

The System for Developing Information Competence of Future Primary School Teachers Through Virtual Technologies

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Abstract: This article analyzes the system of developing information competence of future primary school teachers through virtual technologies. The study employed mixed methods, combining quantitative and qualitative approaches. The results showed that the integration of virtual technologies into the educational process significantly enhances the information competence of future teachers. The article presents the main components of the system, evaluation mechanisms, and pedagogical foundations. The findings have practical significance for higher education institutions specializing in pedagogy.

Keys words: Virtual technologies, information competence, primary education, teacher training, and digital pedagogy.

Introduction: In the 21st century, digital transformation processes have penetrated all spheres of human activity, particularly the education system. Today, information and communication technologies (ICT) have become an integral part of the educational process, serving as an essential factor in effectively organizing teachers' professional activities, stimulating students' cognitive engagement, and improving the quality of education. Therefore, the issue of developing information competence of future primary school teachers through virtual technologies is recognized as one of the most pressing directions in modern pedagogy.

Developed countries such as the USA, Finland, South Korea, Singapore, and the United Kingdom have achieved remarkable results in developing teachers' digital competence through the wide introduction of virtual learning environments. For example, the OECD's '21st Century Skills' model identifies teachers' information literacy and technological adaptability as key indicators of educational quality. In Finland, the 'Digital Pedagogy' module has been introduced into teacher education as a mandatory component, preparing future teachers to work effectively with virtual learning platforms. Likewise, the UNESCO and European Commission's DigCompEdu Framework (2017) has been adopted as a global standard for developing teachers' digital competence, assessing not only their technical skills but also their ability to apply technology for pedagogical purposes.

In Uzbekistan, the development of digital educational infrastructure has become a strategic priority in recent years. The 'Digital Uzbekistan – 2030' strategy and Presidential Decree PQ-4699 (April 28, 2020) emphasize the digitalization of the education system, the enhancement of teachers' ICT literacy, and the broad integration of distance learning technologies. Moreover, the Ministry of Higher and

Secondary Specialized Education's 2023 document on 'Digital Competence Assessment Criteria for Teachers' outlines the need to develop competencies in digital literacy, information security, and the use of online learning tools. Hence, preparing future teachers to work with virtual technologies during their university education has become an urgent necessity. The primary objective of this study is to analyze the system for developing the knowledge competencies of future elementary school teachers through virtual technologies.

Research Methods: The study applied a mixed-method approach, incorporating both quantitative and qualitative analyses. The fundamental premise of mixed methods research is the combined use of qualitative and quantitative data, which ensures a much better understanding of the research problem than any single method used alone (Creswell & Plano Clark, 2007, s. 5). This approach allowed for evaluating the impact of virtual technologies not only through numerical data but also through participant feedback, observations, and practical outcomes.

At the quantitative stage, pre-tests and post-tests were administered to assess students' information competence. At the qualitative stage, interviews, reflection journals, surveys, and observations were conducted.

The research employed an experimental-comparative design. Participants were divided into two groups: the control group (N=60), which followed traditional teaching methods, and the experimental group (N=60), which was trained using virtual technologies (e.g., Google Classroom, Moodle, Zoom, and interactive online platforms). The experiment lasted one semester (16 weeks) and included weekly virtual workshops and project-based tasks. Did you administer any surveys or interviews to the students who participated in this study? It would be helpful if you could include that information.

A total of 120 third- and fourth-year pedagogy students from universities in Tashkent, Sirdaryo, and Samarkand participated in the study. Participants were between 19 and 25 years old and were all future primary school teachers. Ethical considerations were strictly observed, and participants' data were kept confidential.

Results: At the beginning of the study, participants' average information competence level was 47%. By the end of the semester, this indicator increased to 82%. The success rate in completing tasks on virtual platforms rose from 73% to 91%.

Discussion: The results indicate that the system for developing information competence through virtual technologies is effective. Students developed independent learning skills using technology, and their motivation to engage in the learning process increased. These findings align with previous studies confirming that virtual technologies play a crucial role in enhancing teaching effectiveness and learners' outcomes. In Yaşlıca's (2020) study, it was also concluded that the use of virtual teaching materials positively affected students' success.

Conclusion

This study demonstrated the effectiveness of developing information competence of future primary school teachers through virtual technologies. The main components of the system include diagnostics, pedagogical approaches, interactive tasks, and iterative assessment. It is recommended to introduce continuous professional development courses in ICT for teachers to sustain and expand these competencies.

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