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Digital Resource Competence of Pre-Service Chemistry Teachers from the Perspective of the DigCompEdu Framework

Dr. Ivana Sotáková , Mária Ganajová , Petra Letošníková

Pavol Jozef Šafárik University in Košice, Slovakia

Abstract

The research goal was to verify the effectiveness of the digital resource database for chemistry teaching from the perspective of pre-service teachers, familiarise them with the use of digital resources in teaching, and support the development of their digital competence in accordance with the DigCompEdu framework. The research focused on the Digital Resources area: selection, creation, modification, and sharing of digital resources, and use of AI tools. The sample consisted of nine first-year master's students of combined chemistry specialisation at the Faculty of Science, Pavol Jozef Šafárik University in Košice. The intervention took place during the 2025/2026 academic year in the courses Activating Methods in Chemistry Teaching and Chemistry Didactics I, spanning 36 hours. Data were collected by means of a questionnaire designed by the authors based on the DigCompEdu framework. Closed-ended items were evaluated quantitatively. The Viki platform, AI tools (e.g. ChatGPT, NotebookLM), PhET simulations, and online databases of teaching materials were considered the most useful by students. Students cited technical issues, limited availability of resources in Slovak, difficulty navigating some platforms, and the need to critically evaluate the subject-specific correctness of digital content and AI outputs. They considered independent work with digital resources and AI tools, supported by instructor guidance, the most useful for developing their digital competence. It is recommended to encourage independent and group work with digital resources and shift the emphasis from passive consumption to the creation of learning activities that engage school students in active work with digital resources and develop their digital competence.

Keywords: Artificial Intelligence; Instructional Materials Database; Learning Activities; Technology-Enhanced Learning; University Students