dedicated to the education of prisoners have turned out to be an inspiration to other countries, for example, Brazil. Inspired by the EPRIS@@ project, the programme implemented there is attended by 300 female prisoners, who – due to their participation in the project – have been given chances and possibilities to improve their knowledge, to acquire new qualifications and competences also in the field of new technologies. The project partners are Universita Aberda in Porto and Alagoas University City Maceio in Brazil. The implementation of the project helps the scientists to carry out some interesting scientific studies, to expand experience and to invite new partners for international cooperation. It would be also advisable for other countries to implement and to promote the discussed solutions, projects and experience, considering the values they represent.

Conclusions

- E-learning is a complex system of activities, the participants of which represent different expectations and needs;
- The challenges faced by the knowledge-based society force people to develop their digital skills, with the consideration of the potential represented by education supported by technologies; it also refers to the education of prisoners who serve their imprisonment sentences;
- Education of prisoners is a process that prepares them to employment and affects their social reintegration;
- E-learning of prisoners represents enormous potential and values;

- Optimisation of the education process with the use of modern technologies is beneficial and profitable from the perspectives of the society, economy and prisoners themselves, including their families;
- In the Portuguese penitentiary system, the use of digital education in the process of social rehabilitation of prisoners is a priority for people who are responsible for its development and organisation;
- In Portugal, a model of working with prisoners with the use of modern technologies has been developed. Due to the possibilities provided by such technologies, it has been possible to create the Virtual Campus for the population of prisoners and to develop the EPRIS@@ project under which prisoners acquire education;
- The applied solutions have got their flaws, however, due to their evaluation it is possible to implement improvements to the operation of the projects and to increase their individual and social value, efficiency and effectiveness;
- It is worth following the models developed in Portugal to apply similar solutions, with the consideration of the specific character of the imprisonment punishment in the Polish penitentiary system. It is also worth following Portuguese experience and to implement such solutions in Poland, because they can result in measurable social, economic and individual advantages.

References

Act of 6th June 1997 on the Executive Penal Code; Journal of Laws 1997; no. 90, item 557.

Babbie, E. (2019). *Social research in practice*. PWN. ISBN 978-83-01-14068-7.

Barros, R. & Monteira, A. (2022). *Ensaio: aval. pol. públ. Educ.* Rio de Janeiro, v.30, n.116, pp. 837–857, jul./set., pp. 837–857. https://doi.org/10.1590/S0104-40362022003003035 ISSN: 0104-4036.

Barros, A. & Monteiro, A. (2023). *Leite Learning with digital technologies in prison: a scoping review*, Digital Education Review. http://doi/10.1344/der.2023.43.1-17.

Deka, R. (2017). *Social readaptation of convicts as one of the conditions for the safety of local communities.* In P. Frąckowiak, M. Szykut (Eds.) *Wielowymiarowość profilaktyki, resocjalizacji i readaptacji społecznej Tradycja, współczesność i perspektywy inicjatyw probacyjnych [Multi-dimensionality of prevention, resocialization and social readaptation. Tradition, modernity and prospects of probation initiatives].* Wydawnictwo Edukacyjne Akapit. https://doi.org/10.5604/01.3001.0014.5741.

Direção-Geral de Reinserção e Serviços Prisionais (2024, April 12). Current punitive system. Retrieved from https://justica.gov.pt/.

Direção-Geral de Reinserção e Serviços Prisionais (2024, April 12). Microsoft PowerPoint - Regras Penitenciárias. Retrieved from https://justica.gov.pt/.

Direção-Geral de Reinserção e Serviços Prisionais (2024, April 12). Prevention of criminal recidivism [Vision, mission and values, Vision, mission and values. Retrieved from https://justica.gov.pt/.

Direção-Geral de Reinserção e Serviços Prisionais (2024, April 12). Regras Mínimas das Nações Unidas para o Tratamento de Reclusos (Regras de Nelson Mandela). Retrieved from https://justica.gov.pt/.

Direção-Geral de Reinserção e Serviços Prisionais (2024, April 12). The body responsible for prevention, execution of sentences, social reintegration and management of the entire penitentiary system. Retrieved from https://justica.gov.pt/.

Direção-Geral de Reinserção e Serviços Prisionais (2024, April 12). Vision, mission and values. Retrieved from https://justica.gov.pt/.

Dores, A. P., Pontes, N., Loureiro, R. (2013). *Prison conditions in Portugal*. Rome 2013, pp. 10–13, (83). Academia.edu. ISBN: 978-88-98688-01-2.

Frania, M. (2017). New media, technologies and trends in education. Toward mobility and hybrid learning. OW Impuls. ISBN 978-83-8095-383-3.

Fontana, J. & Frey H. (2009). *Interview. From neutrality to political involvement*. In N. K. Denzin, Y. S. Lincoln (Eds.), *Metody badan jakościowych*, vol. 2. PWN. ISBN 978-83-01-15879-8.

Hammersley, M. & Atkinson, P. (1995). *Field research methods*. Wyd. Zysk i S-ka. ISBN 83-7150-704-6.

Hashim, H. & Tasir, Z. (2014). *E-Learning Readiness: A Literature Review*. International Conference On Teaching And Learning In Computing And Engineering (Latice), Proceedings Paper, pp. 267–271. E-Learning Readiness: A Literature Review-Web of Science Core Collection (wsb.gda.pl). ISSN 2377-0309.

Hrastinski, S. (2019). *What Do We Mean by Blended Learning?*, TechTrends 63/2019, pp. 564–569. https://doi.org/10.1007/s11528-019-00375-5.

Indellicato, R. (2020). *Human rights and the educational role of technologies during the Covid-19 period*. Journal of Modern Science tom 2/45/2020, p. 74. https://doi.org/10.13166/jms/131238.

Kędzierski, W. (2008). *Determinants of social rehabilitation – selected aspects*. In F. Kozaczuk (Ed.), *Efektywność oddziaływań resocjalizacyjnych [Effectiveness of social rehabilitation interactions]*. Wyd. Uniwersytetu Rzeszowskiego. ISBN: 9788373383395.

Kędzierski, W. (2017). *Dererminants of social rehabilitation carried out in conditions of penitentiary isolation in the context of social readaptation – selected aspects*. In I. Mudrecka (Ed.), *Resocjalizacja, readaptacja i reintegracja społeczna – problemy, programy i perspektywy rozwoju komunikacji [Resocialization, readaptation and social reintegration-problems, programs and prospects for the development of communication]*. Wyd. Pedagogium. Wyższa Szkoła Nauk Społecznych w Warszawie. ISBN: 978-83-62902-22-4.

Konecki, K. (2000). *Studies in qualitative research methodology. Grounded theory.* PWN. ISBN 83-01-13235-3.

Kuźmicz, K. (2015). *E-learning. The culture of studying online.* GWP. ISBN 978-83-7489-610-8.

Lalima, K. L. D. (2017). *Blended Learning: An Innovative Approach*, Universal Journal of Educational Research 5(1): 129–136. Retrieved from http://www.hrpub.org. https://doi.org/10.13189/ujer.2017.050116.

Lofland, J., Snow, D. A., Anderson, L., & Lofland, L. H. (2009). *Analysis of social systems – a methodological guide to qualitative research.* Wydawnictwo Naukowe „Scholar". ISBN: 978-83-7383-399-9.

Machel, H. (2003). *Prison as a penal and social rehabilitation institution.* Wyd. Arche, Gdańsk. ISBN: 83-89356-10-4.

Molga, A. (2015), *E-learning platforms and their importance for the education process.* Dydaktyka Informatyki 10, 133–139. http://dx.doi.org/10.15584/di.2015.10.15.

Monteiro, A., Barros, R., & Leite, C. (2015). *Lifelong learning through e-learning in european prisons: Rethinking digital and social inclusion*, Conference: INTED2015 CONFERENCE PROCEEDINGS, p. 1038–1046, ISBN:978-84-606-5763-7.

Moreira, J. A. & Horta, M. J. (2020). *Educação e Ambientes Híbridos de Aprendizagem. Um Processo de Inovação Sustentada*, Revista UFG, v.20: e66027, pp. 8–9. https://doi.org/10.5216/REVUFG.V20.66027.

Moreira, J. A., Monteiro, A., & Machado, A. (2017). *Adult higher education in a Portuguese prison*. European Journal for Research on the Education and Learning of Adults, Vol. 8, Issue 1, pp. 37–51. ISSN: 2000-7426.

Moreira, J. A., Reis-Monteiro, A., & Machado A. (2017). *Higher Education Distance Learning and e-Learning in Prisons in Portugal.* Comunicar Vol. 25, Issue 51, pp. 39–47. https://doi.org/10.3916/C51-2017-04.

Rui, J. & Moreira, F. (2008). *E-Skills Are Really Critical To E-Learning Success?*, Conference: IADIS International Conference e-Learning, Amsterdam, The Netherlands, July 22–25. Proceedings, pp. 192–199, ISBN: 978-972-8924-58-4.

Sendur, A. & Kościńska, A. (2021). *Online education – theory and practice. A guide for foreign language teachers and more.* Wyd. Oficyna Wydawnicza KAAFM. ISBN 978-83-66007-73-4.

Siemieniecka, D. & Siemieniecki, B. (2019). *The theories of education in digital world.* OW Impuls. ISBN 978-83-80-95-751-0.

Stake, R. E. (2009). *Qualitative case study*. In N. K. Denzin, Y. S. Lincoln (Eds.), *Qualitative research methods*, vol. 1. PWN. ISBN 978-83-01-15877-4.

Strumińska-Kutra, M. & Kołodkiewicz, I. (2012). *Case study.* In D. Jemielniak (Ed.), *Qualitative research. Methods and tools*, vol. 2. Warszawa: PWN. ISBN: 978-83-01-16947-3.

Sztuka, J. (2018). *The perspective of effectiveness in social rehabilitation.* Studia Paedagogica Ignatiana 2018/21/ 1, pp. 85–105.

UNESCO Chair of applied Research for Education in Prison (2022). *Portrait of a Researcher: José António Marques Moreira*. Newsletter, Volume 10, Issue 1, February 2022.

Woźniak, J., Stanek, M., Jurek, M., Wenda, W., & Zaskórski, P. (2020). *How to study online?*, p. 24. Wyd. CeDeWu. ISBN 978-83-8182-446-4.

Daria Becker-Pestka

Portugalski model e-learningu dla osadzonych jako przykład skutecznego zastosowania nowych technologii w edukacji skazanych. Studium przypadku

S t r e s z c z e n i e

Prezentowany artykuł dotyczy wykorzystania e-learningu w kształceniu osadzonych w Portugalii. W obecnych czasach kształcenie e-learningowe staje się istotnym dopełnieniem i często poszerzeniem już istniejącej oferty edukacyjnej. Niestosowanie nowoczesnych technologii w nauczaniu może prowadzić do pogłębienia nierówności cyfrowych, społecznych, edukacyjnych i ekonomicznych. Istnieje duże zagrożenie wykluczeniem cyfrowym niektórych grup społecznych. Jedną z nich stanowią osoby odbywające karę pozbawienia wolności. Dużym problemem w oferowaniu tej grupie edukacji zdalnej są nierówności infrastrukturalne i dostępność sprzętu oraz łączy internetowych. Ważną kwestią jest także bezpieczeństwo z uwagi na specyfikę instytucji penitencjarnej. W Portugalii od wielu lat kładzie się nacisk na kształcenie osadzonych w tym kształcenie zdalne w kontekście całożyciowego uczenia się człowieka. Tworzone są nowoczesne narzędzia wykorzystywane w nauczaniu osadzonych i w procesie ich uczenia się. Działają projekt EPRIS@ oraz Open University. Mogą być one inspiracją dla personelu więziennego innych krajów. Celem artykułu jest pokazanie jakie rozwiązania są wykorzystywane w Portugalii w zakresie e-learningu w pracy z osadzonymi

jako przykład skutecznego wykorzystania nowych technologii w kształceniu osadzonych. Wykorzystana została metoda indywidualnych przypadków. W badaniu posłużono się techniką analizy dokumentów oraz wywiad. Zostały sformułowane następujące problem badawcze: Jakie rozwiązania są wykorzystywane Portugalii w zakresie wykorzystania e-learningu w kształceniu osadzonych i jak przebiega process ich wdrożenia? Jakie są cele realizowanych przedsięwzięć? Jak przebiega proces kształcenia za pomocą stosowanych narzędzi? Jakie zagadnienia są prezentowane skazanym? Jakie są słabe i mocne strony stosowanych rozwiązań? Jak przebiega proces ewaluacji uzyskanych efektów? Na czym polega innowacyjność stosowanych rozwiązań w obszarze wykorzystania e-learningu w kształceniu osadzonych? Do zebrania prezentowanego materiału wykorzystana została analiza treści, danych statystycznych oraz wywiady z osobami pracującymi ze skazanymi. Materiał do tekstu został zebrany w 2022 roku w Institut Piaget i na Open University w Porto w Portugalii.

S ł o w a k l u c z o w e: e-learning, nowe technologie, system penitencjarny, Portugalia, readaptacja osadzonych

Daria Becker-Pestka

Un modelo portugués de e-learning para reclusos como ejemplo de aplicación con éxito de las nuevas tecnologías en la educación de convictos. Un estudio de caso

R e s u m e n

El artículo presentado trata sobre el uso del e-learning en la educación de reclusos en Portugal. Hoy en día, el e-learning se está convirtiendo en un importante complemento y, a menudo, en una ampliación de la oferta educativa ya existente. La no utilización de las tecnologías modernas en la enseñanza puede conducir a una ampliación de las desigualdades digitales, sociales, educativas y económicas. Existe un alto riesgo de exclusión digital de determinados grupos sociales. Uno de ellos son las personas que cumplen condena en prisión. Un problema importante a la hora de ofrecer educación a distancia a este grupo son las desigualdades infraestructurales y la disponibilidad de equipos y conexiones a Internet. La seguridad también es una cuestión importante debido a la naturaleza de la institución penitenciaria. En Portugal, durante muchos años se ha hecho hincapié en la educación de los reclusos, incluida la educación a distancia en el contexto del aprendizaje humano permanente. Se están desarrollando herramientas de última generación para utilizarlas en la enseñanza de los reclusos y en su proceso de aprendizaje. El proyecto EPRIS@ y la Universidad Abierta están en funcionamiento. Pueden servir de inspiración para el personal penitenciario de otros países. El objetivo de este artículo es mostrar qué soluciones se utilizan en Portugal para el e-learning en el trabajo con reclusos como ejemplo del uso efectivo de las nuevas tecnologías en la educación de los reclusos. Se utilizó un método de estudio de casos. En el estudio se utilizó una técnica de análisis de documentos y una entrevista. Se formuló el siguiente problema de investigación: Qué soluciones se están utilizando en Portugal para el uso del e-learning en la educación de reclusos y cómo va el proceso de implantación? ¿Cuáles son los objetivos de los proyectos implementados? ¿Cómo se lleva a cabo el proceso educativo con las herramientas utilizadas? ¿Qué temas se presentan a los presos? ¿Cuáles son los puntos fuertes y débiles de las soluciones utilizadas? ¿Cómo se lleva a cabo el proceso de evaluación de los resultados obtenidos? ¿Cuál es el carácter innovador de las soluciones aplicadas en el ámbito de la utilización del e-learning en la educación de los reclusos? Para recopilar el material presentado se utilizaron análisis de contenido, datos estadísticos y entrevistas con personas que trabajan con reclusos. El material para el texto se recopiló en 2022 en el Instituto Piaget y en la Universidad Abierta de Oporto (Portugal).

P a l a b r a s c l a v e: e-learning, nuevas tecnologías, sistema penitenciario, Portugal, readaptación de reclusos

Daria Becker-Pestka

Португальская модель электронного обучения для заключенных как пример эффективного использования новых технологий в образовании заключенных. Исследование конкретного случая

А н н о т а ц и я

Представленная статья посвящена использованию электронного обучения в процессе обучения заключенных в Португалии. В настоящее время электронное обучение становится важным дополнением, а зачастую и расширением уже существующего образовательного предложения. Неиспользование современных технологий в обучении может привести к усилению цифрового, социального, образовательного и экономического неравенства. Существует высокий риск цифровой изоляции некоторых социальных групп. Одна из них - люди, отбывающие тюремное заключение. Основной проблемой при предоставлении дистанционного образования этой группе является инфраструктурное неравенство, доступность оборудования и интернет-соединения. Безопасность также является важным вопросом в силу характера пенитенциарного учреждения. В Португалии на протяжении многих лет уделяется особое внимание образованию заключенных, в том числе дистанционному, в контексте непрерывного образования человека. Разрабатываются самые современные инструменты для использования в обучении заключенных и в процессе их обучения. Работают проект EPRIS@ и Открытый университет. Они могут стать источником вдохновения для сотрудников тюрем в других странах. Цель данной статьи - показать, какие решения используются в Португалии для электронного обучения в работе с заключенными в качестве примера эффективного использования новых технологий в образовании заключенных. Использовался метод изучения конкретных ситуаций. В исследовании применялись метод анализа документов и интервью. Была сформулирована следующая проблема исследования: Какие решения используются в Португалии для применения электронного обучения в системе образования заключенных и как проходит процесс внедрения? Каковы цели реализуемых проектов? Как осуществляется образовательный процесс с помощью используемых инструментов? Какие вопросы представляются заключенным? Каковы сильные и слабые стороны используемых решений? Как осуществляется процесс оценки полученных результатов? В чем заключается инновационность применяемых решений в области использования электронного обучения в образовании заключенных? Для сбора представленного материала использовались контент-анализ, статистические данные и интервью с людьми, работающими с заключенными. Материал для текста был собран в 2022 году в Институте Пиаже и Открытом университете в Порту, Португалия.

К л ю ч е в ы е с л о в а: электронное обучение, новые технологии, пенитенциарная система, Португалия, реадаптация заключенных

International Journal of Research in E-learning
Vol. 10 (2), 2024, pp. 1–20

DOI 10.31261/IJREL.2024.10.2.09

Ewelina Rzońca
Cardinal Stefan Wyszyński University in Warsaw
https://orcid.org/0000-0002-6434-9207

Tomasz Warchoł
University of Rzeszów
https://orcid.org/0000-0002-7978-8149

Preparing Pedagogy Students for Teaching Programming in Early Childhood Education

Abstract

The article discusses the competencies of modern teachers in utilizing information and communication technologies, particularly in the context of programming. The main objective of the research was to assess the knowledge and skills of future early childhood education teachers in applying this knowledge to practical tasks. The study was conducted among students from two public universities in Poland using a diagnostic survey method, with a questionnaire based on a knowledge test as the research tool. The test design was based on the theoretical assumptions of Niemierko (2009) regarding educational objectives An analysis of the results showed that future early childhood education teachers possess theoretical knowledge of programming. However, only 35% of them were able to explain programming principles in detail. The application of this knowledge in practice was less effective, with success rates of 45% for typical tasks and 47% for problem-solving tasks. These results suggest the need to modify study programs by increasing the number of hours dedicated to programming-related subjects and placing greater emphasis on solving programming tasks through practical experience. Based on the conducted research and observations, the authors propose increasing the number of hours dedicated to programming-related topics. This approach would allow students not only to acquire theoretical knowledge but also to effectively apply it to practical tasks. After all, future teachers will be responsible for introducing students

in grades 1–3 to the world of programming and developing their computational thinking. Another important aspect is ensuring a teacher education and training system that enables teachers to develop and deepen their digital competencies in programming. New technological solutions emerge rapidly, and teachers should keep up with them to adequately prepare students for future challenges and foster skills such as problem-solving and logical thinking. The authors also suggest that further research is needed on various components of digital competencies to help future teachers adapt pedagogical programs to the realities of the modern world and equip them with the necessary knowledge and skills.

K e y w o r d s: competencies, early childhood education, higher education, programming teacher

Basic Research

The ongoing digitalization and development of artificial intelligence require advanced technological and IT skills. These competencies are crucial for receiving, creating, and utilizing information in everyday life. Generation Alpha students develop these skills at school with the help of teachers, who should also possess such competencies. However, research indicates that educators still prefer traditional pedagogical methods over integrative technology. It is important to note that studies confirm the effectiveness of using modern technologies in teaching (Adebanjo & Rasheed, 2021; Konca & Erden, 2021) and learning processes (Bitante et al., 2017).

