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Innovative educational technologies as a factor in ensuring the quality of training for teachers of Russian language and literature

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ABSTRACT

The goal of this paper was to analyse the effectiveness of integrating innovative educational technologies for future teachers of Russian language and literature. A quasi-experimental design was used, involving 101 fourth-year students from the philology department of two leading pedagogical universities. To assess the impact of the digital modules, a combination of data collection tools was employed, including pre-tests and post-tests, Likert-scale questionnaires, structured interview protocols, and focus group interviews. These tools were self-developed, adapted, based on the objectives of the study. LingvoDesign and ReflexSim modules have been introduced into the professional training of future teachers of Russian language and literature in Kazakhstan. The results showed that the experimental group that used LingvoDesign was significantly more effective in mastering the teaching methodology (d = 1.23 Cohen), while ReflexSim improved pedagogical reflection (M = 4.3 vs. 3.6; p <0.001). Students also demonstrated better digital skills (M = 81.2 vs. 68.5; p <0.001) and reported greater independence in learning, adaptability, and motivation. Conclusion: the integration of innovative educational technologies significantly increases the professional, reflective, and digital competencies of future teachers of Russian language and literature.

Keywords: Acquired teaching methodologies, Digital literacy, LingvoDesign, Pedagogical reflection, Philological education, ReflexSim

1. Introduction

Today, amid rapid technological progress, the requirements for the professional training of future teachers of philological disciplines, in particular Russian language and literature, include not only subject knowledge and teaching methods, but also the ability to adapt educational approaches to the modern challenges of pedagogical practice [1]. Teacher training is focused on developing competencies that ensure readiness for reflection, critical thinking, and work in an inclusive educational environment.

On the other hand, the development of educational technologies (EdTech) dictates the necessity to fit in digital tools into the education process. This includes personalization of learning, the use of adaptive platforms, and the application of simulators and digital modules aimed at increasing engagement and effectiveness of learning [2], [3]. Innovative technologies are becoming an integral part of the modern pedagogical space, strengthening the competency-based approach to learning [2]. Information and technology tools are becoming a key driver of improving the quality of professional training, as they provide access to interactive, adaptive, and personalized learning formats that are closely related to the modern labour market [3]. In the context of digitalization and rapid knowledge renewal, traditional forms of teaching are no longer able to fully meet students' needs for relevant, practice-oriented information [4]. IT tools such as simulators, virtual laboratories, educational platforms, and analytical systems increase student motivation through engagement and visualisation [5]. They also help to quickly track learning progress, adapt learning trajectories, and develop digital competencies that are critical for 21st-century professionals [6].

According to ref. [7], the level of numerical mastery amid future teachers of Russian language and literature in Kazakhstan remains uneven. This situation requires new approaches to training methods. In academic circles, the issue of digitization in education is accompanied by concerns about the risks of unstructured implementation of innovative technologies. It is therefore extremely important to develop both technical and pedagogical digital literacy among future teachers. Ref. [8] confirms the fragmentary nature of the effective integration of educational technologies in the training of Russian language and literature teachers.

The experience of European countries demonstrated the effectiveness of implementing the latest technologies in education. EdTech platforms such as OpenClassrooms, Domoscio, and Duolingo are successfully used to expand access to learning, personalize education, and increase student motivation. Research in ref. [9] points to the transformative potential of tools based on artificial intelligence, VR/AR, and gamification. Despite the widespread recognition of the effectiveness of digital technologies in education and the active development of the EdTech sector, their targeted implementation in the training of future philology teachers remains fragmented and methodologically unstable. Ref. [10] emphasizes that the systematic digitization of philological education remains limited even in countries with developed educational policies. An analysis of current research shows that scientific and practical issues related to the adaptation of IT tools to the tasks of language and literature teaching methods remain unresolved [11]. Particularly underdeveloped is the area related to the formation of humanistic pedagogical reflection as a component of digital pedagogical competence. The proposed study addresses this gap by empirically evaluating the effectiveness of two specific digital solutions: the LingvoDesign and ReflexSim platforms, used in training teachers of Russian language and literature. The novelty of this study lies in its integrative approach to investigating the multifaceted impact of educational technology (EdTech) tools on the professional training of future philology teachers. Thus, the use of digital simulations and multimedia platforms is considered not as an auxiliary resource, but as a structural element of the educational strategy, thereby providing an objective assessment of the contribution of innovative technologies to the development of pedagogical reflection, awareness, and professional readiness of students majoring in philology.

Thus, the goal of the paper is to categorise the most effective influence of selected technological innovations on the level of professional competence of students who are future teachers of Russian language and literature.

To attain this goal line, the next research questions have been put forward:

1. To what extent does the use of an interactive online platform (LingvoDesign module) improve the quality of teaching methodology compared to the ReflexSim module?

2. What impact does the use of multimedia simulations (ReflexSim module) have on the development of pedagogical reflection among students?

3. Do the results of the control and experimental groups differ in terms of the level of digital competence?

The thesis also puts forward a hypothesis that the level of professional competence of students who use innovative technologies in the learning process will be significantly higher than that of students who learn using traditional methods.

