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Editorial

ARTIFICIAL INTELLIGENCE: EDUCATIONAL TOOL OR EDUCATIONAL CHALANGE?

Significant progress has been achieved in artificial intelligence (AI), leading to solutions that have drawn interest and attention from practitioners, academics, and users in the field of education. AI's transformative potential has the capacity to change education through the use of technologies like AI assistants and other current solutions. Research support, content creation, and language learning, including computer language programming, are among the common uses for AI. Numerous topics are examined in this field of study, such as academic honesty and integrity and the efficacy of learning. Hundreds of AI-based teaching and learning strategies have already been detailed and published in various studies. The efforts behind such achievements are enormous. This Special Section of *Facta Universitatis Series: Teaching, Learning and Teaching Education* contributes to the current trends in this rapidly developing and continuously growing subject by looking into several interesting topics related to the use of AI in educational processes.

On November 29–30, 2024, the Pedagogical Faculty in Vranje, University of Niš, Serbia, organized the international conference "Education and Artificial Intelligence" (EDAI2024), held in both, in-person and virtual modes. It brought together leading scientists, researchers and educational professionals who shared their information and experiences and discussed practical challenges encountered and solutions adopted related to the latest developments in the area of AI and education. The conference EDAI2024 represents an intellectual challenge that bridges two transformative fields—education and artificial intelligence. Through engaging discussions, inspiring presentations, and vivid interactions, the event contributed to a deeper understanding of the potentials and challenges involved in integrating artificial intelligence into the education sector.

The conference topics began with the first thematic framework, “Social and Theoretical Aspects of Artificial Intelligence and Education,” where authors addressed the social implications and ethical dimensions of artificial intelligence in education. The discussions highlighted key issues such as the ethical challenges posed by AI, the need to ensure equity and accessibility in AI-enhanced educational environments, and the evolving role of teachers in AI-integrated classrooms. These sessions reminded us that, no matter how powerful, technology must be guided by principles that ensure fairness, inclusivity, and the dignity of every learner. The theoretical frameworks and privacy concerns explored laid a solid foundation for the responsible implementation of AI in education.

In the second thematic framework, “Empirical and Theoretical Contributions of Artificial Intelligence to the Educational Process,” authors focused on the measurable impacts of artificial intelligence on teaching and learning. The presented case studies and empirical research highlighted AI’s potential to increase student engagement, improve curriculum design, and enhance learning outcomes. Additionally, the authors emphasized the importance of balancing innovation with evidence-based practices to ensure that AI complements rather than replaces the valuable human aspects of education. Theoretical models and studies further enriched our understanding of AI’s role in the educational process.

Finally, the third thematic framework, "Technical Aspects and Contributions of Artificial Intelligence Applications in Education," showcased achievements in AI-driven tools and applications. These contributions demonstrate the vast potential of AI to personalize learning experiences and expand access to education. The technical innovations underscore the importance of interdisciplinary collaboration in refining these tools for real-world educational contexts.

The core message of the conference is that the integration of artificial intelligence into education is not merely a technological endeavor, but a deeply human process. As we harness the power of AI, we must remain committed to ethical principles, inclusivity, and the holistic development of learners.

Important lessons learned and future development directions include:

- Collaboration across disciplines is essential for the responsible and effective implementation of artificial intelligence in education.
- Policymakers, educators, technologists, and researchers must work together to address challenges related to ethics, equity, and privacy.
- Ongoing evaluation and adaptation are necessary to ensure that innovations in AI align with the diverse needs of learners around the world.

This conference would not have been possible without the contributions of many: dedicated authors, presenters, panelists, organizers, and all participants whose questions enriched the discussions and made the event engaging for a wider audience, both in-person and online. Special thanks are extended by the conference organizer, the Pedagogical Faculty in Vranje, University of Niš, to the Ministry of Science, Technological Development and Innovation of the Republic of Serbia, under whose patronage the conference was held.

The full proceedings of the conference were published by the Pedagogical Faculty in Vranje, University of Niš, Serbia (ISBN 978-86-6301-060-4) and can be found on the Faculty web site.