Mikulski (2017, p. 280) emphasizes that programming skills are only a part of the broader digital and media competencies. The ubiquity of communication technologies means that the quality of life in modern society increasingly depends on the ability to understand and use information conveyed through the media. Programming should be understood not only as building algorithms but also as exercises that foster computational thinking, which is based on problem-solving using digital tools. This is a key skill for individuals of all ages as its absence can lead to media illiteracy (Rzońca & Warchoł, 2023).

To prepare students for programming, early childhood education teachers must possess the appropriate competencies. Research findings indicate that teachers still combine modern technologies with traditional resources (Peirats et al., 2018), often without fully realizing their value for professional development (Jack & Higgins, 2019). Therefore, it is important to emphasize the significant role of teachers in creating a learning environment that integrates information and communication technologies. When working with digital resources, teachers act as

designers, deciding whether to create their own materials and how to adapt them to their students' needs (Gallardo et al., 2019). Thus, their media competencies and willingness to expand knowledge in this area, as well as incorporating technology into the teaching process, are crucial.

Hayak & Avidov-Ungar (2020), based on their research, discovered a relationship between a teacher's career stage and their attitude toward technology integration. Meanwhile, Alieto (2024) argues that the use of technology correlates with teachers' technological competencies and access to devices. Based on research conducted by Adebanjo & Rasheed (2021), it is recommended to organize training programs on the latest technologies for early childhood education teachers.

Programming has become a fundamental skill for teachers in the modern educational environment. It not only enriches teaching practices but also equips students with key skills essential for success in a technology-driven world. By engaging in programming education, teachers can nurture a generation of students who are not only proficient in coding but also capable of problem-solving and analytical thinking – skills that are becoming increasingly important in the 21st century.

An example of such an initiative is the program in Latvia titled "Fundamentals of Programming in a Visual Programming Environment Using Scratch," aimed at enhancing teachers' professional competencies. The program's results indicated that teachers positively evaluated the area related to learning programming. According to the surveyed teachers, the program significantly improved their knowledge of programming as well as their overall digital competencies (Medveckis, Pigozneb & Tomsons, 2021).

This article focuses on assessing teachers' preparedness in terms of their knowledge and skills in programming, which serves as a modern foundation for the further learning of preschool and early childhood education students.

Teachers' Technological and Information Competencies

Teacher competencies in the context of programming education, as indicated by Jolanta Szempruch (2013), are primarily: interpretative-communicative, creative-critical, cooperative, pragmatic, and information-media competencies.. In the context of research on the preparation for teaching programming in grades 1–3, media competencies are particularly significant. Their importance was highlighted during remote education due to the COVID-19 pandemic. Therefore, students in pedagogical fields should be prepared to use media, including programming. However, it is crucial to emphasize that due to the rapidly evolving technological

landscape, digital skills must be continuously developed throughout a teacher's professional career.

Competencies can be defined as broad attributes related to the ability to use knowledge, social skills, and/or methodological approaches in professional or educational settings, as well as in personal and professional development (EU Science Hub). It is important to remember that individuals acquire competencies through learning, meaning they can be developed, updated, and evaluated by others through observation.

Focusing on teachers' competencies, the literature on the subject defines them as "a cognitive structure composed of knowledge, skills, personality traits, and values that characterize a teacher in performing professional tasks, manifest in specific behaviors, are subject to development, and are measurable" (Szempruch, 2013, p. 103). Thus, competency, as a human attribute, consists of several elements. From this definition, we can conclude that it includes knowledge, skills, personality traits, and values. Figure 1 illustrates the components of competencies, emphasizing the complexity of this individual disposition.

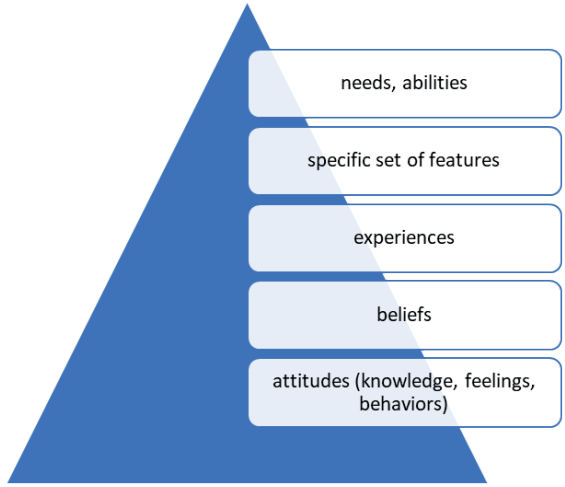


Figure 1. Components of Competencies

S o u r c e: Own elaboration based on Popławska, 2016.

Teachers' competencies are multifaceted and encompass not only subject-specific, didactic, psychological, and organizational skills but also leadership and mentoring abilities. A modern teacher must be not only an expert in their field but also an effective leader, mentor, and organizer of the educational process. The development of these competencies is crucial for ensuring high-quality teaching and supporting students on their path to academic success.

In the context of teacher competencies, it can be stated that teacher education programs form the foundation for acquiring these skills, followed by a lifelong learning process.

The authors of this article focused on the preparation of teachers for teaching programming at two public universities. Given the structure of the research process, it is necessary to specify the course names taught at these universities, where information and technology competencies are particularly emphasized.

At the University of Warsaw, these courses include:

- Fundamentals of Computer Education (30 hours)
- Methodology of Computer Education and the Use of Information and Communication Technologies (45 hours)
- Fundamentals of Programming and Media Education (45 hours)

At the University of Rzeszów, the relevant courses include:

- Media Education with Elements of Programming (30 hours)
- Computer Science (45 hours)
- Methodology of Computer Education and the Use of Information and Communication Technologies (30 hours)

These data come from the curriculum for students who began their studies in the 2019/2020 academic year as this group participated in the research conducted by the authors.

It is also important to recognize that the use of new technologies should be integrated into other courses so that future teachers can effectively utilize new media in their work, not just during computer science classes.

Programming is an essential component of digital competencies, which is reflected in the course titles. Therefore, it is crucial to equip future early childhood educators with the knowledge and skills needed for programming as they will be responsible for teaching these concepts in alignment with curriculum guidelines.

Analysis of the Curriculum in the Field of Programming in Early Childhood Education

The new curriculum, introduced in Poland in September 2017, placed a significant emphasis on teaching computer science in primary schools, as well as on the essential development of basic programming skills in early education. In early childhood education, computer education focuses on understanding, analyzing, and solving problems, programming, using computers and other digital devices to solve problems, as well as computer networks (Regulation of the Minister of National Education, 2017, p. 44).

Preparing students for programming in early education can be achieved through logical sequencing of images, texts, and instructions that include everyday activities, creating instructions or sequences of instructions for specific action plans leading to goal achievement, solving tasks, puzzles, and riddles that lead to discovering algorithms (Regulation of the Minister of National Education, 2017; Przytomska-Pietrzak, 2017). Various tools are used for such activities, including direct block programming or educational games that introduce fundamental programming concepts.

In this context, different lesson scenarios are implemented in various environments, requiring students to apply the knowledge they have acquired. The result is the development of competencies related to problem formulation and resolution, as well as the acquisition of independent thinking skills. Lessons in such formats allow students to actively explore their surrounding reality while fulfilling educational functions. Students become active researchers and discoverers, conducting analyses, generating various concepts, verifying their correctness, moving to the implementation stage, developing solutions, and drawing conclusions from this process (Nowak-Łojewska, 2015, p. 45).

Activating programming competencies through practical activities is considered one of the most effective approaches to the learning process, and its effectiveness is high (Educational Research Institute, 2013, p. 55). At the early education level, students develop their programming skills using digital devices, where they visually program simple situations or stories according to their own ideas and concepts developed in collaboration with other students. They program both individual commands and their sequences, controlling an object on a computer screen or another digital device (Regulation of the Minister of National Education, 2017, p. 44).

The activities undertaken by students in early childhood education aim to prepare them for creating programmable structures designed according to strictly defined rules and principles. According to the curriculum, by the end of early childhood education, students should be able to create commands or sequences of commands for a specific action plan leading to goal achievement, solve tasks, puzzles, and riddles that lead to discovering problem-solving methods, thereby creating simple algorithms (Morańska, 2018, pp. 39–40).

Methodology

Based on a review of the literature in this field and the authors' own observations, the following research questions were formulated:

RQ1: Does the place of study differentiate the theoretical knowledge about programming possessed by future teachers?

RQ2: Does the place of study differentiate pedagogy students' understanding of the acquired theoretical knowledge in programming?

RQ3: Does the place of study differentiate students' skills in applying acquired knowledge to typical programming tasks – both standard and non-standard?

In the process of designing the research methodology, the following research hypotheses were formulated:

H1: Students studying in two different cities possess equal knowledge of programming.

H2: Students studying in two different cities show slight differences in their understanding of the acquired knowledge.

H3: The place of study differentiates students' skills in applying acquired knowledge to typical programming tasks – both standard and non-standard.

The research at both universities followed a similar research procedure, which involved assessing students' knowledge and skills in programming. The study was conducted using the Computer Assisted Personal Interview (CAPI) technique (Boguszewski & Hipsza, 2012, pp. 65–82).

Questionnaire, Research Objective, and Research Questions

The subject of the authors' research was the level of programming knowledge and skills among pedagogy students.

The cognitive objective was to determine the state of knowledge and the ability to apply it in practical programming tasks among students of preschool and early childhood education programs.

The practical objective was to develop guidelines for the education of future teachers in preparation for teaching programming.

The main research problem is expressed in the following question:

What is the level of knowledge and skills of pedagogy students needed to prepare students in grades 1–3 for learning programming?

The study used the diagnostic survey method within which a questionnaire was developed in the form of a knowledge and skills test. The tool was designed based on the theoretical assumptions of Niemierko's ABC Taxonomy Model of Domain B. All educational content presented in the test was structured to meet the requirements of the spiral model of education (Walat, 2010; Walat, 2017). The test consisted of 20 questions, divided into two categories, one focusing on memorized knowledge and understanding, and the other on the ability to apply knowledge to

typical tasks and problem-solving. Each completed task was awarded 1 point, with a maximum possible score of 20 points.

The next step in the research procedure was sampling selection. A purposeful sampling method was used. Fourth-year master's degree students in preschool and early childhood education were selected. The respondents were informed about the research objectives and provided their informed consent to participate. The study was conducted as part of media competence development courses at two universities in Poland, in Warsaw and Rzeszów. Both universities have similar educational goals in training students for preschool and early childhood education and allocate a similar number of hours to technology and IT-related subjects during their studies.

The research sample consisted of 150 students, including both full-time and part-time students. Students from Rzeszów (UR – University of Rzeszów) accounted for 65% of the sample, while those studying in Warsaw (UKSW – Cardinal Stefan Wyszyński University in Warsaw)accounted for 35%. It is also worth noting that almost the entire research group consisted of women (99%), which reflects the feminization of the early childhood education teaching profession in Poland. Regarding place of residence, more than half of the participants lived in cities, while the remaining part resided in rural areas (Boguszewski & Hipsza, 2012, pp. 65–82).

Results and Statistical Tests

The first part of the research analysis focused on the level of knowledge retention among pedagogy students in the field of programming. This aspect of programming knowledge is crucial as it determines the effectiveness of its application in practice at higher levels.

The initial scope of the study concentrated on students' retained theoretical knowledge of programming and their understanding of it. In this section, students were required to select correct answers to the following questions:
Statement 1: What is the name of the application that allows learning programming in early childhood education?
Statement 2: What is an algorithm?
Statement 3: Loops in programming are…
Statement 4: Programming develops…
Statement Question 5: What is a variable?

Figure 2 presents the data obtained from the knowledge test, displayed in the format of the percentage share of correct answers provided by the students.

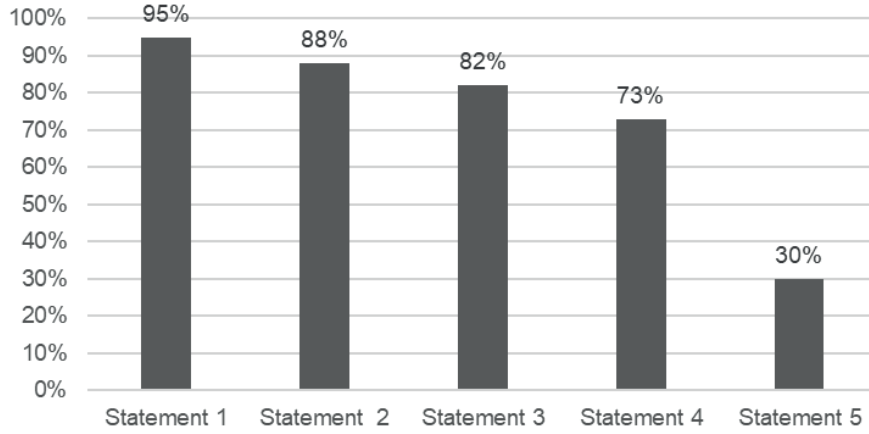
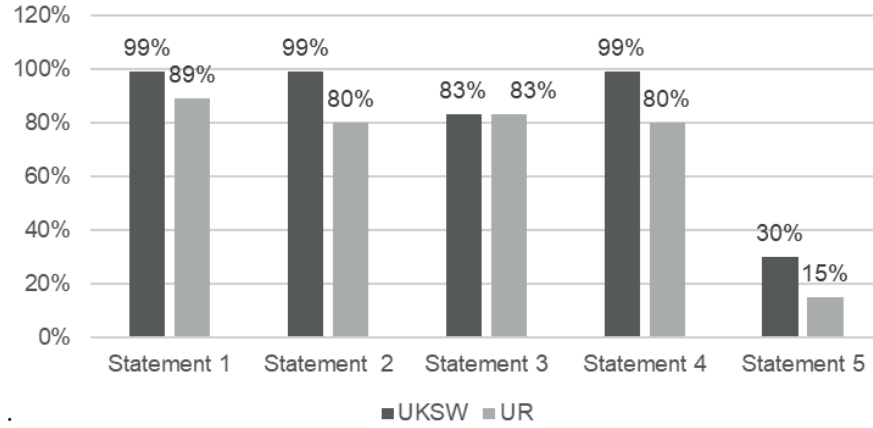


Figure 2. Percentage Share of Correct Answers in the Area of Programming Knowledge Among Future Teachers

S o u r c e: Own work.

The presented data indicate that students possess theoretical knowledge in the field of programming as the average percentage of correct answers in this area is 73%. Students do not encounter difficulties with basic definitions such as "algorithm" and "programming," but they struggle with more specialized terms such as "loop" and "variable." This may suggest that programming education at universities covers a broad range of topics but lacks depth (Tuczyński, 2021, pp. 54–65).

A comparison of correct answers divided by the two universities is presented in Figure 3.



.

Figure 3. Comparison of the Percentage of Correct Answers in the Area of Programming Knowledge Among Future Teachers

S o u r c e: Own Work.

UKSW students achieved very high scores (99%) on most questions, which may indicate their high level of knowledge retention. UR students obtained slightly lower scores (80–89%), suggesting some difficulties in memorizing information compared to UKSW. The largest difference (19 percentage points) in favor of UKSW was observed in questions 2 and 4. The only case where both universities had the same result (83%) was the question about loops in programming.

Based on the obtained data, it can be concluded that hypothesis H1, proposed in the study, has been confirmed. This means that students studying in two different cities possess basic theoretical knowledge of programming, with better results observed among those studying in Warsaw.

The Second Part of the Research Analysis Focused on the Understanding of Programming by Pedagogy Students

The next part of the test focused on understanding programming concepts, which involved correctly interpreting and comprehending the definitions from the previous tasks. In this section, students had to choose the correct answer to the following five statements:

Statement 6: A loop always…

Statement 7: Scratch is an example of a programming language…

Statement 8: The methods of presenting algorithms used in working with children are…

Statement 9: Name some groups of blocks used to create scripts in the Scratch environment.

Statement 10: Scratch can be used for programming…

The results obtained in the study were once again presented as the percentage of correct answers given by students, as illustrated in Figure 4.

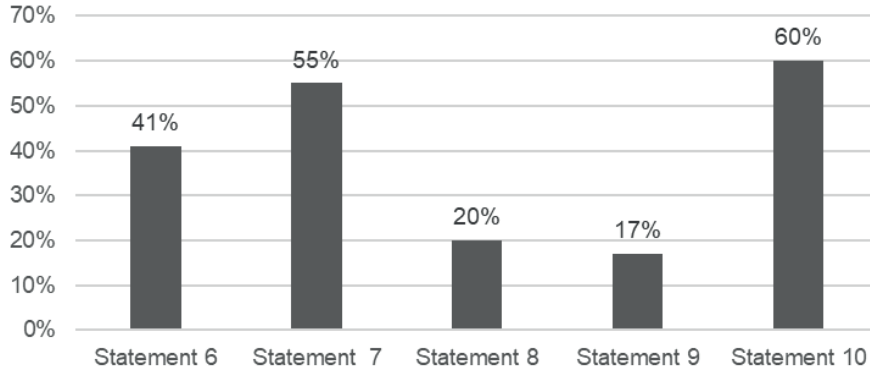


Figure 4. Percentage of correct answers in understanding programming knowledge among early childhood education students

S o u r c e: Own work.

Based on the research results, it can be concluded that the most challenging questions for students were those numbered 8 and 9. They required students to demonstrate substantive knowledge about programming methods and the classification of presented programming blocks. A significant portion of the study participants seemed to struggle with them. This may be due to the curriculum focusing more on teaching methods rather than deepening programming knowledge, possibly because of the limited number of hours allocated to subjects strictly related to programming. It appears that modern early childhood education curricula should be more closely aligned with the current educational framework, which precisely defines the directions of educational transformations at the primary education level (Borgensztajn et al., 2018). In the next stage, the responses of students from the two universities participating in the study were analyzed and presented in Figure 5.

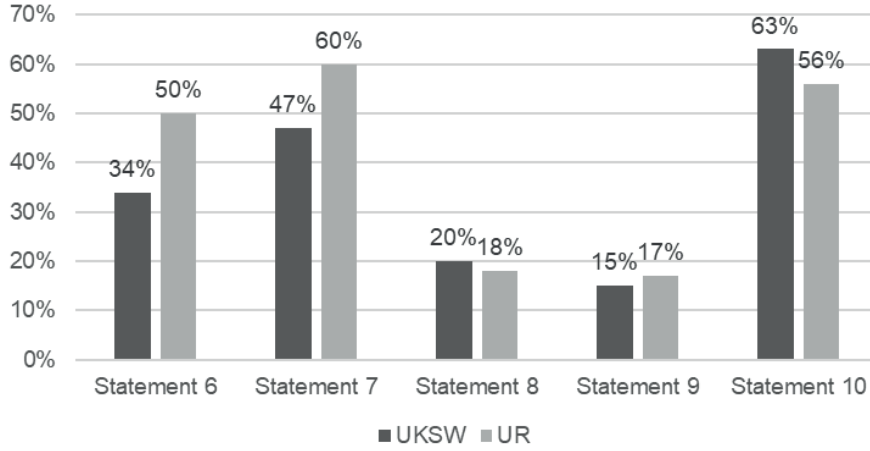


Figure 5. Comparison of the Percentage of Correct Answers in the Area of Programming Knowledge Among Future Teachers

Source: Own Work.

UR students achieved better results in statements 6 and 7, which may suggest that they have a better understanding of the topics covered there. In statements 8 and 9, the results of both universities are similar, indicating a comparable level of understanding in these areas. In statement 10, UKSW students performed better (by 7 percentage points), which may indicate that they have better assimilated the knowledge related to this topic. The largest difference (16 percentage points) in favor of UR appears in the area related to the definition of loops.

Based on the obtained data, the average score in this research area was 35%. These results can be interpreted as low and therefore insufficient for further application in practical tasks or professional work.

Hypothesis H2 has been confirmed as slight differences in the understanding of programming concepts are noticeable. The average score, in turn, indicates that

students are familiar with the theoretical foundations of programming, although they struggle with understanding certain issues, such as methods of presenting algorithms used in working with children and the classification of blocks in the Scratch environment.

Analysis of Research Results on the Application of Knowledge by Future Teachers in Typical and Problem-Solving Programming Tasks

The next part of the test focused on the skills of future teachers, specifically on applying acquired knowledge to typical tasks commonly performed in computer science lessons. These tasks may involve various conditions, logical diagram structures, interpreting program modules based on given input data, etc. For this area, five additional questions were prepared, covering the following topics:
Question 11: How many times will the loop be executed in the given diagram?
Statement 12: Based on the diagram, propose what needs to be done to display the screen shown in Scratch.
Statement 13: Based on the given diagram, determine which field the ghost marked "X" will be on when executing the presented commands.
Statement 14: Based on the given suggestions, determine the correct program code for coding on the mat.
Statement 15: Based on the presented diagram, determine what the ghost will do when it detects color.

