ABSTRACT

of the dissertation by Bauyrzhan Orazayevich Zhankushkov, entitled «Formation digital competence of future primary school teachers through electronic resources» submitted for the degree of Doctor of Philosophy (PhD) in the educational programme 8D01301-Pedagogy and Methods of Primary Education

Research topic: Developing the digital competence of future primary school teachers through electronic resources.

Object of the research: the professional preparation of future primary school teachers at a higher education institution.

Subject of the research: the methodology for developing digital competence of future primary school teachers' through electronic resources.

Aim of the research: To provide a theoretical foundation for and develop a methodology for fostering digital competence of future primary school teachers' through electronic resources, and to evaluate its effectiveness through experimental research.

Research objectives:

- to clarify the meaning and scope of the concepts "electronic resources" and 1digital competence;
- to identify the psychological and pedagogical foundations for developing digital competence of future primary school teachers through electronic resources;
- to describe electronic resources as a means of developing digital competence of future primary school teachers and identify their pedagogical potential;
- to develop a structural and content model for developing of digital competence future primary school teachers through electronic resources;
- to design a methodology for developing digital competence of future primary school teachers through electronic resources and evaluate its effectiveness in a pedagogical experiment.

Research hypothesis: If the conceptual content of developing digital competence of future primary school teachers' through electronic resources is defined, the methodological approaches are substantiated, a structural and content model is developed, and the methodology is implemented in stages, then positive changes will be observed in the motivational, content-related (cognitive and operational), and reflective components of students' digital competence, because the higher education institution will provide electronic resources intended to support its development.

Research methods: theoretical methods included analysis of philosophical, psychological and pedagogical, and methodological literature and regulatory documents; synthesis, comparison, content analysis, critical analysis, systematisation and structuring, classification, modelling, and interpretation. Empirical methods included classroom observation, questionnaires, testing, diagnostic instruments,

profession-related situational tasks, expert assessment of digital products, analysis of electronic portfolios and reflective journals, and a pedagogical experiment comprising baseline, intervention, and follow-up stages. Mathematical and statistical methods included calculation of frequencies by level and percentages, Pearson's chi-square test (χ^2), and Cramér's V.

Main propositions (scientific hypotheses supported by the research and other findings constituting new knowledge):

1. An analysis of the conceptual foundations of developing digital competence of future primary school teachers through electronic resources clarified the following concepts: "Electronic resources" are a collection of educational content stored in digital format, structured according to didactic principles, and adapted to support management in accordance with learning objectives, enabling future teachers to undertake learning, research, and professional teaching activities through information and communication technologies; "Digital competence is an integrative quality that reflects an individual's ability and readiness to act purposefully, critically, ethically, and safely in a digital environment, rather than their level of technical proficiency with digital tools."; "developing digital competence of future primary school teachers through electronic resources" is a purposeful, managed pedagogical process aimed at developing students' motivational, content-related (cognitive and operational), and reflective components through the phased organisation of professional activities (evaluation, adaptation, digital product creation, application, and reflection) using pedagogically selected electronic resources in higher education.

2. Electronic resources develop digital competence through students' professional activity rather than independently. Their pedagogical potential is identified across information and research, didactic and methodological support, interaction and activity, communication, design and creativity, assessment and reflection, safety and ethics, and professional development. This potential is realised through the sequence "resource property → pedagogical function → professional activity → component".

3. Classifying electronic resources by their pedagogical functions (information and content provision, interaction and activity, communication and organisation, design and practical application, assessment and reflection, and AI-supported design) provides a basis for integrating the author-developed resources EduQuiz, "Digital Quest: Teacher 4.0", and AI-assisted Lesson Design into a coherent methodological system in which each resource performs a leading function.

4. The structural and content model comprises goal-setting, theoretical and methodological, content and procedural, and outcome and assessment blocks. It draws on systemic, competence-based, activity-based, informational, and technological approaches and five principles derived from them. The model links each component to one criterion, three indicators, a diagnostic method, and a description of proficiency levels.

5. The methodology comprises orientation and diagnosis, content and operations, design and practice, and reflection and correction stages. It produced positive within-group changes in the experimental group, characterized by a decrease in the proportion of students at the low level across all three components. Since the final between-group differences did not reach statistical significance ($p > 0.05$), further testing of the methodology's comparative effectiveness through delayed assessment and an expanded sample is warranted.

Main research findings:

- The meaning and scope of «electronic resources» and «digital competence» were clarified;
- The psychological and pedagogical foundations for developing prospective primary school teachers' digital competence through electronic resources were identified;
- Electronic resources were characterized as a means of developing prospective primary school teachers' digital competence, and their pedagogical potential was identified;
- A structural and content model for developing prospective primary school teachers' digital competence through electronic resources was developed;
- A methodology for developing prospective primary school teachers' digital competence through electronic resources was designed and its effectiveness was evaluated in a pedagogical experiment.

Originality and significance of the findings:

- The first finding is original in its clarification of the meaning and scope of «electronic resources» and «digital competence»;
- The second finding is original in identifying the psychological and pedagogical foundations for developing prospective primary school teachers' digital competence through electronic resources;
- The third finding is original in characterizing electronic resources as a means of developing this competence and identifying their pedagogical potential;
- The fourth finding is original in the development of a structural and content model for developing prospective primary school teachers' digital competence through electronic resources,
- The fifth finding is original in the design of a methodology for developing this competence through electronic resources and its experimental evaluation.