For this Special Section of *Facta Universitatis Series: Teaching, Learning and Teaching Education*, a few articles from EDAI2024 served as the inspiration for the extended, revised, and amended manuscripts that produced qualitatively new findings. Since the articles published here were loosely based on the respective EDAI2024 presentations, they were written especially for this Special Section. Every newly created manuscript was put through a rigorous peer review process with two or three reviewers.

Three papers altogether were selected for this Special Section. The chosen articles are the following

1. Marko Stanković, Aleksandar Milenković, Marina Svičević, Nemanja Vučićević, "Success of AI Math Solver Tool in Solving Non-Standard Mathematics Competition Problems"
2. Kristina Anđelić, Nina Kosanović, "The Application of the Principle of Bona Fides to the Use of Artificial Intelligence in Student Papers"
3. Tatjana Milosavljević Đukić, Teodora Kragović, Aleksandar Stojadinović, "Digital Transformation of Music Education: The Potentials of the Internet of Musical Things and Smart Musical Instruments in Contemporary Teaching Practice"

Stankovic et al. investigate how well the Interactive Mathematics platform's AI Math Solver performs when resolving 2024 Kangaroo competition problems. Three student categories—third and fourth grade elementary, seventh and eighth grade primary, and third and fourth grade high school students—were the focus of the chosen assignments. Because the Kangaroo competition's problem formulations and solution options often

contain visual details, the problems were posted as images (screenshots) in both Serbian and English. The findings are presented in two parts: a quantitative analysis that provides an overview of the tool's overall performance and a qualitative study of a few chosen situations that highlight typical patterns and errors. The results achieved fall substantially short of the authors' expectations. The system successfully completed 24 of the 84 tasks in both Serbian and English, which is slightly less than 30% of the total. Additionally, some tasks that were completed in English were not completed in Serbian, and vice versa. Furthermore, variations in the distribution of right answers among tasks with different degrees of difficulty were discovered.

The ethical use of artificial intelligence now falls under the sphere of morality rather than legal responsibility because its usage is not yet fully governed by legislation. Even though the idea of bona fides was present throughout Roman law, it was not always clear what exactly qualified as fair behavior and good faith in certain circumstances. Bona fides as a legal standard has always been open to interpretation. This also holds true for the problem the paper authored by Anđelić et al. attempts to solve. AI is portrayed as a technology that encourages student plagiarism because of its accessibility and user-friendliness. The lack of precise guidelines and regulations around the use of AI in the classroom is one of the issues with preventing potential abuse of the technology. When a student uses artificial intelligence (AI) to finish a writing project, the problem is not only how to establish criteria for defining what plagiarism is. Universities have to develop strategies for identifying AI-generated content in student writing and, more crucially, methods for modifying teaching procedures to prevent the use of AI to accomplish assignments.

Through a review of relevant research, Milosavljević Đukić et al. introduce the idea of the Internet of Musical Things (IoMusT) and the use of smart musical instruments in the classroom. Personalized practice, instant feedback, and synchronized virtual ensemble performance are made possible by a number of technological components, including pressure and motion sensors, wireless connectivity (Wi-Fi, Bluetooth), cloud and edge computing architectures, and AI-driven "microlearning" algorithms. The study shows that practice time may be decreased, social and metacognitive abilities can be significantly improved, and student motivation and autonomy can be raised through data-driven analytics and GDPR-compliant anonymization standards. The suggested solutions—"instrument as a service" finance methods, modular micro-certificate programs for AI-supported education, and privacy by design practices—address issues like high prices, the requirement for teacher training, and ethical privacy concerns. In the end, the study provides useful suggestions for the ethically responsible, pedagogically empowering, and interoperable integration of IoMusT technologies into music curricula at all educational levels.

The excellent quality of the papers in this Special Section should inspire young researchers to showcase their own achievements. I would be very pleased to see novel works that draw inspiration from our Special Section. Additionally, I want to thank all of the authors for their outstanding efforts, which made this Special Section possible. The gratitude also extends to FUTLTE Editor-in-Chief, Prof. Danijela Zdravković who initiated and outlined the work on this Special Section.

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