The results obtained in the study are once again presented as the percentage of correct answers given by students in Figure 6.

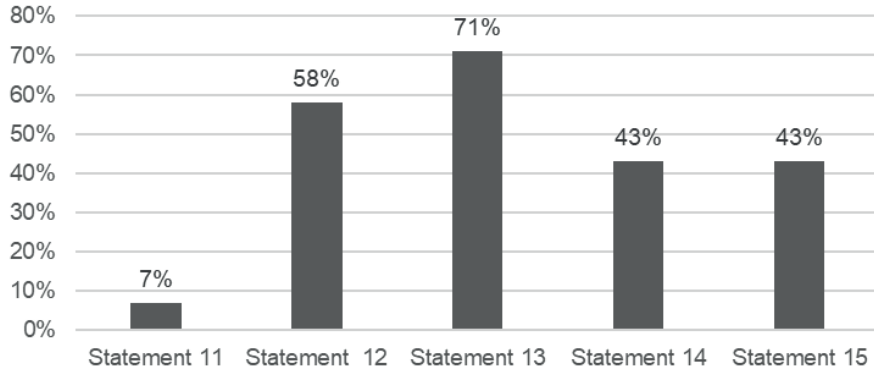


Figure 6. Percentage of correct answers regarding the application of programming knowledge by early childhood education pedagogy students in typical programming tasks

S o u r c e: Own work.

The average score for this area is 45%, which is close to 50%, indicating that approximately every second pedagogy student is able to handle tasks related to

applying knowledge in typical scenarios. An exception in this area is question 11, where students had difficulty correctly calculating the number of loop iterations. Further analysis of this question reveals that most students miscalculated by one iteration. This may be due to a misinterpretation of the diagram, inaccuracies in calculations, or difficulty in understanding how the loop functions.

A comparison of student responses from both universities is presented in Figure 7.

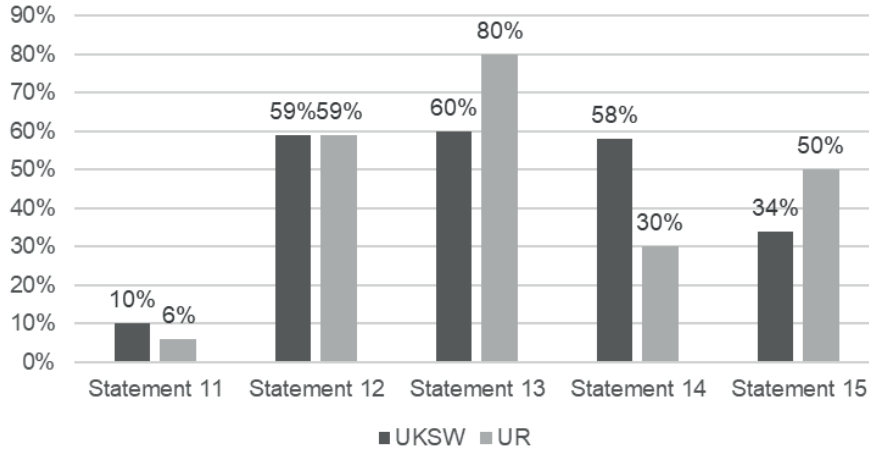


Figure 7. Comparison of the percentage of correct answers in the field of programming knowledge among future teachers

S o u r c e: Own work.

The analysis of collected data indicates that students from UKSW achieved better results in question 11 and statement14. Particularly, in the question regarding coding on a mat, the difference is significant (28 percentage points). In statements 13 and 15, UR students performed better, with the largest difference (20 percentage points) observed in identifying the field where the ghost will be after executing the given commands. It is worth noting that in statement 12, the results for both universities are identical (59%), suggesting a similar level of skills in working with the Scratch environment.

The final area of research focuses on students' ability to handle problem-solving situations, find the correct solution path for a given problem, and identify alternative ways to eliminate errors and other associations.

Once again, five statements were presented in this area:

Statement 16: Based on the diagram, determine what needs to be changed in the given program code so that the cat (ghost) can draw triangles.

Statement 17: Based on the provided code, decide what will happen if the ball touches the ballerina.

Statement 18: Analyze the given diagram and propose the role that the presented program code might play in any Scratch game.
Statement 19: Based on the provided diagram, deduce why the ghost has zero points.
Statement 20: Check the correctness of the code shown in the diagram, considering that the ghost's task is to detect red and green colors.

The results for this research area are presented in Figure 8, where the data is shown as the percentage of correct answers provided by students.

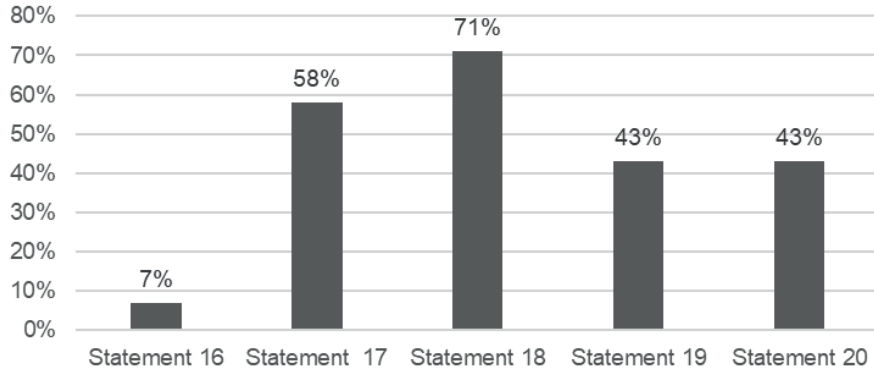


Figure 8. Percentage of Correct Answers by Pedagogy Students in Applying Programming Knowledge to Problem-Solving Tasks

S o u r c e: Own Work.

Based on the obtained data, it should be noted that only Statement 16 received a lower percentage of correct answers than the average score of 47%. This may be related to the previous conclusion regarding the application of knowledge in typical tasks, as this question also focused on the use of loops.

Statement 17, in which students demonstrated both knowledge of sensor blocks and the correct interpretation of blocks related to character control in a game, yielded results above the average.

A division of responses regarding the use of knowledge in problem-solving tasks, taking into account the place of study, is presented in Figure 9.

The obtained results indicate that UKSW students performed better in four out of five statements (16, 17, 18, and 20), with the most significant differences observed in Statement 20 (40 pp.) and Statement 16 (25 pp.). This may suggest that UKSW students are better prepared to tackle more complex practical problems.

On the other hand, UR students performed better in only one question (Statement 19), where they outscored UKSW students by 16 percentage points. The most balanced results were in Statement 18, where the difference was just 5 pp.

Therefore, based on the data on problem-solving skills in both standard and non-standard tasks, the H3 hypothesis was partially confirmed. Specifically, students studying in Warsaw performed better in problem-solving tasks. However, in

typical tasks, it is difficult to determine whether the place of study significantly influences problem-solving abilities, as in one question, both groups achieved identical results. Additionally, each university's students excelled in two separate areas.

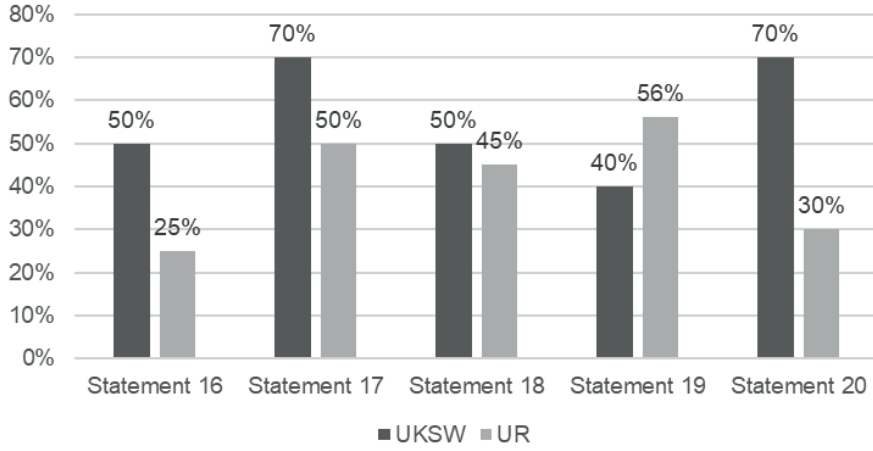


Figure 9. Percentage Comparison of Correct Answers Among Pedagogy Students in Applying Programming Knowledge to Problem-Solving Tasks

S o u r c e: Own Work.

Discussion

Programming is a part of everyone's life, and its elements such as coding are introduced as early as preschool age. In early childhood education, according to the curriculum, teachers are required to conduct programming classes as part of computer education. As a result, it has become essential to prepare teachers for this task, initially during their pedagogical studies and later through professional development programs.

Future teachers demonstrated theoretical knowledge of programming but encountered difficulties with more specialized topics. It is worth noting that one in two students is capable of applying their acquired knowledge in practice and correctly solving both typical and non-typical programming tasks.

Based on the presented research, it can be concluded that students are prepared in terms of knowledge and skills to teach programming in grades 1–3. Hypotheses 1 and 2 were fully confirmed, while hypothesis 3 was partially confirmed. This indicates differences based on the place of study, which may be due to variations in the number of hours allocated to programming-related topics at the two universities.

However, it is clear that more effort should be made to improve students' understanding of programming methods and the classification of programming blocks. Greater emphasis should be placed on applying acquired knowledge rather than just memorizing it.

Recommendations and Further Research

Based on the conducted research and observations, the authors propose increasing the number of hours dedicated to programming-related topics. This would allow students to better understand the acquired knowledge and apply it more effectively in practical tasks. Ultimately, future teachers are responsible for introducing students in grades 1–3 to programming and fostering their computational thinking skills.

It is also crucial to establish a system of education and training for teachers, enabling them to develop and deepen their digital competencies in programming. As new technological solutions continue to emerge, educators must stay up to date to prepare students for future challenges and help them develop fundamental skills such as problem-solving and logical thinking.

Further research should be conducted on various components of digital competencies for future teachers. This would allow for the adaptation of the teacher training curriculum and ensure that educators are equipped with the necessary knowledge and skills to effectively teach programming in early childhood education.

References

Adebanjo, A.A. & Rasheed, ST (2021). Usage of information and communication technology in early childhood in Ijebu North, Ogun State, Nigeria. Journal of Co-Operative and Business Studies, 6(2). https://journals.mocu.ac.tz/index.php/jcbs/article/view/31

Alieto, E., Abequibel-Encarnacion, B., Estigoy, E., Balasa, K., Eijansantos, A., & Torres-Toukoumidis, A. (2024). Teaching inside a digital classroom: A quantitative analysis of attitude, technological competence and access among teachers across subject disciplines. *Heliyon*, 10, 2. https://doi.org/10.1016/j.heliyon.2024.e24282

Bitante, A.P., Faria A.C., Gaspar M.A., Gaspar, M.A., Iglesias Pascual, J.A., Donaire D. (2017). Impactos da tecnologia da informação na aprendizagem dos alunos em escolas públicas de São Caetano do Sul (SP). *Hologram,* 32. https://doi.org/10.3895/rts.v12n25.3824

Bizon, W. (2019). *Wiedza i jej transfer z perspektywy współczesnej ekonomii* [*Knowledge and its transfer from the perspective of contemporary economics*]. Gdańsk: Wydawnictwo Uniwersytetu Gdańskiego. ISBN 978-83-7865-759-0

Borgensztajn, J., Karczewska-Gzik, A., Milewska, M., Witkowska, E., & Brewczyńska, M. (2018). *Wytyczne wraz z załącznikiem do tworzenia programów nauczania i scenariuszy lekcji* [*Guidelines with an attachment for creating curricula and lesson plans*]. Centrum Rozwoju Edukacyjnego. Pobrane 20 lutego 2024 z: https://doi.org/10.21831/jitp.v1li1.67300

Gallardo, IM, San Nicolás, M.B., Rdzenie, A. (2019). Visiones del profesorado de primaria sobre materiales didácticos digitales. *Campus Virtuales,* 8. ISSN 2255-1514

Hayak, M., Awidow-Ungar, O. (2020). The Integration of Digital Game-Based Learning into the Instruction: Teachers' Perceptions at Different Career Stages. *TechTrends*, 64. https://doi.org/10.1007/s11528-020-00503-6

EU scientific center defining the concepts of "skills" and "competences". Retrieved at 23 December 2024: https://ore.edu.pl/wp-content/plugins/download-attachments/includes/download.php?id=34568

IBE. (2013) *Najlepsze praktyki w pozaformalnej edukacji naukowej: badanie zajęć z nauk przyrodniczych* [*Best practices in non-formal science education: a study of natural science activities*]. Instytut Badań Edukacyjnych. ISBN 978-83-65115-88-1

Jack, C., Higgins, S. (2019). What is educational technology and how is it used to support teaching and learning in early childhood? Int. *J. Wczesne lata edukacji*, 27. https://doi.org/10.1080/09669760.2018.1504754

Konca, A.S. & Erden, F. T. (2021). Digital Technology (DT) Usage of Preschool Teachers in Early Childhood Classrooms, *Journal of Education and Future*, 19. https://doi.org/10.30786/jef.627809

Medveckis, A., Pigozneb, T. i Tomsons, D. (2021). Enhancement of Educators' Digital Competences in the Acquisition Programming Fundamentals in Programming Environment Scratch. *World Journal on Educational Technology: Current Issues*, 13(4). https://doi.org/10.18844/wjet.v13i4.6276

Mikulski, K. (2017). Nauka programowania jako nowe wyzwanie (zadanie) edukacji [*Learning programming as a new challenge (task) for education*]. *Edukacja –Rodzina – Społeczeństwo*, 2. ISSN: 2450-9760

Morańska, D. (2018). Nauczanie programowania w edukacji wczesnoszkolnej – rozwijanie myślenia komputacyjnego. Dylematy i problemy [*Teaching programming in early childhood education – developing computational thinking. Dilemmas and challenges*]. *Edukacja-Technologia-Informatyka*, 9(4). https://doi.org/10.15584/eti.2018.4.3

Niemierko, B. (2009) *Diagnostyka edukacyjna. Podręcznik akademicki* [*Educational Diagnostics. Academic textbook*]. Warszawa: Wydawnictwo Naukowe PWN. ISBN 978-83-01-17717-1

Nowak-Łojewska, A. (2015). *Wybrane obszary edukacji matematycznej dzieci: Poradnik dla nauczycieli klas I–III* [*Selected areas of mathematical education for children: A guide for teachers of grades I–III*]. Wydawnictwo ORE. Retrieved at 20 February 2024: https://ore.edu.pl/wp-content/uploads/phocadownload/EFS/Wybrane-obszary-edukacji-matemacznej-dzieci_ANowak-Lojewska.pdf

Peirats, J., Gabaldón, D. i Marín, D. (2018). Percepciones sobre materiales didácticos y la formación en competencia digital. *Primavera*, 20. https://doi.org/10.7203/attic.20.12122

Popławska, A. (2016). Kompetencje nauczyciela w zmieniającej się szkole (wybrane zagadnienia) [*Teacher competencies in a changing school (selected issues)*]. *Zagadnienia społeczne*, 2(6). ISSN 2353-7426

Przytomska-Pietrzak, A. (2017). Czas zacząć programować! [*It's time to start programming!*]. *Biuletyn Nauczycieli Bibliotekarzy*, 6, 64–72. ISSN 2300-5955

Rozporządzenie Ministra Edukacji Narodowej z dnia 14 lutego 2017 r. w sprawie podstawy programowej wychowania przedszkolnego oraz podstawy programowej kształcenia ogólnego w szkole podstawowej (…) [Regulation of the Minister of National Education of February 14, 2017, on the core curriculum for preschool education and the core curriculum for general

education in primary schools (...)], Dz. U. z 2017 r. poz. 356. Retrieved at 20 February 2024: https://isap.sejm.gov.pl/isap.nsf/download.xsp/WDU20170000356/O/D20170356.pdf

Rzońca, E., Warchoł, T. (2023). Od kodowania na dywanie po Scratch – rozwijanie wizualnych umiejętności językowych u dzieci w wieku przedszkolnym i wczesnoszkolnym [*From coding on the carpet to Scratch – developing visual language skills in preschool and early school-age children*]. *Kultura – Przemiany – Edukacja*, 12. https://doi.org/10.15584/kpe.2023.12.12

Szempruch, J. (2013). *Pedagogika. Studium teoretyczno-praktyczne* [*Pedagogy. A theoretical and practical study*]. Kraków: Wydawnictwo „Impuls". ISBN 978-83-7587-906-3

Tuczyński, K. (2021). *Postawy nauczycieli akademickich wobec e-learningu w szkolnictwie wyższym* [*Attitudes of academic teachers towards e-learning in higher education*]. Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego. ISBN 978-83-7996-958-6

Uluyol, Ç., Şahin, S. (2014). Elementary school teachers' ICT use in the classroom and their motivators for using ICT. *British Journal of Educational Technology*, 47, p. 65–75. https://doi.org/10.1111/bjet.12220

Walat, W. (2010). Poszukiwanie nowego modelu edukacji opartego na ideach kognitywizmu i konstruktywizmu [Seeking a new model of education based on the ideas of cognitivism and constructivism]. *Edukacja – Technologia – Informatyka*, 1/2. https://doi.org/2080-9069

Walat, W. (2017). Założenia modelu edukacji opartego na ideach kognitywizmu i konstruktywizmu [*Assumptions of an educational model based on the ideas of cognitivism and constructivism*]. *Lubelski Rocznik Pedagogiczny*, 36(4). http://dx.doi.org/10.17951/lrp.2017.36.4.109

Ewelina Rzońca, Tomasz Warchoł

Przygotowanie uczniów do nauczania programowania w edukacji wczesnoszkolnej

Streszczenie

Artykuł omawia kompetencje współczesnych nauczycieli w zakresie wykorzystania technologii informacyjno-komunikacyjnych, szczególnie w kontekście programowania. Głównym celem badań było ocenienie wiedzy i umiejętności przyszłych nauczycieli edukacji wczesnoszkolnej w zakresie stosowania tej wiedzy w praktyce. Badania przeprowadzono w grupie studentów dwóch uczelni publicznych w Polsce, wykorzystując metodę sondażu diagnostycznego, a narzędziem badawczym była ankieta oparta na teście wiedzy. Konstrukcja testu została oparta na założeniach teoretycznych B. Niemierki, dotyczących celów nauczania.

Analiza wyników wykazała, że przyszli nauczyciele edukacji wczesnoszkolnej posiadają wiedzę teoretyczną z zakresu programowania, jednak tylko 35% z nich potrafiło dokładnie wyjaśnić zasady programowania. Zastosowanie tej wiedzy w praktyce okazało się mniej efektywne, z wynikami na poziomie 45% dla zadań typowych i 47% dla zadań związanych z rozwiązywaniem problemów. Te wyniki sugerują konieczność modyfikacji programów studiów, aby zwiększyć liczbę godzin poświęconych przedmiotom związanym z programowaniem oraz większy nacisk na rozwiązywanie zadań programistycznych poprzez doświadczenie praktyczne.

Na podstawie przeprowadzonych badań oraz obserwacji, autorzy proponują zwiększenie liczby godzin poświęconych tematom bezpośrednio związanym z programowaniem. W ten sposób studenci będą mieli możliwość nie tylko przyswajać teoretyczną wiedzę, ale również skutecznie ją stosować w praktycznych zadaniach. W końcu to właśnie przyszli nauczyciele będą odpowiedzialni za wprowadzenie uczniów klas 1–3 w świat programowania oraz rozwijanie ich myślenia obliczeniowego.

Ważnym elementem jest także zapewnienie systemu kształcenia i szkoleń dla nauczycieli, który umożliwi im rozwój i pogłębianie kompetencji cyfrowych w zakresie programowania. Nowe rozwiązania technologiczne pojawiają się w szybkim tempie, a nauczyciele powinni nadążać za nimi, aby odpowiednio przygotować uczniów do przyszłych wyzwań i rozwijać u nich umiejętności takie, jak rozwiązywanie problemów i myślenie logiczne.