Alignment with scientific development priorities and government programmes. The main directions of the research align with the objectives of digitalisation, the broad adoption of artificial intelligence, and human capital development set out in President Kassym-Jomart Tokayev's Address to the People of Kazakhstan of 8 September 2025, "Kazakhstan in the Age of Artificial Intelligence: Current Challenges and Their Solutions through Digital Transformation". The research was also conducted in accordance with the Concept for the Development of Higher Education and Science in the Republic of Kazakhstan for 2023–2029,

approved by Resolution No. 248 of the Government of the Republic of Kazakhstan on 28 March 2023; Law of the Republic of Kazakhstan No. 418-V of 24 November 2015, “On Informatization”; and the state compulsory education standards. These regulatory and strategic documents address the digitalisation of education and science, effective use of modern information technologies, development of students’ digital competence, improvement of research outcomes, and development of an innovative educational environment. The aims and content of the research therefore align with Kazakhstan’s priorities for the development of education and science and the strategic objectives of state policy.

The doctoral candidate’s contribution to each publication (expressed as a percentage of the total text). Eight scholarly works were published on the research topic: one article in a Scopus-indexed journal (63rd percentile), three articles in publications approved by the Committee for Quality Assurance in Science and Higher Education of the Ministry of Science and Higher Education of the Republic of Kazakhstan, and four papers in the proceedings of international scientific and practical conferences.

All publications were prepared during the research:

1. Enhancing Teaching Skills Through Electronic Resources: A Study with Prospective Primary Teachers. Journal of Technical Education and Training. ISSN: 2229-8932; e-ISSN: 2600-7932. Vol. 18, No. 1 (2026), pp. 43–55. Doctoral candidate’s contribution: 60%; Amina Amirova: 10%; Gulshat Bakhtiyarova: 10%; Gulsara Zhussupbekova: 10%; Saniya Nurgaliyeva: 10%.

2. Electronic resources as a means of forming the digital competence of future primary school teachers. Абай атындағы ҚазҰПУ-ң Хабаршысы. «Педагогика ғылымдары» сериясы. No. 3 (83), 2024. https://doi.org/10.51889/2959-5762.2024.83.3.021. Doctoral candidate’s contribution: 70%; Онланбекқызы Г.: 20%; Сержанқызы Ж.: 10%.

3. Болашақ бастауыш сынып мұғалімдерінің цифрлық құзыреттілігін электрондық білім беру ресурстары арқылы қалыптастыру. Абылай хан ат. ҚазХҚжӘТУ Хабаршысы. «Педагогика ғылымдары» сериясы. No. 2 (77), 2025, pp. 112–133. https://doi.org/10.48371/PEDS.2025.77.2.007. Doctoral candidate’s contribution: 70%; co-author Амирова А.С.: 30%.

4. Электронды ресурстар арқылы болашақ бастауыш сынып мұғалімдерінің цифрлық құзыреттілігін қалыптастырудың әдістемесі. Абай атындағы ҚазҰПУ-ң Хабаршысы. «Педагогика ғылымдары» сериясы. No. 4 (88), 2025. https://doi.org/10.51889/2959-5762.2025.88.4.015. Doctoral candidate’s contribution: 70%; co-author Амирова А.С.: 30%.

5. Цифрлық технологиялардың бастауыш сынып оқушыларының білім алуына әсері. Proceedings of the international scientific and practical conference “Жаңа Қазақстанның басым құндылықтары: XX ғасыр педагогтерінің новаторлық идеяларынан білім берудегі заманауи инновацияларға / Приоритетные ценности Нового Казахстана: от новаторских идей педагогов XX

столетия к современным инновациям в образовании”, dedicated to the 80th anniversary of the Great Victory and the 100th anniversary of Құмаш Нұрғалиұлы, People’s Teacher of the USSR. Almaty: Abai Kazakh National Pedagogical University, 2025, pp. 204–206. Doctoral candidate’s contribution: 100%.

6. Болашақ бастауыш сынып мұғалімдерін кәсіби даярлауда электрондық білім беру ресурстарын тиімді қолдану. Proceedings of the international scientific and practical conference “Заманауи бастауыш білім беру: жаһандану мәселелері және цифрлық трансформациялау”. Doctoral candidate’s contribution: 100%.

7. Электрондық ресурстар – болашақ бастауыш сынып мұғалімдерінің цифрлық құзіреттілігін қалыптастырудың дидактикалық құралы ретінде. International OPEN SPACE “Әлеуметтік педагогтерді даярлаудың эволюциясы: тәжірбиесі және стратегиялық перспективалары”. 2026. (Doctoral candidate’s contribution: 100%)

8. Болашақ бастауыш сынып мұғалімдерінің цифрлық құзыреттілігін электронды ресурстар арқылы қалыптастыру. Proceedings of the scientific and practical conference «XXI Ғасырдағы білім беру сапасы: заманауи педагогикалық тәжірибелер мен инновациялар», dedicated to the 75th anniversary of А.Қ. Құсайынов, research professor at Abai Kazakh National Pedagogical University, Doctor of Pedagogical Sciences, President of the Academy of Pedagogical Sciences of Kazakhstan, academician, and recipient of the State Prize of the Republic of Kazakhstan. Almaty, 2026, 717 pages. Doctoral candidate’s contribution: 100%.