Autorzy sugerują również, że konieczne są dalsze badania nad poszczególnymi komponentami kompetencji cyfrowych przyszłych nauczycieli, aby dostosować programy pedagogiczne do realiów współczesnego świata i wyposażyć je w niezbędną wiedzę oraz umiejętności.

S ł o w a k l u c z o w e: kompetencje, wczesna edukacja dzieci uczenie się na poziomie edukacji wyższej, nauczanie programowania

Ewelina Rzońca, Tomasz Warchoł

Preparación de los estudiantes de pedagogía para enseñar programación en la educación infantil temprana

R e s u m e n

El artículo discute las competencias de los docentes contemporáneos en el uso de las tecnologías de la información y la comunicación, particularmente en el contexto de la programación. El objetivo principal de la investigación fue evaluar los conocimientos y habilidades de los futuros maestros de educación infantil en la aplicación de estos conocimientos en tareas prácticas. La investigación se llevó a cabo entre estudiantes de dos universidades públicas en Polonia, utilizando el método de encuesta diagnóstica, y la herramienta de investigación fue un cuestionario basado en una prueba de conocimientos. El diseño de la prueba se basó en las suposiciones teóricas de B. Niemierka sobre los objetivos de la enseñanza.

El análisis de los resultados reveló que los futuros maestros de educación infantil poseen conocimientos teóricos en programación. Sin embargo, solo el 35% de ellos füe capaz de explicar detalladamente los principios de la programación. La aplicación de estos conocimientos en la práctica resultó ser menos eficaz, con un 45% de aciertos en tareas típicas y un 47% en tareas relacionadas con la resolución de problemas. Estos resultados sugieren la necesidad de modificar los programas de estudio para aumentar el número de horas dedicadas a asignaturas relacionadas con la programación y poner más énfasis en la resolución de tareas de programación mediante la experiencia práctica.

Con base en la investigación realizada y las observaciones, los autores proponen aumentar el número de horas dedicadas a los temas directamente relacionados con la programación. De este modo, los estudiantes tendrán la oportunidad no solo de adquirir conocimientos teóricos, sino también de aplicarlos eficazmente en tareas prácticas. Al fin y al cabo, serán los futuros maestros los responsables de introducir a los alumnos de los grados l–3 al mundo de la programación y de desarrollar su pensamiento computacional.

Un aspecto importante es también garantizar un sistema de educación y formación para los maestros que les permita desarrollar y profundizar sus competencias digitales en programación. Las nuevas soluciones tecnológicas están surgiendo rápidamente, y los maestros deben mantenerse al día con ellas para preparar adecuadamente a los estudiantes para los desafíos futuros y desarrollar habilidades como la resolución de problemas y el pensamiento lógico.

Los autores también sugieren que es necesario realizar más investigaciones sobre los diversos componentes de las competencias digitales para los futuros maestros, con el fin de ajustar los

programas pedagógicos a las realidades del mundo moderno y dotarlos de los conocimientos y habilidades necesarios.

P a l a b r a s c l a v e: competencias, educación infantil, educación superior, programación docente

Эвелина Жоньца, Томаш Вархол

Подготовка студентов педагогики к преподаванию программирования в раннем детском образовании

А н н о т а ц и я

Статья обсуждает компетенции современных учителей в использовании информационно-коммуникационных технологий, особенно в контексте программирования. Основной целью исследования было оценить знания и навыки будущих учителей начальных классов в применении этих знаний на практике. Исследования были проведены среди студентов двух государственных университетов в Польше с использованием метода диагностического опроса, а инструментом исследования была анкета, основанная на тесте знаний. Конструкция теста была основана на теоретических положениях Б. Немьерки, касающихся целей обучения.

Анализ результатов показал, что будущие учителя начальной школы обладают теоретическими знаниями в области программирования. Однако только 35% из них смогли подробно объяснить принципы программирования. Применение этих знаний на практике оказалось менее эффективным: результаты составили 45% для типичных заданий и 47% для задач по решению проблем. Эти результаты указывают на необходимость модификации учебных программ для увеличения числа часов, посвященных предметам, связанным с программированием, а также на более значительное внимание к решению программных задач через практический опыт.

Основываясь на проведенных исследованиях и наблюдениях, авторы предлагают увеличить количество часов, посвященных темам, непосредственно связанным с программированием. Таким образом, студенты получат возможность не только усваивать теоретические знания, но и эффективно применять их в практических заданиях. В конце концов, именно будущие учителя будут отвечать за введение учеников 1–3 классов в мир программирования и развитие их вычислительного мышления.

Важным аспектом является также обеспечение системы образования и подготовки учителей, которая позволит им развивать и углублять цифровые компетенции в области программирования. Новые технологические решения появляются с высокой скоростью, и учителя должны успевать за ними, чтобы подготовить учеников к будущим вызовам и развивать у них навыки решения проблем и логического мышления.

Авторы также предлагают, что необходимы дополнительные исследования различных компонентов цифровых компетенций будущих учителей, чтобы адаптировать педагогические программы к реалиям современного мира и оснастить их необходимыми знаниями и навыками.

К л ю ч е в ы е с л о в а: компетенции, раннее детское образование, обучение в высшем образовании, преподавание программирования

International Journal of Research in E-learning
Vol. 10 (2), 2024, pp. 1–34

DOI 10.31261/IJREL.2024.10.2.04

Marzena Wysocka-Narewska
University of Silesia in Katowice, Institute of Linguistics
https://orcid.org/0000-0003-2787-8676

English Teachers' Digital Competences in a Post-COVID Classroom: A Case Study

Abstract

The article addresses the issue of digital competences observed among English teachers in the context of the post-COVID classroom covered by the time-frame from September 2022 to 2023. In order to check the level of professional digital competences (TPDC) of teachers, who, according to the current state of research showed a complete lack of such skills in the first period of the pandemic, a retrospective interview was conducted. Next, in September 2022, when the first school year without any COVID-19 restrictions began, the teachers underwent a detailed analysis of their competences *via* a questionnaire based on the European Framework for the Digital Competence of Educators (DigCompEdu), allowing them to self-mark (un)used digital skills during language lessons. Additionally, the teachers' state of knowledge and skills from this period were compared with their competences at a later stage, in September 2023, to check the impact of such factors as time, previous experience in using the skills and trainings completed on the teachers' functioning in the classroom. The study includes four teachers representing two primary schools in Poland. It demonstrates that the respondents' knowledge and use of modern technologies was negligible in the first period of the pandemic, as assumed, while their digital competences acquired later were a matter of time and the result of the courses they had attended. As the study participants exhibit different levels of proficiency, distributed unevenly over time, three distinct patterns in teachers' (non)development of the above-mentioned competences have been outlined. In addition, the profiles of teachers participating in the study have been constructed in line with the lists of determinants of teachers' digital proficiency proposed by the European Framework for the DigCompEdu.

Following the research findings, it is not the teachers' age, seniority or degree of professional promotion at school that influences their digital skills, but rather their basic knowledge, education and additional functions performed in an institution that immediately impact the level of modern technology competences. It is recommended to expand the research to measure the competences in question on a larger research sample, as well as to look at the very classroom situation from the point of view of actual skills (un)used by teachers during language instruction.

K e y w o r d s: digital competences, English teachers, European Framework for the Digital Competence of Educators (DigCompEdu), a post-COVID classroom

A review of the research on the subject reveals that the concept of teachers' professional digital competence (TPDC) is difficult to define, as it may partly overlap with such commonly used concepts in the literature as digital literacy, media literacy, media competence or information and technology competence (Falloon, 2020). Given that TPDC is gradually being established in the educational research and has already been ascribed a multitude of definitions pertaining to teachers' competences in the context of technology-based teaching, the author of the article starts with offering the most suitable definition, one that aligns with the environmental conditions and participants of the study to be performed.

Definitions of TPDC

In its broader terms, TPDC is defined as a series of interrelated aspects including teachers' technological competence, content knowledge, attitudes to technology use, pedagogical competence, cultural awareness, critical approach and professional engagement (Selwyn, 2011). To cut a long story short, Aznar & González (2010) and Ouma et al. (2013) argue that TPDC should be restricted to basic skills in both hardware and software to make teachers deal with digital resources easily. Following Krumsvik et al., (2016) TPDC is tantamount with teachers' elementary and basic skills as far as using technology for learning and teaching is concerned. The former refer to generic operational skills, such as turning a computer or an iPad on and off or using a word processor, whereas the latter are teacher-specific, such as handling "digital learning platforms and digital teaching aids attached to the curricula" (Krumsvik et al., 2016, p. 147). With regard to particular competences required of teachers, Badia et al. (2014) and Tomczyk (2019) enumerate browsing, retrieving, storing, producing, presenting, exchanging information and communicating on social networking sites. Ceana & Reddecker (2019) point to the

importance of teachers' skills in finding and selecting appropriate resources out of a vast range of programmes and applications, as well as making their own modifications depending on the content and learning goals of their classes. Olofsson et al. (2019) underline the fact that teachers also need to have skills to solve technical problems that may reappear in the classroom. Regardless of the scope of the above-mentioned activities, all the interpretations of TPDC seem to meet along the way for the purpose of emphasizing the teacher's ability to successfully use technology for teaching. What is more, all these descriptors of TPDC can be easily related to the DigCompEdu Framework referred to as a general reference frame to support the development of teacher-like digital competences in Europe.

DigCompEdu Framework

According to the *European Framework for the Digital Competence of Educators* (2019), TPDC is divided into the following six competence areas, being further divided into three to five competences (Table 1):

Table 1.
Teachers' Digital Competences based on The DigCompEdu Framework

Educators' professional competences	Educators' pedagogic competences		Learners' competences
1. PROFESSIONAL ENGAGEMENT	2. DIGITAL RESOURCES	3. TEACHING LEARNING	6. FACILITATING LEARNERS' DIGITAL COMPETENCES
• organisational communication	• selecting	• teaching	• information and media literacy
• professional collaboration	• creating and modifying	• guidance	• communication
• reflective practice	• managing, protecting, sharing	• collaborative learning	• responsible use
• digital CPD		• self-regulated learning	• problem solving
	4. ASSESSMENT	5. EMPOWERING LEARNERS	
	• assessment strategies	• accessibilty and inclusion	
	• analyzing evidence	• differentiation and personalization	
	• feedback & planning	• actively engaging	

S o u r c e: DigCompEdu (2019).

Following Ceana & Reddecker (2019), the framework gives a few characteristics typical of any teaching process (area 1, 2 and 3), whether technologically-supported or not, and many details on how to make an efficient and innovative use of digital technologies when planning (area 2), implementing (area 3), and assessing (area 4) the process of teaching and learning *via* new technologies. In addition to that, area 5 takes into consideration the benefits of digital technologies for learner-centred education, and is transversal to the previous areas, giving guidelines complementary to all the skills enumerated.

Area 1: Professional Engagement

This area underlines the need of teachers' ability to enhance teaching through efficient organization as a result of well-developed communication strategies (*organizational communication*), but also their professional interactions with colleagues, learners, parents and others in the form of sharing and exchanging knowledge and experiences, including pedagogic innovations (*professional collaboration*). Also, it includes teachers' skills in reflection on and evaluation of their digital pedagogical practices among others (*reflective practice*), as well as using digital (re)sources for continuous professional development as required (*digital continuous professional development*).

Area 2: Digital Resources

This area deals with the teachers' ability to recognize, judge and select digital resources suitable for the process of teaching and learning, by means of carefully planning and adjusting them beforehand to a specific goal, context, and group (*selecting digital resources*). The key competences here are two-fold, i.e. connected with the teachers' ability to modify and adapt the already existing digital materials when permitted, and create, recreate and/or co-create new digital educational materials, in line with the needs of the classroom context, its participants, objectives and intended results (*creating and modifying resources*). Last but not least, the teachers are expected to be able to develop themselves digital resources and make them available to learners, parents and others as needed. At this point it is also crucial for teachers to protect sensitive data, and correctly use the privacy and copyright rules in particular (*managing, protecting and sharing digital resources*).

Area 3: Teaching and Learning

The teachers' main competences lie in correctly orchestrating the use of digital technologies. Within the scope of *teaching*, the emphasis is put on experimenting

and developing new ways of digitally-based pedagogical instruction. In addition to that, the educators are required to use digital technologies and services while contacting students outside the classroom context. The next component, *Guidance*, translates into teachers using innovative forms and formats of digital means to offer help and assistance. Also, it is vital that teachers are able to enhance digital cooperation among learners by means of collaborative assignments through joint communication and knowledge production (*collaborative learning*). Finally, it is required of teachers to digitally monitor learner's self-regulation, consisting in helping them plan and execute their individual learning pursuits focused on progress, *via* sharing interesting insights and solutions (*self-regulated learning*).

Area 4: Assessment

This area is tightly connected with implementing widely-available assessment and correction techniques in a digital way. The first sub-component (*assessment strategies*) deals with teachers' ability to use technologies for providing a range of feedback as part of both formative and summative assessment, adjusted to learning. The second issue here is associated with teachers' actions directed at analyzing learners' digital data, whether in terms of their behaviour or progress, and using it to monitor a forthcoming learning process as well as its consequences (*analyzing evidence*). Again, on the basis of the learning evidence generated by digital technologies, the teachers are obliged to support learners in their outcomes using appropriate strategies available online, help parents understand the digital information stemming from learners' performance, and inform both parties about future plans (*feedback and planning*).

Area 5: Empowering Learners

This category, in broad terms, concentrates on using digital technologies to foster learners' active engagement in the learning process. The first key issue, called *accessibility and inclusion*, is addressed to teachers and their full readiness to involve all learners in a digital education, taking into account special needs of learners and their constraints to the use of technologies. Secondly, it is important for teachers to allow diversity in the classroom understood as working at a different pace and levels of difficulty, as well as following individual learning goals and objectives (*differentiation and personalization*). Lastly, the teachers are expected to use digital technologies to make all learners actively participate in the lesson, providing space for new, real-world contexts and topical issues. What is more, the class engagement is to be focused on creative activities, such as hands-on tasks, scientific investigation and complex problem-solving/decision making assignments (*actively engaging learners*).

Area 6: Facilitating Learners' Digital Competence

This area focuses on learners' digital skills, although it also resembles teachers' digital competences and overlaps with the competences traditionally ascribed to educators. The starting point is *information and media literacy* described as learners' ability to "articulate information needs, to find information and resources in digital environments, to organize, process, analyze and interpret information, and to compare and critically evaluate the credibility and reliability of information and its sources" (DigCompEdu, 2019, p. 23). The second area, referred to as *digital communication and collaboration*, consists in learners being ready for using technologies to cooperate smoothly and participate eagerly in learning activities as well as citizen engagement outside the learning context. Third, the learners are expected to express themselves through digital technologies when on a task, as well as create their own digital content in multiple ways. Additionally, they are obliged to know all the license and copyright regulations, and apply them correctly to the digital data available (digital content creation). The next issue concerns responsibility while using digital technologies. It involves both the learners' physical and mental well-being, and them being empowered to manage risks connected with using technologies (*responsible use*). In case of problems, the learners are required to correctly identify and deal well with all technical issues, as well as use their technological knowledge to offer new solutions (*digital problem solving*).

Language Teachers and Integration of Digital Competences in the Classroom

Building on Caena & Redecker (2019), digital technologies have profound implications for language teaching in the sense that much of students' language use outside the classroom is mediated through digitally. It thus seems legitimate to say that students should be able to use digital technologies to support first of all their learning experiences, but also their social contacts (Kessler, 2018). In fact, many recent studies have shown that not all teachers can afford that type of instruction due to lack of competences to use technology, while those who try to follow computer-assisted language learning face serious challenges, such as adapting their content, materials and mode of delivery to remote teaching (Carillo & Flores, 2020; Kim & Asbury, 2020).

The Polish Context before the COVID-19

The 2018 EU Kids Online study conducted by Pyżalski et.al. (2019) showed that Polish students did not receive sufficient support from teachers in acquiring digital competences, e.g. the ability to verify the credibility of information found on the Internet (45.5% of students responded that the teacher did not explain why some Internet content is good and others are bad) or reacting to threats on the Internet (63.3% of students have not received help from a teacher in the past when a student was concerned about something on the Internet). Moreover, 44.5% of the surveyed students stated that the teacher never or almost never encouraged them to use and learn things from the Internet.

The situation was even more dire at the start of the pandemic, when the rapid and unexpected transition to distance learning did not allow much time for teacher training on the most effective teaching methods. This lack of professional digital skills was further accompanied by the lack of resource availability, adaptability and implementation.

The COVID-19 Classroom, Technology Use and Teachers' Professional Digital Competence

According to Tomczyk (2021), the first stage of the pandemic in Poland was a time of crisis, because the majority of teachers had only intuitive knowledge of the methodology of distance learning. They did not receive adequate technical support, and had to gain e-learning skills through self-education, often by means of tutorials available on the Internet, and/or peer support with a constant concern about the quality of education. According to Śmiechowska-Petrovskij (2020), the next stage was the implementation of a synchronous teaching where the teacher's ongoing interaction with students and control of the learning process provided a substitute for regular (stationary) lessons. The results of the study conducted in Poland in June 2020 show that 42% of teachers switched from classes initially held asynchronously to synchronous ones, either in accordance with the time schedule or by an individual appointment by means of MS Teams, Zoom or Google Hangouts, with the help of videos and/or multimedia presentations as well as various educational websites offering interactive tasks. The second largest group of teachers (27%) constituted those who relied on the asynchronous mode of teaching and provided learners with e-materials for individual study. Next, 8% of the instructors surveyed used Skype, Messenger or even telephone calls to

contact the students and cover the material. Exactly the same results were obtained in the report commissioned by Librus (2020).

Taking no account of the previously-mentioned imperfections, it must be highlighted that teachers faced constant problems connected with the lack of structured linguistic content *versus* the abundance of online resources to evaluate before the lesson, students' lack of interactivity and motivation, as well as lack of social and cognitive presence to appropriately monitor the language instruction in the classroom. All that instilled negative emotions in teachers and blocked their professional development in terms of technology use in education (Papaja, 2021; Plebańska et al., 2020). There have been no studies describing the exact scope of digital competences of language instructors at the time of on-going pandemic education. Nevertheless, a lot of research on teachers' skills has demonstrated the benefits of courses and training in this area. To name an example, Pedagogical University of Krakow has been offering continuous in-service training courses for primary and secondary school language teachers. The courses in question cover basic issues related to creating educational content and operating the Moodle and Teams platforms (creating teams and channels, inviting students to remote meetings, enhancing student involvement in remote activities, starting from forming attendance lists, making presentations, desktops, and whiteboards available to using chat, class booklet, and tests) (Tomczyk, 2021).

Teachers' Professional Digital Competence in a Post-COVID Classroom

The main assumption for conducting the present study is the expected impact of the ICT courses and teachers' self-education during the pandemic on the current state of teachers' professional digital competences. As Dycht & Śmiechowska-Petrovskij (2020) claim, the implementation of distance education and use of ICT has realized the potential of digital teaching to a small extent. On the one hand, the forced online education has highlighted the insufficiency of teachers' competences related to the usage of technological tools and digital resources, already visible much earlier, and, on the other, the whole situation has turned out to be "an accelerated course" for teachers in the field of information technology and interrelated issues. Consequently, as observed by Plebańska et al. (2020), the level of teachers' digital competences has increased, including, among others, their ability to use the ICT tools, such as searching for network resources, and interactive mechanisms to communicate and collaborate digitally. Another significant change was noticed in the improved level of equipment supply, and institutional support.

The Study

Having proven that there is a correlation between the period of the pandemic classroom practice experienced by language teachers and the scope of digital skills they hold these days, the study has been designed to identify the teachers' acquired competences, whether independently or through formal training, and to create a post-COVID profile of a digitally-competent language teacher, differing in terms of seniority and experience. At the time of the research design there were few studies showing the state of knowledge and digital competences of (post)-pandemic teachers working in Polish schools that would show the current state of English teachers' TPDC and the impact of time on their potential (non)-development. The vast majority of studies focused on the well-being of English teachers during the pandemic and the emotions that accompanied this period (e.g. Papaja, 2021; Jelińska & Paradowski, 2021; Pawlak et al., 2021; Derakhshan et. al., 2022). Thus, the main aim of the current research has been to outline the situation before COVID-19, and detect areas of increase and/or decrease in teachers' digital skills experienced over a time-period. In order to focus on the above-mentioned goals, the following research questions have been formulated:

RQ1. Do the teachers under investigation confirm the lack of digital competences in the first period of pandemic education?

RQ2. Did the teachers surveyed possess digital competences in the first period of post-pandemic education (in September 2022)? And if so, what specific digital skills did they possess? And, what are the sources of teachers' competences acquired over time?

RQ3. Do teachers' competences diagnosed in September 2022 differ from those observed in September 2023? If so, what are the differences and what are the reasons for the *status quo*?

RQ4. How digitally-proficient are the teachers according to the DigCompEdu Framework and what user profile do they represent?

RQ5. What factors can be expected to influence the level of teachers' digital proficiency?

The term "post-COVID" is used here to denote a post-pandemic period with all the consequences and changes that have occurred in the forms of teaching and participants engaged in the learning and teaching process (Bieganowska-Skóra & Pankowska, 2020). The study under discussion was longitudinal in the time frame of September 2022 and September 2023, and consisted of the following steps:

- A retrospective interview aimed at investigating the teachers' state of knowledge and level of digital competences at the outbreak of the pandemic and the early stage of teaching;
- A questionnaire in the form of a check-list aiming at a thorough examination of teachers' digital skills starting from September 2022, which was the first

school year without any COVID-19 restrictions, hence referred to as the post-pandemic school year;
- A questionnaire in the form of a check-list aiming at a thorough examination of teachers' digital skills after yet another year of classroom learning influenced by the previous school semesters.

All of the above tools guarantee that the requirements for longitudinal studies are met, that is, examining the same individuals to detect any changes that might have occurred over a period of time, and detecting developments or changes in the characteristics of the target population.

The Participants

The sample in question included four English teachers who had spent almost three semesters at home or school on distance learning. At the time of the interview, in September 2022, they were entering the first school year without any COVID-19 restrictions. The teachers were affiliated with two primary schools, Szkoła Podstawowa nr 2 in Będzin (school A), and Szkoła Podstawowa nr 40 in Sosnowiec (school B). They were all females, aged 25 to 44 years old, having all necessary qualifications to teach English (MA degrees) and a varying teaching experience (from 2 to 20 years). All respondents agreed to participate in the study willingly, three of them emphasizing that they were in the course of their career development and advancement applicable in schools in Poland (see Table 2):

Table 2.
The Participants of the Study

Category	Teacher 1	Teacher 2	Teacher 3	Teacher 4
Gender	Female	Female	Female	Female
Age	25	28	32	44
Education	University of Silesia	Humanitas University in Sosnowiec	WSB Dąbrowa Górnicza, SWE Katowice	University of Silesia, HR University of Humanitas
School	A	A	B	A
Subject	English	English	English	English
Teaching experience	2	3	4	20
Degree of professional advancement	Trainee/ beginner	Contract/ beginner	Appointed	Diploma
Type of instruction from March to June 2020	asynchronous	asynchronous	asynchronous	asynchronous

S o u r c e: author's own work.

The respondents eagerly answered all the questions from the so-called personal details category enclosed into the opening part of an interview. What is also worth mentioning is the fact that three out of four teachers treated participation in the research as a prestigious experience that would help them on their career path, being part of the teacher development plan.

The Tools

As mentioned before, the study began with a retrospective interview designed to collect retrospective data on teachers' digital competences at the outbreak of the pandemic interrupting the regular (stationary) learning and imposing restrictions thereon. The form of the interview was semi-structured and two-fold, allowing teachers to reflect on digital competences presented in accordance with the DigCompEdu in its main part, and leaving room for teachers' comments and extra thoughts in between the ready-made sections devoted to digital skills to better understand the participants' reasoning, worded as follows:

- using digital technologies within the scope of professional engagement (organizational communication, professional collaboration, reflective practice and continuous professional development);
- using digital resources (selecting, creating and modifying, managing, protecting and sharing);
- using digital technologies for teaching and learning (teaching and guiding, collaborative learning and self-regulated learning);
- using digital technologies for assessment (assessment strategies, analyzing evidence, feedback and planning);
- using digital technologies for empowering learners (learner accessibility and inclusion, differentiation and personalization, active engagement);
- using digital technologies for facilitating learners' digital competence (information and media literacy, communication, content creation, responsible use and problem-solving strategies).

The second tool was a questionnaire devoted to gathering a detailed characteristic of the teachers' digital competences in the post-pandemic classroom distributed among the subjects on two separate occasions, i.e. September 2022 and September 2023. The first period of measurement was expected to provide an answer to the question of what digital competences teachers possessed after the period of the forced online teaching, while the second was envisaged to determine the level of the teachers' competences in question after another year of stationary work, looking for such changes as increased/decreased competences, an expanded/limited range of tools used, etc. To obtain as much detailed information on teachers' competences

as possible the content of the check-list was consistent with the DigCompEdu Framework, the meaning of which was encapsulated under the statements covering teachers' activities performed in the language classroom or class-related ones on a daily basis (Table 3):

Table 3.
The Questionnaire Form (based on the DigCompEdu Framework)

	YES	NO	I DON'T KNOW	COMMENTS
1. I make use of digital technologies for communication e.g. with learners, parents, colleagues or support staff.				
2. I communicate responsibly and ethically with digital technologies, e.g. respecting netiquette and acceptable use policies (AUP).				
3. I use digital technologies to collaborate with colleagues in my organisation, e.g. on a dedicated joint project, or to exchange content, knowledge and opinions.				
4. I use digital technologies to share and exchange the resources I use, my knowledge and opinion, with colleagues within and beyond my organisation.				
5. I help peers in developing their digital competence.				
6. I use the internet to update my subject-specific or pedagogical knowledge.				
7. I use the internet to identify suitable training courses and other opportunities for professional development (e.g. conferences).				
8. I use the internet for professional development, e.g. by participating in online courses, webinars, or consulting digital training materials and video tutorials.				
9. I use digital technologies to advise peers on innovative teaching practices, e.g. in professional communities, through personal blogs, or by developing digital training materials for them.				
10. I evaluate the quality of digital resources based on basic criteria, such as e.g. place of publication, authorship, other users' feedback.				
11. In addition to search engines, I use a variety of other sources, e.g. collaborative platforms, official repositories, etc.				
12. When I use resources in class, I contextualise them for the students, e.g. by pointing out their source and potential bias.				

13. I create and modify complex and interactive digital learning activities, e.g. interactive worksheets, online assessments, online collaborative learning activities (e.g. wikis, blogs), games, apps, visualisations. I co-create learning resources with colleagues.
14. I compile comprehensive digital content repositories and make them available to learners or other educators.
15. I apply licenses to the resources I publish online.
16. I manage the integration of digital content, e.g. videos, interactive activities, into the teaching and learning process.
17. I experiment with and develop new formats and pedagogical methods for instruction.
18. I use a common digital communication channel with my learners to respond to their questions and doubts.
19. When I implement digital learning activities in class, I make sure I am able to (digitally) monitor student behaviour, so that I can offer guidance when needed.
20. I require learners to document their collaborative efforts using digital technologies, e.g. digital presentations, videos, blog posts.
21. I use digital technologies to enable learners to share insights with others and receive peer-feedback, also on individual assignments.
22. I use digital technologies for peer-assessment and as a support for collaborative self-regulation and peer-learning.
23. I use digital technologies for learner self-assessment.
24. I encourage learners to use digital technologies to collect evidence and record progress, e.g. to produce audio or video recordings, photos, texts.
25. I adapt digital assessment tools to support my specific assessment goal, e.g. create a test using a digital test system.
26. I critically reflect on my use of digital technologies for assessment and adapt my strategies accordingly.
27. I continuously monitor digital activity and regularly reflect on digitally recorded learner data to timely identify and react upon critical behaviour and individual problems.

28. I select digital pedagogical strategies that adapt to learners' digital contexts, e.g. limited usage time, type of device available.
29. I select and use some learning activities, e.g. quizzes or games, that allow learners to proceed at different speeds, select different levels of difficulty and/or repeat activities previously not solved adequately.
30. When designing learning and assessment activities, I use a range of different digital technologies, which I adapt and adjust to account for different needs, levels, speeds and preferences.
31. I select, design, employ and orchestrate the use of digital technologies within the learning process according to their potential for fostering learners' active, creative and critical engagement with the subject matter.
32. I teach learners how to find information, how to assess its reliability, how to compare and combine information from different sources.
33. I incorporate assignments and learning activities which require learners to effectively and responsibly use digital technologies for communication, collaboration, knowledge co-creation, and civic participation.
34. I implement learning activities in which learners use digital technologies to produce digital content, e.g. in the form of text, photos, other images, videos, etc.
35. I enable learners to understand risks and threats in digital environments (e.g. identity theft, fraud, stalking, phishing) and how to react appropriately.
36. I encourage learners to help each other in developing their digital competence.
37. I enable learners to apply their digital competence in unconventional ways to new situations and creatively come up with new solutions or products.

S o u r c e: author's own work.

The teachers' task was to go through the statements included in the form, and tick the appropriate answer (*yes*, *no*, or *I don't know*), which translates into the respondents' common knowledge and practice, lack of competences and non-use of the mentioned tools, and lack of confidence or uncertainty in having/using a digital skill, respectively. Additionally, there was an option to add comments

next to each of the statements if the respondents felt that they met the requirements partially, under certain conditions and/or as a result of something. The contents of the questionnaire reflect all the main areas of teachers' professional digital competence hinted at in the DigCompEdu, involving specific determinants of skills within each category. To start with that of *professional engagement* (statements 1–9), the questionnaire was further divided into *organizational communication* (statements 1–2), *professional collaboration* (statements 3–4), *reflective practice* (statement 5) and *continuous professional development* (statements 6–9). The second area referred to as *digital resources* (statements 10–15) was split into *selecting digital resources* (statements 10–12), *creating and modifying digital resources* (statement 13), as well as *managing, protecting and sharing digital resources* (statements 14 and 15). The next group of competences under the heading *teaching and learning* (statements 16–24) was categorized into *teaching* itself (statements 16–17), *guidance* (statements 18–19), *collaborative learning* (statements 20–22), and *self-regulated learning* (statements 23–24). Accordingly, the *assessment* section (statements 25–27), involved *assessment strategies* (statements 25–26) and *analyzing evidence* (statement 27), while the section that followed, called *empowering learners* (statements 28–31), was divided into *accessibility and inclusion* (statement 28), *differentiation and personalization* (statements 29–30), and *actively engaging students* (statement 31). Last but not least, the area of *facilitating learners' digital competence* was under discussion (statements 32–37), segmented into *information and media literacy* (statement 32), *digital communication and collaboration* (statement 33), *digital content creation* (statement 34), *responsible use* (statement 35), and *digital problem solving* (statements 36–37).

Presentation and Discussion of Results

Teacher 1

Teacher 1 is a 25-year-old woman, who was a trainee teacher at the onset of the pandemic in 2020, conducting English classes in grade four (teaching fourth graders exclusively) in an asynchronous way. The whole classroom instruction took on the form of homework assignments sent to the learners *via* a messenger group set up by their parents. They were then asked to email the photos of learners' completed tasks to be graded by the teacher. After several works of that type, the learners received the final semester grades. Apart from the messenger, the teacher did not use any other tools, justifying it by the lack of competence and knowledge about a range of possibilities related to ICT. When asked about the activities

included within the DigCompEdu Framework, she denied her awareness of their existence at that time, which confirmed the teacher's very low or even negligible level of digital competences.

In September 2022, however, the situation was different, demonstrating the teacher's self-awareness in terms of competences, which translated into their actual use in the educational context. The exact scope of the teacher's abilities referring to the original statements taken from the questionnaire is illustrated below (Table 4):

Table 4.
The Results of the Study – Teacher 1 and Her Digital Competences (Measurement 1)

1. I make use of digital technologies for communication e.g. with learners, parents, colleagues or support staff.
2. I communicate responsibly and ethically with digital technologies, e.g. respecting netiquette and acceptable use policies (AUP).
3. I use digital technologies to collaborate with colleagues in my organisation, e.g. on a dedicated joint project, or to exchange content, knowledge and opinions.
4. I use the internet to update my subject-specific or pedagogical knowledge.
5. I use the internet to identify suitable training courses and other opportunities for professional development (e.g. conferences).
6. I use the internet for professional development, e.g. by participating in online courses, webinars, or consulting digital training materials and video tutorials.
7. I evaluate the quality of digital resources based on basic criteria, such as e.g. place of publication, authorship, other users' feedback.
8. In addition to search engines, I use a variety of other sources, e.g. collaborative platforms, official repositories, etc.
9. I create and modify complex and interactive digital learning activities, e.g. interactive worksheets, online assessments, online collaborative learning activities (e.g. wikis, blogs), games, apps, visualisations. I co-create learning resources with colleagues.
10. I compile comprehensive digital content repositories and make them available to learners or other educators.
11. I manage the integration of digital content, e.g. videos, interactive activities, into the teaching and learning process.
12. I encourage learners to use digital technologies to collect evidence and record progress, e.g. to produce audio or video recordings, photos, texts.
13. I critically reflect on my use of digital technologies for assessment and adapt my strategies accordingly.
14. I select digital pedagogical strategies that adapt to learners' digital contexts, e.g. limited usage time, type of device available.
15. I select and use some learning activities, e.g. quizzes or games, that allow learners to proceed at different speeds, select different levels of difficulty and/or repeat activities previously not solved adequately.

16. When designing learning and assessment activities, I use a range of different digital technologies, which I adapt and adjust to account for different needs, levels, speeds and preferences.
17. I select, design, employ and orchestrate the use of digital technologies within the learning process according to their potential for fostering learners' active, creative and critical engagement with the subject matter.
18. I implement learning activities in which learners use digital technologies to produce digital content, e.g. in the form of text, photos, other images, videos, etc.

S o u r c e: author's own work.

Judging by the data, the teacher was equipped with a variety of digital competences, which she practically implemented at the organizational level while communicating with learners, parents and school staff (statements 1–3), as well as the educational one orchestrating the use of digital technologies for professional self-development *via* a variety of webinars and vlogs (statements 6–8), and teaching *per se* in the shape of selecting digital resources judging carefully the internet websites (statements 10–11, 31), designing learning activities on a game-based learning platforms such as Kahoot (statement 13–14), and managing them in the classroom (statements 16, 24, 34), taking into account learners' constraints, from hardware and software limitations to mental disabilities (statements 28–30), constantly reflecting on the tools used (statement 26). The "operating" skills she possessed at that period can be referred to as the most in-demand ones, catering for the teaching and learning process on the highest possible level, which she had obtained as a result of numerous courses and teacher trainings offered by many institutions.

In September 2023, the repertoire of the teacher's skills expanded to reach the area of sharing skills with others and assessing learners' progress, encapsulated in the statements 4, 5, 23 and 24, respectively. Having improved her resources and techniques through self-study, she felt ready to exchange her ideas with fellow teachers both inside and outside the school, whereas at the classroom level she started using digital technologies to test learners' language skills by playing Blooket, to give an example.

Teacher 2

Teacher 2 is a 28-year-old woman, who was a contract teacher in March 2020, with commenced procedures for the position of an appointed teacher, which she wanted to fulfill to be promoted in the future. At the time of the outbreak of the pandemic, she was responsible for teaching English mainly to grades five. It was the pandemic that forced her to open a messenger account, and, consequently, use it for contacts with her learners. As she also has a musical education, she initially taught English through links to English songs, to which the learners were asked

to make Polish translations of the lyrics, or to record cover versions. Having recognized the ineffectiveness of such tasks due to the lack of learner response, she continued her asynchronous teaching by sending specific groups of fifth graders a series of activities taken directly from their textbooks and exercise books, and evaluating them on the basis of the feedback she received in the form of photos of the solved tasks sent by parents. Eventually, three months passed this way, resulting in the learner's final grades with which the teacher was not satisfied. Her dissatisfaction was mainly caused by the lack of tools to conduct the teaching and learning process differently. As regards the repertoire of digital skills encompassed in the DigCompEdu Framework, the teacher admitted that she had not been using any of them in the first period of the pandemic education.

The results of the questionnaire administered to the teacher in September 2022 showed little change in this respect. The only digital competences she demonstrated (through ticking in the form) ranged from having digital skills for organizational communication to using the Internet for continuous professional development included in the following statements (Table 5):

Table 5.
The Results of the Study – Teacher 2 and Her Digital Competences (Measurement 1)

1.	I make use of digital technologies for communication e.g. with learners, parents, colleagues or support staff.
2.	I communicate responsibly and ethically with digital technologies, e.g. respecting netiquette and acceptable use policies (AUP).
4.	I use the internet to update my subject-specific or pedagogical knowledge.
5.	I use the internet to identify suitable training courses and other opportunities for professional development (e.g. conferences).
6.	I use the internet for professional development, e.g. by participating in online courses, webinars, or consulting digital training materials and video tutorials.

S o u r c e: author's own work.

To be more specific, the first two entries concerned the teacher's ability to use the Teams application to participate in school conferences and meetings with parents held online until this point. The remaining ones, on the other hand, cannot be explained in any other way than for her individual use in the context of attending professional development courses.

The second meeting with the teacher, in September 2023, produced exactly the same outcomes. Namely, she turned out to possess the same skills related to communication with the school members and authorities, yet she no longer used them due to a complete elimination of online services at school. When it comes to the second area of professional development, the teacher claimed that she had taken fewer online courses in favour of face-to-face meetings.

Teacher 3

Teacher 3 is a 32-year-old appointed teacher, who taught English to fourth, fifth and sixth graders in an asynchronous manner in the first stage of pandemic education in March 2020. Her main duty at that time was being a form teacher in one of the fourth grades. Her language classes in this group were limited to telephone calls addressed to the parents in which she evaluated her students' individual work previously sent *via* a text message. In the other classes, though, she claimed using *Vulcan* – a school register for communication with parents. This interaction involved writing emails with descriptions of language tasks to be completed by the learners. All the work was then subject to correction and feedback from the teacher, which was the basis for the learners' final grades in all classes. The teacher found the entire period to be exhausting due to the significant number of emails written and written tasks checked, which was a direct result of her lack of familiarity with digital technology. The next stage of education, i.e. the period of returning to schools with no COVID-19 restrictions in September 2022, portrayed the teacher as a person with a wide array of digital competences within the scope of professional elaboration, digital resources, teaching and learning digitally, and empowering learners. The scope of skills used by her is evidenced by the following statements (Table 6).

As seen in the table, the teacher perceived herself as professionally elaborate, i.e. proficient at digital technologies in terms of communication and collaboration both within and beyond the institution of the school, providing an example of her participation in the teaching council and parents' meetings (statements 1–3). She was also very active as far as continuous professional development is concerned, taking part in teacher training programmes and sharing the acquired knowledge with others (statements 6–8). What needs to be emphasized is her ability to assess digital data (statement 10), select appropriate materials by browsing the Internet sources and identify potential threats and risks associated with inappropriate contents (statements 10–11), and create/modify the content (statements 13–14, 16) in line with the learners' needs (statements 28–31). Also, it is worth underlining the fact that she aimed at encouraging learners to work on the linguistic material digitally in the form of collaborative projects such as video recordings or presentations (statement 24) and to share their knowledge outside the classroom by taking part in different school competitions (statement 33).

In the next period of instruction, namely September 2023, the teacher was equipped with additional digital competences which focused on educating learners in terms of threats, and support (statements 35 and 26). The acquisition of her new skills was the result of her attendance at a workshop on Internet law and regulations, and covered both theoretical and practical knowledge regarding the potential dangers of the Internet, which she subsequently conveyed to her learners

(statement 35). Moreover, she admitted spending a lot of time encouraging learners to help one another in developing their digital skills (statement 36).

Table 6.
The Results of the Study – Teacher 3 and Her Digital Competences (Measurement 1)

1. I make use of digital technologies for communication e.g. with learners, parents, colleagues or support staff.
2. I communicate responsibly and ethically with digital technologies, e.g. respecting netiquette and acceptable use policies (AUP).
3. I use digital technologies to collaborate with colleagues in my organisation, e.g. on a dedicated joint project, or to exchange content, knowledge and opinions.
6. I use the internet to update my subject-specific or pedagogical knowledge.
7. I use the internet to identify suitable training courses and other opportunities for professional development (e.g. conferences).
8. I use the internet for professional development, e.g. by participating in online courses, webinars, or consulting digital training materials and video tutorials.
10. I evaluate the quality of digital resources based on basic criteria, such as e.g. place of publication, authorship, other users' feedback.
11. In addition to search engines, I use a variety of other sources, e.g. collaborative platforms, official repositories, etc.
13. I create and modify complex and interactive digital learning activities, e.g. interactive worksheets, online assessments, online collaborative learning activities (e.g. wikis, blogs), games, apps, visualisations. I co-create learning resources with colleagues.
14. I compile comprehensive digital content repositories and make them available to learners or other educators.
16. I manage the integration of digital content, e.g. videos, interactive activities, into the teaching and learning process.
24. I encourage learners to use digital technologies to collect evidence and record progress, e.g. to produce audio or video recordings, photos, texts.
28. I select digital pedagogical strategies that adapt to learners' digital contexts, e.g. limited usage time, type of device available.
29. I select and use some learning activities, e.g. quizzes or games, that allow learners to proceed at different speeds, select different levels of difficulty and/or repeat activities previously not solved adequately.
30. When designing learning and assessment activities, I use a range of different digital technologies, which I adapt and adjust to account for different needs, levels, speeds and preferences.
31. I select, design, employ and orchestrate the use of digital technologies within the learning process according to their potential for fostering learners' active, creative and critical engagement with the subject matter.
33. I incorporate assignments and learning activities which require learners to effectively and responsibly use digital technologies for communication, collaboration, knowledge co-creation, and civic participation.

S o u r c e: author's own work.

Teacher 4

Teacher 4 is a 44-year-old woman, who was a diploma teacher at the time of the school closure and lockdown in March 2020. She taught English in the upper grades, that is, seventh and eighth grade learners with the objective of preparing them for the final examination at the end of the school year. Her only medium of communication with her learners at that time was *Vulcan* – an electronic version of the school register, where she posted messages concerning the class material to be covered asynchronously. The learners followed assignments that consisted mostly of the exercises taken from their regular book, and such a form of work was continued until the end of the semester. The teacher regretted having had no other means of communication and/or skills to meet and teach the groups of learners at that time.

In September 2022, when she was asked to complete the questionnaire, the situation was different not only in terms of school-working conditions, but above all the function she performed in the school. She was appointed a vice-deputy of the school in September 2022 and, consequently, she taught English to eighth graders exclusively. As far as her digital competences are concerned, the list of skills she implemented on a regular basis was impressive, and included all the areas of teachers' professional competences suggested by the DigCompEdu Framework (Table 7):

Table 7.
The Results of the Study – Teacher 4 and Her Digital Competences (Measurement 1 & 2)

1. I make use of digital technologies for communication e.g. with learners, parents, colleagues or support staff.
2. I communicate responsibly and ethically with digital technologies, e.g. respecting netiquette and acceptable use policies (AUP).
3. I use digital technologies to collaborate with colleagues in my organisation, e.g. on a dedicated joint project, or to exchange content, knowledge and opinions.
4. I use digital technologies to share and exchange the resources I use, my knowledge and opinion, with colleagues within and beyond my organisation.
5. I help peers in developing their digital competence.
6. I use the internet to update my subject-specific or pedagogical knowledge.
7. I use the internet to identify suitable training courses and other opportunities for professional development (e.g. conferences).
8. I use the internet for professional development, e.g. by participating in online courses, webinars, or consulting digital training materials and video tutorials.
9. I use digital technologies to advise peers on innovative teaching practices, e.g. in professional communities, through personal blogs, or by developing digital training materials for them.
10. I evaluate the quality of digital resources based on basic criteria, such as e.g. place of publication, authorship, other users' feedback.

11. In addition to search engines, I use a variety of other sources, e.g. collaborative platforms, official repositories, etc.
12. When I use resources in class, I contextualise them for the students, e.g. by pointing out their source and potential bias.
13. I create and modify complex and interactive digital learning activities, e.g. interactive worksheets, online assessments, online collaborative learning activities (e.g. wikis, blogs), games, apps, visualisations. I co-create learning resources with colleagues.
14. I compile comprehensive digital content repositories and make them available to learners or other educators.
15. I apply licenses to the resources I publish online.
16. I manage the integration of digital content, e.g. videos, interactive activities, into the teaching and learning process.
17. I experiment with and develop new formats and pedagogical methods for instruction.
18. I use a common digital communication channel with my learners to respond to their questions and doubts.
19. When I implement digital learning activities in class, I make sure I am able to (digitally) monitor student behaviour, so that I can offer guidance when needed.
20. I require learners to document their collaborative efforts using digital technologies, e.g. digital presentations, videos, blog posts.
21. I use digital technologies to enable learners to share insights with others and receive peer-feedback, also on individual assignments.
22. I use digital technologies for peer-assessment and as a support for collaborative self-regulation and peer-learning.
23. I use digital technologies for learner self-assessment.
24. I encourage learners to use digital technologies to collect evidence and record progress, e.g. to produce audio or video recordings, photos, texts.
25. I adapt digital assessment tools to support my specific assessment goal, e.g. create a test using a digital test system.
26. I critically reflect on my use of digital technologies for assessment and adapt my strategies accordingly.
27. I continuously monitor digital activity and regularly reflect on digitally recorded learner data to timely identify and react upon critical behaviour and individual problems.
28. I select digital pedagogical strategies that adapt to learners' digital contexts, e.g. limited usage time, type of device available.
29. I select and use some learning activities, e.g. quizzes or games, that allow learners to proceed at different speeds, select different levels of difficulty and/or repeat activities previously not solved adequately.
30. When designing learning and assessment activities, I use a range of different digital technologies, which I adapt and adjust to account for different needs, levels, speeds and preferences.
31. I select, design, employ and orchestrate the use of digital technologies within the learning process according to their potential for fostering learners' active, creative and critical engagement with the subject matter.
32. I teach learners how to find information, how to assess its reliability, how to compare and combine information from different sources.

33. I incorporate assignments and learning activities which require learners to effectively and responsibly use digital technologies for communication, collaboration, knowledge co-creation, and civic participation.
34. I implement learning activities in which learners use digital technologies to produce digital content, e.g. in the form of text, photos, other images, videos, etc.
35. I enable learners to understand risks and threats in digital environments (e.g. identity theft, fraud, stalking, phishing) and how to react appropriately.
36. I encourage learners to help each other in developing their digital competence.
37. I enable learners to apply their digital competence in unconventional ways to new situations and creatively come up with new solutions or products.

S o u r c e: author's own work.

To be more specific, she had digital competences referred to as professional elaboration characterized by using digital skills for communication and collaboration within the school community and beyond it, offering innovative pedagogical practices at the school and inter-school level. In addition to that, it involved all practices aimed at professional self-development and staff development promoting teacher reflection (statements 1–9). Next, when it comes to the area of digital resources, the teacher had all the skills from assessing the quality of the Internet sources to compiling her own digital content repositories to use and share with others (statements 10–15). What followed on the list was her digital competences implemented for the very process of teaching and learning, such as experimenting with methods of instruction, monitoring students digitally, fostering peer-assessment, and encouraging learners to use digital technologies in the classes, indicating that this was the most-frequently employed activity (statements 16–24). As for the assessment-specific issues, she tested students digitally and was constantly self-reflecting on the tools used (statements 25–27). The most eagerly used applications involved Quizlet, Kahoot and Quizizz activities for a more informal evaluation of the learners' language command. The whole section dedicated to learner empowerment showed her awareness in the learner accessibility and inclusion issues, as evidenced by her providing the equipment, adjusting the pace of work and preparing special language materials, often characterized by larger font sizes as required (statements 29–31). Accordingly, the area meant for facilitating learners' digital content made her devote lesson time to teaching learners how to deal with the digital data responsibly and safely, solve any problems encountered, and share this knowledge with others (statements 32–37). In her comments placed next to some of the questions, there were annotations to courses and postgraduate studies she graduated from, including above all Modern Digital Technologies in Education at DSW University of Lower Silesia in Wroclaw, Poland. The re-measurement of teacher's digital competences during the second meeting in September 2023 brought about exactly the same results, proving her excellent skills.

Comparing Teachers' Competences

All the data derived from the four teachers under investigation have allowed for comparing their responses. The table below (Table 8) can be read in three different ways, showing the characteristics common to all the teachers, those that were true for most of them, and those that identified one or two respondents only:

Table 8.
A compilation of study results – Competences of Teacher 1, 2, 3 & 4

	T1	T2	T3	T4
1. I make use of digital technologies for communication e.g. with learners, parents, colleagues or support staff.	X	X	X	X
2. I communicate responsibly and ethically with digital technologies, e.g. respecting netiquette and acceptable use policies (AUP).	X	X	X	X
3. I use digital technologies to collaborate with colleagues in my organisation, e.g. on a dedicated joint project, or to exchange content, knowledge and opinions.	X		X	X
4. I use digital technologies to share and exchange the resources I use, my knowledge and opinion, with colleagues within and beyond my organisation.		X		X
5. I help peers in developing their digital competence.		X		X
6. I use the internet to update my subject-specific or pedagogical knowledge.	X	X	X	X
7. I use the internet to identify suitable training courses and other opportunities for professional development (e.g. conferences).	X		X	X
8. I use the internet for professional development, e.g. by participating in online courses, webinars, or consulting digital training materials and video tutorials.	X		X	X
9. I use digital technologies to advise peers on innovative teaching practices, e.g. in professional communities, through personal blogs, or by developing digital training materials for them.				X
10. I evaluate the quality of digital resources based on basic criteria, such as e.g. place of publication, authorship, other users' feedback.	X		X	X
11. In addition to search engines, I use a variety of other sources, e.g. collaborative platforms, official repositories, etc.	X		X	X
12. When I use resources in class, I contextualise them for the students, e.g. by pointing out their source and potential bias.				X
13. I create and modify complex and interactive digital learning activities, e.g. interactive worksheets, online assessments, online collaborative learning activities (e.g. wikis, blogs), games, apps, visualisations. I co-create learning resources with colleagues.	X		X	X
14. I compile comprehensive digital content repositories and make them available to learners or other educators.	X		X	X
15. I apply licenses to the resources I publish online.				X

16. I manage the integration of digital content, e.g. videos, interactive activities, into the teaching and learning process.	X	X	X
17. I experiment with and develop new formats and pedagogical methods for instruction.			X
18. I use a common digital communication channel with my learners to respond to their questions and doubts.			X
19. When I implement digital learning activities in class, I make sure I am able to (digitally) monitor student behaviour, so that I can offer guidance when needed.			X
20. I require learners to document their collaborative efforts using digital technologies, e.g. digital presentations, videos, blog posts.			X
21. I use digital technologies to enable learners to share insights with others and receive peer-feedback, also on individual assignments.			X
22. I use digital technologies for peer-assessment and as a support for collaborative self-regulation and peer-learning.			X
23. I use digital technologies for learner self-assessment.			X
24. I encourage learners to use digital technologies to collect evidence and record progress, e.g. to produce audio or video recordings, photos, texts.	X	X	X
25. I adapt digital assessment tools to support my specific assessment goal, e.g. create a test using a digital test system.			X
26. I critically reflect on my use of digital technologies for assessment and adapt my strategies accordingly.	X		X
27. I continuously monitor digital activity and regularly reflect on digitally recorded learner data to timely identify and react upon critical behaviour and individual problems.			X
28. I select digital pedagogical strategies that adapt to learners' digital contexts, e.g. limited usage time, type of device available.	X	X	X
29. I select and use some learning activities, e.g. quizzes or games, that allow learners to proceed at different speeds, select different levels of difficulty and/or repeat activities previously not solved adequately.	X	X	X
30. When designing learning and assessment activities, I use a range of different digital technologies, which I adapt and adjust to account for different needs, levels, speeds and preferences.	X	X	X
31. I select, design, employ and orchestrate the use of digital technologies within the learning process according to their potential for fostering learners' active, creative and critical engagement with the subject matter.	X	X	X
32. I teach learners how to find information, how to assess its reliability, how to compare and combine information from different sources.			X
33. I incorporate assignments and learning activities which require learners to effectively and responsibly use digital technologies for communication, collaboration, knowledge co-creation, and civic participation.		X	X

34. I implement learning activities in which learners use digital technologies to produce digital content, e.g. in the form of text, photos, other images, videos, etc.	X	X
35. I enable learners to understand risks and threats in digital environments (e.g. identity theft, fraud, stalking, phishing) and how to react appropriately.		X
36. I encourage learners to help each other in developing their digital competence.		X
37. I enable learners to apply their digital competence in unconventional ways to new situations and creatively come up with new solutions or products.		X

S o u r c e: author's own work.

Building on Correos et al., (2014), common to all the teachers are the so-called basic ICT literacy skills (statements 1, 2 and 6) that include general computer knowledge, file management knowledge, system maintenance and security knowledge, word processing skills, communication skills, web skills and presentation skills. The remaining statements ticked fall into the category of ICT utilization in teaching skills (Perez &Murray, 2010; Correos, 2014) denoting the activities that go beyond the computer operation tasks as such. Here, most teachers (Teacher 1, 3 and 4) have this ability to utilize most of digital tools both among their learners and peer teachers for instruction and professional development respectively (statements 3, 7, 8, 10, 11, 13, 14, 16, 24, 28, 30, 31). The skills characterizing the two instructors exclusively pertain to more sophisticated actions, such as producing digital contents with and by their learners themselves, and self-assessment (statements 4, 5, 26, 33, 34). Last but not least, the features placed next to Teacher 4, reflected in every single statement, prove her being the most digitally-advanced, and exceptional in view of being the only one to choose the options promoting digital support among the learners (statements 27, 35, 36, 37). The types of digital competences possessed by the sample correspond to Morańska's (2023) study, where the repertoire of digital skills has been found among the majority of teachers examined and regarded as protective competences intended to ensure that students can function efficiently and safely in the emerging information society.

Profiling Language Teachers in a Post-COVID Classroom

All things considered, the state and growth of teachers' professional digital competences can be portrayed in at least three different ways. The first one, being *progressive* in nature, is likely to stand for a situation in which teachers acquire competences over time, starting from the zero level (the period between March

and June 2020), going through the measurement 1 or level 1 (September 2022) and measurement 2 or level 2 (September 2023) with increased areas of skills marked by the time interval each time. It is also presumed that teachers' competences will develop in the future. As an instance here, Teacher 1 and Teacher 3 best fit this description, striving for a continuous development of their knowledge and skills. Another observation made, characterized by *progression* and *stability*, concerns the cases of improvement taking into account the first educational stage (March–June 2020) and the post-pandemic period at the onset of September 2022 and, later on, evidence of stability comparing the time-lines of September 2022 and September 2023. Here, a perfect example would be Teacher 2 and Teacher 4, showcasing their improved competences at level 1 (September 2022), and skill stability level at a later time (September 2023). However, due to the scope and quality of competences achieved by the teachers up to the measurement 1, it is suggested to divide this stage of teacher competences into two substages, notably, a *positive* and *negative* one. The positive one is likely to apply to a rich skill repertoire enabling the teacher to conduct language classes with a huge base of knowledge and facilities (Teacher 4), whereas the negative variant is bound to cover basic teachers' digital competences limiting work with the help of new technologies, and more often than not making it impossible (Teacher 2).

Going even further and trying to outline the language teachers' profiles, it seems legitimate to make use of the descriptors of the teachers' digital proficiency levels offered by the DigCompEdu Framework, beginning from A1 (Novice) to C2 (Pioneer) teachers. To build on the framework reference list, a novice is a teacher who has very little contact with digital tools and feels insecure. The explorer uses digital tools, but needs help and inspiration to expand competences. The integrator uses and experiments with digital tools for various purposes, and tries to understand which digital strategies work best. The expert makes use of a range of digital skills confidently, and critically extends the repertoire. The leader has a wide repertoire of flexible, comprehensible and effective digital strategies and is a source of inspiration for others. Last but not least, a pioneer is considered an expert in the field of digital technologies, experiments, introduces innovations, and is a model for other teachers. On the basis of the research findings, Teacher 1 seems to display the features of both the explorer (willing to learn) and the integrator (trying to find the best solutions) with some characteristics of an expert educator (sharing with others). Teacher 2 appears to be a novice with a huge deficit of skills to overcome (if ever realized and approached). Teacher 3, accordingly, resembles all the qualities ascribed to Teacher 1, focused on development and integration of skills, as well as interaction with others. Finally, Teacher 4 gives the impression of being a leader and a pioneer taking care of digital competences both when it comes to the learners and the teachers through efficient development and innovation. Looking at the teachers from a more practical perspective defining digital competences as consisting of IT, information and communication/functional competences (Ogonowska,

2016), the sample in question can be conceived of as representative of *IT* (Information Technology), *literates*, *I* (Information) *literates* and *mass-self communication users* respectively. By definition, the first category of competences involves teachers who are hardware, software and application literates (Teacher 1, 3 and 4), leaving Teacher 2 behind due to her lack of skills in using a variety of applications. The second type of competences, reckoned as the teacher's ability to determine when the information is needed, as well as to search, evaluate and use the information from various sources, can be ascribed to all four respondents. Likewise, the third one, interpreted as the skills which encompass features of mass and individual communication, resulting in shaping an image online and communicating effectively with the environment, seems to concern all the teachers under investigation.

Conclusions

Irrespective of the before-mentioned tendencies, a few facts have to be underlined. First of all, based on the interview data collected, it is evident that the teachers in question did not possess any digital competences in the initial period of the pandemic, which immediately answers the first research question (RQ1). This piece of evidence is also consistent with the research results obtained by others (e.g. Maziarz, 2020; Jabłonowska & Wiśniewska, 2021), proving that definitely more teachers knew the applications than used them in their work. Second, dealing with the issues encapsulated in the second research question (RQ2), the competences of the subjects under investigation became visible as a result of the first questionnaire measurement, confirming the assumption that time makes a difference. Here, this difference was the result of the courses taken by the teachers in the lockdown period. Third, with regard to the answers to the remaining research questions (RQ 3, 4, 5), it must be emphasized that the second measurement of the teachers confirmed that their competences differed from the previous period, but to a different extent, probably for individual reasons. Furthermore, the observed tendencies that can be translated into the teachers' digital profiles (from being a novice teacher to a leading one) are independent of teacher seniority and length of teaching experience, yet it is evident that the quality of the teachers' competences is relative to their basic skills and education, as well as the functions performed in the institution, which directly correlates with higher professional skills, including digital competences. Taking into account the increased dynamics of transformation of digital tools and the dynamics of their multiple educational applications during and after the pandemic, it is necessary for teachers to undergo a constant process of developing their digital fluency determined by standardization, affordance and hybridization of ICT (Turula,

2023). Standardization means that teachers use technology seamlessly, that is, blending it into everyday practices, without emotions, and automatically wherever it makes life easier. Affordance stands for a wise matching of technologies (in the sense of specific application(s) to the tasks which teachers set for students. Most often, affordances refer to Puentedura's SAMR model, where S refers to substitution of traditional tools, A means augmentation of didactics using ICT, M stands for modification, while R for redefinition of tasks using technology. Lastly, hybridization denotes here a teacher's ability to implement a flexible learning schedule, be flexible in teaching modes, as well as promote flexibility in collaboration and communication between peers thanks to robust technology skills and infrastructure (Turula, 2023, p. 14).

Study Limitations

Although the study allowed for examining teachers' self-perception of digital competences over time, and profiling the teachers in accordance with the digital competence framework, several shortcomings and limitations of the research can be found. First of all, focusing on English teachers' digital competences, the research involved a small sample of four teachers from two primary schools in Poland. Second, the study does not delve into the specific challenges or obstacles which English teachers face in improving their digital competences, which could provide valuable insights for future research and practical implications. Being general in nature, the study does not take into account any specific digital tools, platforms or resources that the English teachers found the most difficult or the most beneficial in improving their digital competences, which could provide practical recommendations for teacher training programmes and curriculum development. Last but not least, the paper does not trace any long-term effects improving the teachers' digital competences on student performance or engagement in the classroom. All of these aspects will be addressed in the future research.

Further Studies

Also, the reasons for teachers' (non)development of digital competences could be a possible direction for the future studies. Moreover, it is worth broadening a perspective of the case study reported on here, and designing research on a larger number of teachers, and on different educational levels, including secondary and

tertiary education. Yet another suggestion is to implement a more practical study, centred on the classroom procedures focused on the actual use of digital competences employed by teachers in the context of language instruction. The latter seems to be extremely timely in the light of the changes announced in the government programme for the development of digital competences, which announces primarily the improvement and development of teachers' methodological skills in the field of digital education, including, among others, improvement and development of teachers' digital skills in the field of artificial intelligence, and digital competences necessary for modern and high-quality management (Monitor Polski, 2023).

References

Aznar, V., & González, J. (2010). Interactive resources in secondary education: Design and application. *International Journal of Learning*, *17*(2), 181–194.

Badia, A., Meneses, J., Sergi, F., & Sigalés, C. (2014). Factors affecting school teachers' perceptions of the instructional benefits of educational digital media. *Electronic Journal of Educational Research, Assessment & Evaluation*, *21*(2), 1–11. https://doi.org/ 10.1016/j.sbspro.2014.05.063.

Bieganowska-Skóra, A., Pankowska, D. (2020). Moje samopoczucie w e-szkole. Raport z badań. [My well-being at e-school. The research report]. https://phavi.umcs.pl/at/attachments/2020/1126/112228-moje-samopoczucie-w-e-szkole-raport-zbadan. pdf.

Caena, F., & Redecker, C. (2019). Aligning teacher competence frameworks to 21st century challenges: The case for the European digital competence framework for educators (Digcompedu). *European Journal of Education*, *54*(3), 356–369. https://doi.org/10.1111/ejed.12345.

Carmen, C., & Flores, M., A. (2020). COVID-19 and teacher education: a literature review of online teaching and learning practices. *European Journal of Teacher Education*, *43*(4), 466–487. https://doi.org/10.1080/02619768.2020.1821184.

Correos, C. (2014). Teachers' ICT Literacy and Utilization in English Language Teaching. *ICT & Innovations in Education International Electronic Journal*, *2*(1), 1–25.

Derakhshan, A., Kruk, M., Mehdizadeh, M., & Pawlak, M. (2022). Activity-induced boredom in online EFL classes. *ELT Journal*, *76*(1), 58–68. https://doi.org/10.1093/elt/ccab072.

Dycht, M., & Śmiechowska-Petrovskij, E. (2021). *Edukacja w sytuacji (post)pandemii – wyzwania i perspektywy*. [Education in a (post)-pandemic situation – challenges and perspectives]. Wydawnictwo Adam Marszałek.

Falloon, G. (2020). From digital literacy to digital competence: The teacher digital competency (TDC) framework. *Educational Technology Research and Development*, *68*(5), 2449–2472. https://doi.org/10. 1007/s11423-020-09767-4.

Jabłonowska, M., &Wiśniewska, J. (2021). Edukacyjne ramy kompetencji cyfrowych nauczycieli – kluczowe obszary badania poziomu umiejętności i ich implikacje. [The European Framework for the Digital Competence of Educators (DigCompEdu): key skills evaluation areas and their implications]. *Edukacja Ustawiczna Dorosłych*, *1*(2021), 49–61. http://dx.doi.org/10.34866/nb0c-2e79.

Jelińska, M., & Paradowski, M. B. (2021). Teachers' engagement in and coping with emergency remote instruction during COVID-19-induced school closures: a multinational contextual perspective. *Online Learning Journal*, *25*(1), 303–328. https://doi.org/10.24059/olj.v25i1.2492.

Kessler, G. (2018). Technology and the Future of Language Teaching. *Foreign Language Annals*, *51*, 205–218. https://doi.org/10.1111/flan.12318.

Kim, L. E., & Asbury, K. (2020). 'Like a rug had been pulled from under you': The impact of COVID-19 on teachers in England during the first six weeks of the UK lockdown. *British Journal of Educational Psychology*, *90*(4), 1062–1083. https://doi.org/10.1111/bjep.12381.

Krumsvik, R. J., Øen Jones, L., Øfstedgaard, M., & Eikeland, O. J. (2016). Upper secondary school teachers' digital competence: Analysed by demographic, personal and professional characteristics. *Nordic Journal of Digital Literacy*, *11*(3), 143–164. https://doi.org/10.18261/issn.1891-943x-2016-03-02.

Maziarz, M. (2020). Kompetencje cyfrowe przyszłych nauczycieli języków obcych i ich potencjalny wpływ na planowanie procesu dydaktycznego. [The digital competencies of future foreign language teachers and their potential impact on planning the teaching process]. *Neofilolog*, *55*(1), 107–123. https://doi.org/10.14746/n.2020.55.1.7.

Monitor Polski Dziennik Urzędowy Rzeczypospolitej Polskiej. Uchwała nr 24 Rady Ministrów z dnia 21 lutego 2023r. https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WMP20230000318.

Morańska, D. (2023). Kompetencje cyfrowe nauczycieli. Raport z badań. [The digital competencies of teachers. Research report]. *Dydaktyka Informatyki*, *18*, 92–104. https://doi.org/10.15584/di.2023.18.7.

Ogonowska, A. (2016). Kompetencje cyfrowe we współczesnej cywilizacji medialnej. [Digital Competences in the Modern Media Civilization]. *Cyfrowa humanistyka*, *8*(2), 14–26.

Olofsson, A. D., Fransson, G., & Lindberg, J. O. (2019). A study of the use of digital technology and its conditions with a view to understanding what 'adequate digital competence' may mean in a national policy initiative. *Educational Studies*, *46*(6), 1–17. https://doi:10.1080/03055698.2019.1651694.

Ouma, G. O., Awuor, F. M., & Kyambo, B. (2013). E-Learning readiness in public secondary schools in Kenya. *European Journal of Open, Distance and E-Learning*, *16*(2), 97–110. https://files.eric.ed.gov/full text/EJ1017522.pdf.

Papaja, K. (2021). Negative emotions experienced by Polish English teachers during COVID 19: a qualitative study based on diaries. *Lublin Studies in Modern Languages and Literature*, *45*(3), 3–17. https://doi.org/10.17951/lsmll.2021.45.1.3-17.

Pawlak, M., Derakhshan, A., Mehdizadeh, M., & Kruk, M. (2022). Boredom in online English language classes: Mediating variables and coping strategies. *Language Teaching Research*, *101*, 41–82. https://doi.org/10.1177/13621688211064944.

Pérez, J., Murray, M. C. (2010). Generativity: The New Frontier for Information and Communication Technology Literacy. *Interdisciplinary Journal of Information, Knowledge, and Management*, *5*, 127–137.

Plebańska, M., Szyller, A., Sieńczewska, M. (2020). *Edukacja zdalna w czasach COVID-19. Raport z badania – czerwiec 2020*. [*Distance Education in the Times of COVID19. Research report – June 2020*]. University of Warsaw.

Pyżalski, J., Zdrodowska, A., Tomczyk, Ł., Abramczuk, K. (2019). *Polskie badanie EU Kids Online 2018. Najważniejsze wyniki i wnioski*. Wydawnictwo Naukowe UAM.

Selwyn, N. (2011). *Schools and schooling in the digital age: A critical analysis*. Routledge.

Tomczyk, Ł. (2019). What do teachers know about digital safety? *Computers in the Schools*, *36*(3), 167–187. https://doi.org/10.1080/07380569.2019.1642728.

Tomczyk, Ł. (2021). E-learning in Poland: Challenges, opportunities and prospects for remote learning during the Covid-19 pandemic. *Higher Education in Russia and Beyond*, *2*(27), 10–12.

Turula, A. (2023). Postęp technologiczny a przyszłość edukacji. [Technological progress and the future of education]. *Refleksje*, *4*, 12–16.

Marzena Wysocka-Narewska

Kompetencje cyfrowe nauczycieli języka angielskiego w klasie post-covidowej – studium przypadku

S t r e s z c z e n i e

Artykuł porusza kwestię kompetencji cyfrowych nauczycieli języka angielskiego w kontekście klasy post-covidowej objętej ramami czasowymi począwszy od września 2022 do września 2023 roku. W celu sprawdzenia poziomu kompetencji cyfrowych nauczycieli, którzy według obecnego stanu badań, w pierwszym okresie pandemii wykazywali brak ww, przeprowadzony został wywiad retrospektywny. Na etapie drugim, we wrześniu 2022 roku, kiedy rozpoczął się pierwszy rok szkolny bez jakichkolwiek restrykcji pandemicznych, nauczyciele zostali poddani szczegółowemu oglądowi kompetencji za pomocą ankiety pozwalającej na samodzielne oznaczenie (nie)wykorzystywanych kompetencji cyfrowych podczas zajęć językowych zaczerpniętych z europejskiej ramy kompetencji cyfrowych nauczycieli (DigCompEdu). Dodatkowo, stan wiedzy i umiejętności nauczycieli z tego okresu, został porównany z ich kompetencjami w okresie drugim, we wrześniu 2023 roku, by sprawdzić wpływ takich czynników, jak czas, wcześniejsze doświadczenie w używaniu kompetencji oraz przebyte szkolenia i kursy na funkcjonowanie nauczycieli w klasie w okresie późniejszym. Do badania przystąpiło 4 nauczycieli reprezentujących szkoły podstawowe (SP nr 2 w Będzinie – trzech nauczycieli i SP nr 40 w Sosnowcu – 1 nauczyciel). Okazało się, że znajomość nowoczesnych technologii wśród próby była znikoma w pierwszy okresie lockdownu, co potwierdziło wstępne założenie, a później nabyte kompetencje cyfrowe były kwestią czasu i efektem udziału w szkoleniach i kursach. Jako że badani reprezentowali różny poziom umiejętności, który różnie rozkładał się w czasie, zarysowane zostały trzy tendencje (nie)rozwoju ww. kompetencji u poszczególnych respondentów. Ponadto nakreślono profile osób biorących udział w badaniu w oparciu o zestawienie determinantów biegłości cyfrowej nauczycieli zaproponowanej przez europejskie ramy kompetencji cyfrowych nauczycieli. Podkreślono fakt, iż nie tyle wiek, staż pracy, czy stopień awansu zawodowego mają wpływ na jakość kompetencji nauczycieli, ile ich wiedza bazowa, wykształcenie oraz dodatkowa funkcja w szkole, z którą mogą wiązać się dodatkowe kompetencje z zakresu nowoczesnych technologii. Zaleca się poszerzenie badań, w celu zmierzenia kompetencji na większej próbie badawczej, a także przyjrzenia się sytuacji klasy szkolnej pod kątem (nie)wykorzystywanych konkretnych kompetencji cyfrowych przez nauczycieli.

S ł o w a k l u c z o w e: kompetencje cyfrowe, nauczyciel języka angielskiego, europejskie ramy kompetencji cyfrowych (DigCompEdu), klasa post-covidowa

Marzena Wysocka-Narewska

Competencias digitales de profesores de inglés en el aula post-covid: un estudio de caso

R e s u m e n

El artículo aborda la cuestión de las competencias digitales de los profesores de inglés en el contexto del aula post-Covid abarcado por el periodo de septiembre de 2022 a septiembre de 2023. Con el fin de comprobar el nivel de competencias digitales de los docentes que, según el estado ac-

tual de la investigación, presentaban una falta de las habilidades mencionadas en el primer período de la pandemia, se realizó una entrevista retrospectiva. En la segunda etapa, en septiembre de 2022, cuando comenzó el primer año escolar sin restricciones pandémicas, los docentes fueron sometidos a una revisión detallada de las competencias mediante una encuesta que les permitió autocalificar las competencias digitales (no) utilizadas durante las clases de idiomas tomadas del Marco Europeo de Competencias Digitales del Profesorado (DigCompEdu). Además, se comparó el estado de conocimientos y habilidades de los docentes de este período con sus competencias en el segundo período, en septiembre de 2023, para comprobar el impacto de factores como el tiempo, la experiencia previa en el uso de competencias y la formación y los cursos realizados en el desempeño de los docentes. funcionando en el aula más tarde. En el estudio participaron cuatro profesores de escuelas primarias (escuela primaria n° 2 de Będzin, tres profesores y escuela primaria n° 40 de Sosnowiec, 1 profesor). Resultó que el conocimiento de las tecnologías modernas entre la muestra era insignificante en el primer período del confinamiento, lo que confirmó la suposición inicial, y posteriormente las competencias digitales adquiridas fueron una cuestión de tiempo y el resultado de la participación en formaciones y cursos. Como los encuestados representaban diferentes niveles de habilidades, que se distribuyeron de manera diferente a lo largo del tiempo, se describieron tres tendencias en el (no)desarrollo de las habilidades mencionadas anteriormente. competencias de los encuestados individuales. Además, se delinearon los perfiles de las personas que participaron en el estudio a partir de la lista de determinantes de la competencia digital de los docentes propuesta por el Marco Europeo de Competencia Digital de los Docentes. Se destacó que no es la edad, la antigüedad o el grado de promoción profesional lo que influye en la calidad de las competencias de los docentes, sino más bien sus conocimientos básicos, su educación y una función adicional en la escuela, que puede implicar competencias adicionales en el campo de las tecnologías modernas. Se recomienda ampliar la investigación para medir las competencias en una muestra de investigación más amplia, así como observar la situación de la clase escolar en términos de competencias digitales específicas (no) utilizadas por los docentes.

P a l a b r a s c l a v e: competencias digitales, profesor de inglés, Marco Europeo de Competencias Digitales (DigCompEdu), aula post-covid

Marzena Wysocka-Narewska

Цифровые компетенции учителей английского языка в постковидном классе – практический пример

А н н о т а ц и я

В статье рассматривается вопрос цифровых компетенций учителей английского языка в контексте постковидного обучения, охватываемого временным интервалом с сентября 2022 по сентябрь 2023 года. С целью проверки уровня цифровых компетенций учителей, которые, по данным текущего состояния исследований, в первый период пандемии показали отсутствие вышеперечисленных навыков, было проведено ретроспективное интервью. На втором этапе, в сентябре 2022 года, когда первый учебный год начался без ограничений, связанных с пандемией, учителя прошли детальную проверку компетенций с помощью опроса, позволяющего им самостоятельно отмечать (не)используемые цифровые компетенции на уроках языка, взятые из Европейская система цифровой компетентности учителей (DigCompEdu). Кроме того, состояние знаний и навыков учителей за этот период сравнивалось с их компетенциями во втором периоде, в сентябре 2023 года, чтобы проверить влияние таких факторов,

как время, предыдущий опыт использования компетенций, а также пройденное обучение и курсы на учителях. функционирование в классе позже. В исследовании приняли участие четыре учителя, представляющие начальные школы (Начальная школа № 2 в Бендзине – три учителя и Начальная школа № 40 в Сосновце – 1 учитель). Оказалось, что знание современных технологий среди выборки было незначительным в первый период локдауна, что подтвердило первоначальное предположение, а в дальнейшем приобретенные цифровые компетенции были вопросом времени и результатом участия в тренингах и курсах. Поскольку респонденты представляли разные уровни навыков, которые по-разному распределялись во времени, были намечены три тенденции в (не)развитии вышеупомянутых навыков. компетенции отдельных респондентов. Кроме того, профили людей, участвовавших в исследовании, были составлены на основе списка факторов, определяющих цифровую компетентность учителей, предложенных Европейской рамкой цифровой компетентности учителей. Подчеркнуто, что на качество компетенций учителей влияют не возраст, стаж или степень профессионального роста, а их базовые знания, образование и дополнительная функция в школе, которая может предполагать дополнительные компетенции в области современных технологий. Рекомендуется расширить исследование для измерения компетенций на более крупной исследовательской выборке, а также посмотреть на ситуацию школьного класса с точки зрения конкретных цифровых компетенций, (не) используемых учителями.

К л ю ч е в ы е с л о в а: цифровые компетенции, учитель английского языка, Европейская система цифровых компетенций (DigCompEdu), постковидный класс

International Journal of Research in E-learning
Vol. 10 (2), 2024, pp. 1–8

DOI 10.31261/IJREL.2024.10.2.08

Eugenia Smyrnova-Trybulska
University of Silesia in Katowice, Faculty of Arts and Educational Sciences Katowice, Poland
https://orcid.org/0000-0003-1227-014X

Aleksandra Słonka
The Higher School of Management and Entrepreneurship in Wałbrzych
https://orcid.org/0009-0000-8149-7802

A Report from the International Scientific Conference "Theoretical and Practical Aspects of Distance learning" DLCC2024 (www.dlcc.us.edu.pl) subtitled: "E-learning & Enhancing Soft Skills" which was held at the University of Silesia, Cieszyn, Poland. Monday 14th and Tuesday 15th October 2024

The 16th edition of the International Scientific Conference, "Theoretical and Practical Aspects of Distance learning" DLCC2024 (www.dlcc.us.edu.pl) was held under the theme "E-learning & Enhancing Soft Skills" on October 14th and 15th, 2024, at the University of Silesia in Cieszyn. It was organised by the Faculty of Arts and Educational Sciences in Cieszyn, the Faculty of Computer Science and Materials Sciences in Sosnowiec and the University of Silesia in Katowice (Poland).

The Conference was organized under the auspices of Rector of the University of Silesia in Katowice – Prof. dr hab. Ryszard Koziołek, Dean of the Faculty of Arts and Sciences of Education – Prof. dr hab. Katarzyna Marcol, Dean of the Faculty of Social Sciences – Prof. dr hab. Małgorzata Myśliwiec, Director of the Institute of Pedagogy – Prof. dr hab. Irena Polewczyk, Dean of the Faculty of Science and Technology – Prof. dr hab. Seweryn Kowalski, Director of the Institute of Computer Science – Prof. dr hab. inż. Rafał Doroz. The co-organisers were the University of Ostrava (UO), Czech Republic, Silesian University in Opava (SU), Czech Republic, Constantine the Philosopher University in Nitra (UKF), Slovakia, University of Extremadura (UEx), Spain, University of Twente (UT), The Netherlands, Lisbon Lusiada University (LU), Portugal, Curtin University in Perth

(CU), Australia, Borys Grinchenko Kyiv University (BGKU), Ukraine, Dniprovsk State Technical University (DSTU), Ukraine, IADIS – International Association for Development of the Information Society, a non-profit association, Polish Pedagogical Society, Branch in Cieszyn, Polish Scientific Society for Internet Education Association of Academic E-learning, Poland.

The International Scientific Conference "Theoretical and Practical Aspects of Distance Learning" DLCC2024 is an important event within the field of education, particularly focused on distance learning and its practical applications. It is organized annually by prominent academic institutions, including the University of Silesia in Katowice, Poland, and co-organized with various international universities. This conference brings together scholars, experts, and educators from around the world to discuss advancements in distance education, e-learning, and technology-enhanced learning, which is critical as educational systems modernize worldwide .

Members of the International Programme Committee are experienced scientists, scholars, and researchers in the field of ITC and distance learning from many countries in Europe and worldwide. The Honorary Scientific Committee goes as follows:

- Prof. dr hab. Katarzyna Marcol, Dean of the Faculty of Arts and Educational Sciences, University of Silesia in Katowice, Poland
- Prof. dr hab. Małgorzata Myśliwiec, Dean of the Faculty of Social Sciences, University of Silesia in Katowice, Poland
- Prof. dr hab. Piet Kommers, Professor UNESCO, University of Twente, The Netherlands
- Doc. Ing. Katerina Kostolanyova, PhD, Vice-Dean of the Faculty of Pedagogy University of Ostrava, Czech Republic
- Prof. dr hab. Inż. Jan Kusiak, Head of E-Learning Centre, University of Science and Technology in Cracow (AGH), Poland
- Prof. dr hab. Natalia Morze, Vice-Rector of the Borys Grinchenko Kyiv University, Ukraine
- Professor Norbert Pachler, London University, United Kingdom
- Prof. dr hab. Irena Polewczyk, Director of the Institute of Pedagogy, University of Silesia in Katowice, Poland
- Prof. dr hab. inż. Rafał Doroz, Director of the Institute of Computer Science, University of Silesia in Katowice, Poland
- Prof. dr hab. Seweryn Kowalski, Dean of the Faculty of Sciences and Technology, University of Silesia in Katowice, Poland
- Prof. dr hab. Maciej Tanaś, Dean of the Pedagogical Faculty, Maria Grzegorzewska Academy of Special Education, Poland
- Professor dr inż. Milan Turcani, Constantine the Philosopher University in Nitra, Slovakia
- Professor Pedro Veiga, Vice-rector of the Lisbon University, Portugal

The conference topics include the following thematic sections:

1. E-learning & Enhancing Soft Skills
- Key competences and soft skills in the digital society
- E-learning for humanities and social sciences
- Self-learning based on e-learning and Internet technology
- E-learning and online learning
- Blended learning
- Legal, social, human, scientific, and technical aspects of distance learning and e-learning in different countries
- European and national standards of e-learning quality evaluation
- Psychological and ethical aspects of distance learning and e-learning
- E-collaboration and e-communication in e-learning
- E-environment of the contemporary university
- E-learning in a sustainable society. Ecosystem and green university
- Comparative approach in research on e-learning

2. E-learning & enhancing key competences.
- Methodology and Tools Development
- Use of e-learning in improving the level of specialists and students' digital competences
- Innovative educational technologies, tools and methods for e-learning
- Modern ICT tools for e-learning in the time of COVID-19 and after pandemic – review, implementation, opportunities for effectiveness of learning and teaching
- MOOCs – methodology of design, conducting, implementation and evaluation
- Education 4.0 and Education 5.0
- E-learning and effectiveness using Learning Management System (LMS), CMS, VSCR, SSA, CSA
- Cloud computing environment, social media, multimedia resources
- Methodological tools. E-tutoring. (Video)tutorial design
- Simulations, models in e-learning and distance learning
- Successful examples of M-learning, e-learning
- Evaluation of synchronous and asynchronous teaching and learning, methodology and good examples

3. E-learning in the transformation of education in digital society: training of the specialists and LLL
- Contemporary trends in world e-learning in conditions of globalization, internationalization, mobilities
- Effective development of teachers' digital skills
- E-learning and Lifelong Learning
- E-environment and cyberspace security development of key and soft competences and e-learning
- AI and cyberspace. Cybersecurity

- Networking, distance learning systems

4. E-learning & AI, STEAM Education

- Artificial intelligence (AI), augmented reality (AR), virtual reality (VR)
- SMART Universities. SMART Technology in education
- AI in education: perspective and challenges
- AI Apps: ChatGPT and beyond
- Students and teacher competences in the area of AI
- Ethical and social aspects of AI
- Machine learning. Learning analytics.
- Immersive learning environments. Blockchain. ChatBots
- E-learning and STEAM Education
- Robots and coding in education
- Internet of things. 3D printing
- STEM education contemporary trends and challenges
- Distance learning in humanities and science
- Quality of teaching, training in the area of e-learning
- E-learning for science and technologies

Experts from many countries, such as Bulgaria, Czech Republic, Portugal, Poland, Slovakia, Taiwan, Turkey, United Kingdom, Ukraine, reflected on innovative educational technologies, tools and methods, particularly artificial intelligence (AI), for e-learning, as they presented their research results, contemporary trends and scientific, as well as educational projects devoted to Artificial intelligence (AI), MOOCs, augmented reality (AR), virtual reality (VR), mobile learning and other topics related to digital technologies and innovative methods of education.

Professor Nian-Shing Chen from the National Taiwan Normal University, Taiwan, presented a Keynote Lecture titled "Revolutionizing Education with Pedagogical AI Agents" (Figure 1).

He presented essential concepts about AI Agent, including:

- From human writing programs to AI writing programs
- From AI as tools to AI colleagues
- Millions of AI agents are entering the workforce across all domains
- Agents sitting on top of tools
- Multi-modality LLM
- Embodied AI – Robotics
- Realtime AI and Edge AI

To summarize his speech, , in the third part of his address, Professor Nian-Shing Chen demonstrated that science should be integrated with technology (AI Agent + Robot + IoT Object).

Subsequently, Professor Anna Ślósarz, from the Pedagogical University of Kraków, initiated a discussion on the active NAVOICA forum and the Polish MOOC platform.

Figure 1. Keynote Speaker Professor Nian-Shing Chen

A u t h o r of the photo: Konrad Matinyarare.

A team of researchers from Bulgaria, Professor Todorka Gluskova and her team Asya Stoyanova-Doycheva, Vanya Ivanova, Irina Krasteva, Mariya Grancharova-Hristova from Plovdiv University in Bulgaria, delivered a lecture titled: "An approach to automatic test generation from ontologies in the virtual education platform". The team introduced the audience to the topic of AI in education (AIEd), and cyber-physical and social education space (VES). The attendees learned what semantic modelling in VES is about and the importance of semantic web technologies.

Next, Prof. Małgorzata Przybyła-Kasperek, and her group of researchers, Prof. Rafał Doroz, Prof. Agnieszka Lisowska, Prof. Grzegorz Machnik, MSc, Arkadiusz Nowakowski, Dr Krzysztof Wróbel, and Prof. Beata Zielosko from the University of Silesia in Katowice, Institute of Computer Science, Poland, familiarized the audience with the process of exploring the educational efficacy and potential of 24-hour Hackathon Programming Marathon – HackEmotion. They explained what a Hackathon is and its educational benefits.

Representatives from the Poznań University of Medical Sciences, Prof. Magdalena Roszak and Prof. Katarzyna Zaorska, , called the report on the topic of "Multimedia resources should be standard in e-learning for medical and health sciences" on behalf of the team consisting of Prof. Katarzyna Zaorska, Dr Anna Smelkowska, Prof. Przemysław Keczmer, Prof. Karolina Szczeszek, Prof. Barbara Purandare, Prof. Agnieszka Karbownik, Prof. Marta Jokiel, Prof. Maurycy

Jankowski, Prof. Michał Duchodolski and Prof. Magdalena Roszak. The project "E-materials for the industry: health care, social welfare, protection of the safety of persons and property" co-financed by EU funds under the European Social Fund and Łódź University of Technology and Poznan University of Medical Sciences enabled the design and creation of educational electronical sources based on interactive and multimedia materials in six professions:

- Occupational therapist
- Medical caretaker
- Pharmaceutical technician
- Medical sterilization technician
- Orthopaedic technician

The didactic content included interactive exercises, a dictionary, a teacher's teaching guide, netography and bibliography and a user manual.

Prof. Stefan Gubo, from J. Selye University, Komarno, Slovakia, spoke on the topic of "Solution time and confidence in the assessment of algorithmic and logical thinking of first-year computer science students" on his behalf and his co-author, Prof. Ladislav Vegh. Dr. Miroslav Hruby from the Department of Informatics and Cyber Operations Faculty of Military Technology, University of Defence, Brno, Czech Republic, introduced programming in technical-focused education.

After the break, Professor Nian-Shing Chen conducted the Workshop titled „Designing pedagogical AI agents" on the first day of the conference (October 14). He presented theoretical bases and practical aspects of designing pedagogical AI agents step by step using ChatGPT 4.0 and the Kebbi Air robot as well as the Internet of Things (IoS) component (Figure 2).

Figure 2. Professor Nian-Shing Chen conducted the Workshop titled „Designing Pedagogical AI Agents"

A u t h o r of the photo: Jakub Sacewicz.

The second day (October 15) in the framework of DLCC2024 conference started with the round table debate "E-Learning and Enhancing Soft Skills: Contemporary Models of Education in the Era of Artificial Intelligence", moderated by Eugenia Smyrnova-Trybulska and Magdalena Roszak. The participants of the debate were Prof. Nian-Shing Chen – Taiwan, Prof. Todorka Glushkova – Bulgaria, Prof. Pedro Isaias – in Portugal, Prof. Anna Ślósarz – Poland, Prof. Nataliia Morze – Ukraine, Prof. Štefan Gubo – Slovakia, Prof. Małgorzata Przybyła-Kasperek – Poland, Dr Miroslav Hruby – Czech Republic. The main reflections were presented by experts from different countries in the area of AI in education, who participated in the round table debate "E-Learning and Enhancing Soft Skills: Contemporary Models of Education in the Era of Artificial Intelligence". The agenda included three topics: 1) E-learning and enhancing soft skills: contemporary models of education in the era of artificial intelligence; 2) Good practice examples using AI in education for soft skills development; 3) AI – perspective and challenges used in education (Figure 3).

Figure 3. Participants of the round table debate "E-Learning and Enhancing Soft Skills: Contemporary Models of Education in the Era of Artificial Intelligence"

A u t h o r of the photo: Emilia Gogol.

During the plenary and conference session on the second day of the conference, the researchers and participants were presented with 22 lectures, and two workshops „Enhancing the competences in area AI based microlearning using Priscilla platform" and "AI without secrets" were held, conducted by prof. Małgorzata Przybyła-Kasperek and dr Kornel Chromiński.

In total, the conference included 29 presentations, three workshops, a round table debate and a poster session.

The DLCC2024 conference was actively attended by 81 participants (Figure 4) from over 10 countries in an offline and online mode, including 9 from the University of Silesia, 18 from Poland and 54 from abroad. There were also over 100 passive participants.

Figure 4. Participants of the DLCC2024 conference

A u t h o r of the photo: Emilia Gogol.

The articles developed based on the conference participants' papers will be published in a book. The monograph on "E-learning & Enhancing Soft Skills" will be published by the renowned Springer publishing house.

Considering the international scope and involvement of respected institutions, the DLCC2024 conference is a significant international scientific event for a wide range of scientists, teachers, PhD students, students, educators, tutors, mentors, and anyone interested in the future of education, especially in the context of digital learning environments and the implementation of new technologies and innovative methods. The conference video available on the University of Silesia YouTube channel: https://www.youtube.com/watch?v=MrmomAgwslo&t=63s

The next 17th edition of the DLCC2025 conference is planned for October 21–22 2025 at the WSNE UŚ in Cieszyn. We thank you for your interest in this scientific event and invite you kindly to participate in this international forum.

International Journal of Research in E-learning
Vol. 10 (2), 2024, p. 1

Contributors

Daria Joanna Becker-Pestka, PhD, WSB University, Gdańsk, Poland, email: dbecker@wsb.gda.pl
Harshita Bhatnagar, PhD, Vidya Bhawan Rural Institute, Affiliated to MLSU, India, email: hbhatnagar.mba@gmail.com
Nian-Shing Chen, Professor, PhD, National Taiwan Normal University, Taiwan, email: nianshing@gmail.com
Mirosław Hruby, PhD, Ing., CSc., University of Defence, Faculty of Military Technology, Department of Communication and Information Systems (CIS), Brno, Czech Republic, email: miroslav.hruby@unob.cz
Todorka Glushkova, PhD, Associate Professor, Department of Computer Technologies, University of Plovdiv, Bulgaria, email: todorka.glushkova@gmail.com
Štefan Gubo, PhD, Associate Professor, J. Selye University, Faculty of Economics and Informatics, Komárno, Slovakia, email: gubos@ujs.sk
Tomasz Kopczyński, PhD, Professor of the University of Silesia in Katowice, Poland, email: tomasz.kopczynski@us.edu.pl
Nataliia Morze, PhD hab., Professor Borys Grinchenko Kiev Metropolitan University, Ukraine, email: n.morze@kubg.edu.ua
Zdenek Mruzek, MA, Albrechtova Stredni Szkoła in Český Těšín, Czech Republic, email: zmruzek@seznam.cz
Natalia Maria Ruman, PhD, assistant professor, University of Silesia in Katowice, Poland, email: natalia.ruman@us.edu.pl
Małgorzata Przybyła-Kasperek, PhD hab., Professor of the University of Silesia in Katowice, Poland, email: malgorzata.przybyla-kasperek@us.edu.pl
Ewelina Rzońca, PhD, associate professor, Kardinal Stefan Wyszyński University in Warsaw, email: e.rzonca@uksw.edu.pl
Aleksandra Słonka, MA, the Higher School of Management and Entrepreneurship in Wałbrzych, Poland, email: aslonka1975@gmail.com
Eugenia Smyrnova-Trybulska, PhD hab., Professor of the University of Silesia in Katowice, Poland, email: esmyrnova@us.edu.pl
Anna Ślósarz, Dr hab., Professor of the University of the National Education Commission in Krakow, Poland, email: anna.slosarz@uken.krakow.pl
Tomasz Warchoł, PhD, University of Rzeszów, Poland, email: twarchol@ur.edu.pl
Marzena Wysocka-Narewska, PhD, assistant professor, University of Silesia in Katowice, Poland, email: marzena.wysocka-narewska@us.edu.pl

International Journal of Research in E-learning
Vol. 10 (2), 2024, pp. 1–3

In the "E-learning" Series

http://weinoe.us.edu.pl/nauka/serie-wydawnicze/seria-e-learning/seria-e-learning
http://www.ig.studio-noa.pl/pubusc.html

ISSN 2451-3644
(print edition)
ISSN 2451-3652
(digital edition)

1. Smyrnova-Trybulska, E. (ed.) (2023). *E-learning & Artificial Intelligence*. "E-learning" Series. Vol. 15 (2023). Katowice–Cieszyn: STUDIO NOA for University of Silesia. 305 p. ISSN 2451-3644 (print edition), ISSN 2451-3652 (digital edition), ISBN 978-83-66055-39-1. https://doi.org/10.34916/el.2023.15.
2. Smyrnova-Trybulska, E. (ed.) (2022). *E-learning in the Transformation of Education in Digital Society*. "E-learning" Series. Vol. 14 (2022). Katowice–Cieszyn: STUDIO NOA for University of Silesia. 287 p. ISSN 2451-3644 (print edition), ISSN 2451-3652 (digital edition), ISBN 978-83-66055-31-5. https://doi.org/10.34916/el.2022.14 (**indexed in Web of Science Core Collection**)
3. Smyrnova-Trybulska E. (ed.) (2021). *E-learning in the Time of COVID-19*. "E-learning" Series. Vol. 13 (2021). Katowice–Cieszyn: STUDIO NOA for University of Silesia. 322 p. ISSN 2451-3644 (print edition), ISSN 2451-3652 (digital edition), ISBN 978-83-66055-25-4. https://doi.org/10.34916/el.2021.13 (**indexed in Web of Science Core Collection**)
4. Smyrnova-Trybulska E. (ed.) (2020). *Innovative Educational Technologies, Tools and Methods for E-learning*. "E-learning" Series. Vol. 12 (2020). Katowice–Cieszyn: STUDIO NOA for University of Silesia. 335 p. ISSN 2451-3644 (print edition), ISSN 2451-3652 (digital edition), ISBN 978-83-66055-19-3. https://doi.org/10.34916/el.2020.12 (**indexed in Web of Science Core Collection**)
5. Smyrnova-Trybulska E. (ed.) (2019). *E-learning and STEM Education*. "E-learning" Series. Vol. 11 (2019). Katowice–Cieszyn: STUDIO NOA for University of Silesia. 704 p. ISSN 2451-3644 (print edition), ISSN 2451-3652 (digital edition), ISBN 978-83-66055-12-4 (**indexed in Web of Science Core Collection**)
6. Smyrnova-Trybulska E. (ed.) (2018). *E-learning and Smart Learning Environment for the Preparation of New Generation Specialists*. "E-learning" Series. Vol. 10 (2018). Katowice–Cieszyn: STUDIO NOA for University of Silesia. 667 p. ISSN: 2451-3644 (print edition), ISSN 2451-3652 (digital edition), ISBN 978-83-66055-05-6 (**indexed in Web of Science Core Collection**)
7. Smyrnova-Trybulska, E. (ed.) (2017). *Effective Development of Teachers' Skills in the Area of ICT and E-learning*. "E-learning" Series. Vol. 9 (2017). Katowice–Cieszyn: STUDIO NOA for University of Silesia. 497 p. ISSN 2451-3644 (print edition), ISSN 2451-3652 (digital edition), ISBN 978-83-60071-96-0 (**indexed in Web of Science Core Collection**)
8. Smyrnova-Trybulska, E. (ed.) (2016). *E-learning Methodology – Implementation and Evaluation*. "E-learning" Series. Vol. 8 (2016). Katowice–Cieszyn: STUDIO NOA for University of Silesia.

478 p. ISSN 2451-3644 (print edition), ISSN 2451-3652 (digital edition), ISBN 978-83-60071 -86-1.
9. Smyrnova-Trybulska, E. (ed.) (2015). *IT Tools – Good Practice of Effective Use in Education*. Katowice–Cieszyn: STUDIO NOA for University of Silesia, 2015, 408 p. ISBN 978-83-60071 -82-3.
10. Smyrnova-Trybulska, E. (ed.) (2014). *E-learning and Intercultural Competences Development in Different Countries*. Katowice–Cieszyn: STUDIO NOA for University of Silesia, 2014, 484 p. ISBN 978-83-60071-76-2.
11. Smyrnova-Trybulska, E. (ed.) (2013). *E-learning & Lifelong Learning*. Katowice–Cieszyn: STUDIO NOA for University of Silesia, 2013, 587 p. ISBN 978-83-60071-66-3.
12. Smyrnova-Trybulska, E. (ed.) (2012). *E-learning for Societal Needs*. Katowice–Cieszyn: STUDIO NOA for University of Silesia, 2012, 557 p. ISBN 978-83-60071-59-5.
13. Smyrnova-Trybulska, E. (ed.) (2011). *Use of E-learning in the Developing of the Key Competences*. Katowice–Cieszyn: STUDIO NOA for University of Silesia, 2011, 462 p. ISBN 978 -83-60071-39-7.
14. Smyrnova-Trybulska, E. (ed.) (2010). *Use of E-learning in the Training of Professionals in the Knowledge Society*. Cieszyn–Katowice: STUDIO NOA for University of Silesia, 2010, 344 p. ISBN 978-83-60071-30-4.
15. Smyrnova-Trybulska, E. (ed.) (2009). *Theoretical and Practical Aspects of Distance Learning*. Cieszyn: Studio TK Graphics for University of Silesia, 308 p. ISBN 978-83-925281-4-2.

Coursebooks on e-learning

1. Smyrnova–Trybulska, E., Stach, S., Burnus, A., Szczurek, A. (2012). *Wykorzystanie LCMS Moodle jako systemu wspomagania nauczania na odległość* [*Using LCMS Moodle as a distance learning support system. Academic textbook*], Smyrnova–Trybulska, E., Stach, S. (red.). Katowice–Cieszyn: STUDIO NOA dla Uniwersytetu Śląskiego, 560 s. ISBN 978-83-60071 -56-4. Retrieved from https://rebus.us.edu.pl/handle/20.500.12128/7515
2. Stach S., Fuklin, B., Staniek, D. (2012). *Zastosowanie systemów CMS w tworzeniu przestrzeni informacyjno-edukacyjnej w Internecie* [*Using CMS systems in creating information and educational space on the Internet. Academic textbook*], E. Smyrnova–Trybulska, S. Stach (red.). Katowice–Cieszyn: STUDIO NOA dla Uniwersytetu Śląskiego, 194 s. ISBN 978-83-60071-55-7. Retrieved from https://rebus.us.edu.pl/handle/20.500.12128/7516

Monograph

1. Smyrnova–Trybulska, E. (2018). *Technologie informacyjno-komunikacyjne i e-learning we współczesnej edukacji* [*Information and communication technologies and e-learning in contemporary education*]. Katowice: Wydawnictwo Uniwersytetu Śląskiego [Univresity of Silesia Press], 572 s. ISSN 0208-6336 ISBN 978-83-226-3070-9 (wersja drukowana [printed version]); ISBN 978-83-226-3071-6 (wersja elektroniczna [electronic version]). Retrieved form https://rebus.us.edu.pl/bitstream/20.500.12128/22016/1/Smyrnova_Trybulska_Technologie_ informacyjno_komunikacyjne.pdf
2. Smyrnova-Trybulska, E., Chen, N.-S., Kommers, P. & Morze, N. (Eds.). (2025) *E-Learning and Enhancing Soft Skills: Contemporary Models of Education in the Era of Artificial Intelligence*. Springer Nature Switzerland .https://doi.org/10.1007/978-3-031-82243-8; ISBN 978-3-031-82 242-1; https://link.springer.com/book/10.1007/978-3-031-82243-8

Contact
International Journal of Research in E-learning
University of Silesia in Katowice
Faculty of Arts and Educational Sciences
Bielska 62, 43-400 Cieszyn, Poland
phone: +48 33 854 61 12
fax: +48 33 854 61 01
email: esmyrnova@us.edu.pl

Copy editing and proofreading
Marzena Wysocka-Narewska

Cover design
Emilia Dajnowicz

Cover preparation for printing
Tomasz Kiełkowski

Typesetting
Ireneusz Olsza

Electronic version is the original one.
The journal was previously published in printed form with the **ISSN 2451-2583**

The journal is distributed free of charge **ISSN 2543-6155**

Published by
Wydawnictwo Uniwersytetu Śląskiego
ul. Bankowa 12B, 40-007 Katowice
www.wydawnictwo.us.edu.pl
e-mail: wydawnictwo@us.edu.pl

Printed sheets: 12.0.
Publishing sheets: 15.0.

ISSN 2543-6155
44
9 772543 615409

Free copy

About this book