1.1. Advanced technologies in the transformation of the field of education

Technological advances are transforming the field of education, making learning more engaging and accessible. Innovations such as artificial intelligence are helping to personalize the educational experience for students, while virtual and augmented reality offer immersive simulations that enrich the material being taught [12]. Online learning platforms and mobile apps are also part of this revolution, opening up new possibilities for personalized and collaborative education. Thanks to these technologies, education is transforming, promising to improve the classrooms of the future and enhance access to education for all [13]. The field of education is undergoing a revolution driven by technological advances that are changing teaching methods. These new initiatives are making education not only more accessible but also more interesting for students [14]. Ref. [15] indicates that one of the main characteristics of educational technologies is their ability to personalize the learning process. In the same context, ref. [16] states that thanks to artificial intelligence, platforms can familiarise with the content and learning tactics in order to achieve the individual needs of each student. This aspect creates an individual educational trajectory, thereby maximizing student engagement and achievement [17]. One of the most significant achievements in the arena of instruction in Kazakhstan is the usage of artificial intelligence (hereinafter referred to as AI) [18]. Artificial intelligence used in education has the ability to create

individual educational paths. This involves tailoring learning processes to the needs of each participant in education. Consequently, this is personalized learning, which makes education more effective. By analysing performance, the system can identify knowledge gaps and offer special tasks to improve the skills that need improvement [19]. The aim is to stimulate creativity and student engagement. The educational technology sector is booming. Ref. [20] indicates that today in Kazakhstan, startups are being created that offer new and diverse solutions to improve learning. Using mobile apps, educational games, or online collaboration tools, these companies are challenging traditional methods and offering innovative alternatives that engage students. Innovative educational technologies are a requirement of our time, the main task of which is to raise the level of knowledge of Kazakhstan's younger generation to international standards [20].

1.2. The socio-economic configurations taking place in Kazakhstan

The current situation poses new challenges for the education sector in terms of reviving the intellectual potential of the people and developing science to world-class standards. One of the ways to achieve this goal is to promote education based on new concepts and introduce innovative technologies into the educational process [20], [21], [22]. Currently, digital technologies are evolving at such a rapid pace that equipment often becomes obsolete before it is even introduced into production. Multimedia systems are successfully used in education and professional training. Computer-based multimedia training systems occupy a special place, allowing for the deepening of knowledge, reduction of training time, and increase in the number of students per teacher [1]. In a similar context, ref. [8] describes the improvement of training efficiency in the context of modern Kazakh education. The authors claim that achieving this area is unrealistic without implementing modern methods of organising the educational process. One effective approach to achieving this is through the use of innovative technologies, which enable teachers to improve the learning involvement by making it more attractive, visual, and interactive.

1.3. New technologies as important tool for philologists

New technologies are especially important for philologists. A range of multimedia tools should be used in the educational process for humanities students, as they really facilitate the work of teachers, increasing motivation to learn and optimizing and refining the efficiency of the didactic procedure [23]. The increase in workload and the expansion of Russian language and literature curricula raise the question of how to maintain students' interest and activity at the required level throughout the entire period of study. According to the author of ref. [24], the use of multimedia presentations created with innovative technologies will stimulate students' interest and curiosity and encourage them to engage in self-education. Furthermore, according to ref. [25], these technologies contribute to developing research skills, scientific literacy, and the ability to independently find, analyse, and critically evaluate information. In the same context, ref. [26] emphasizes the special attention that should be paid to future philologists in their education. After all, the formation of teamwork skills, effective communication, and the creation of conditions for implementing an interdisciplinary approach in the educational process are important strategies for philological education. And although technological progress brings many advantages, it also raises questions of ethics and justice [27]. According to ref. [28], [29] ensuring equal access to new technologies for all groups, including disadvantaged, is extremely important. Discussion of these issues is important for building an inclusive education system.

Thus, the work hypothesizes that advanced instructive machineries are an effective means of improving the quality of professional training for education seekers, as they contribute to the integration of theoretical knowledge and practical skills, increase motivation to learn, and provide conditions for the implementation of the principles of individualization and a person-centred approach.

Although the studied literature confirmed the transformative potential of advanced educational technologies in numerous educational sceneries, numerous important gaps remain. First of all, most current studies focus on the all-purpose application of EdTech in larger educational contexts, often overseeing subject-specific areas such as philological education. Next, there is incomplete research that concomitantly explores the advance of methodological, digital, and reflective competencies within a single background, chiefly in the training of future philology teachers. Though individual features – such as digital literacy or the use of multimedia tools – have been debated, consolidative investigation into how EdTech tools effect all three key mechanisms of professional competence in this field is lacking. This study addresses that gap by its contribution to all-inclusive, empirical analysis of the complex impact of EdTech on future philology teachers, thus contributing new visions to both the local and international discourse on teacher training and digital transformation.

2. Research method

The study has a quasi-experimental design, which focuses on the non-random distribution of participants into experimental and control groups. The study used a methodological approach that included various methods of data collection and processing. The experiment lasted eight weeks. In order to better comprehend the effectiveness of educational innovations, scientific interviews were conducted with teachers of Russian language and literature between September 1 and October 31, 2024. The focus group consisted of fourth-year students (101 participants) applying for philological specialties at two leading pedagogical universities in the Republic of Kazakhstan. Students in the experimental group (n=51) were enrolled in the 6B01703 Russian Language and Literature program at the Kazakh National Women's Pedagogical University. Students in the control group (n=50) were enrolled in the 6B01702 Russian Language and Literature program at the Kazakh National Pedagogical University named after Abai. The study used criteria defined at the preliminary assessment stage that influenced the successful completion of the main courses, ranging from teaching methodology and experience in actively using digital educational platforms to the completion of the experiment.

The criteria for inclusion in the selection of students were successful completion of basic methodology courses and no previous experience in actively using the target IT platforms. Two innovative EdTech modules served as teaching materials and tools. For Module X, an interactive online platform for creating, modelling, and analyzing Russian language and literature lessons, LingvoDesign, was selected. The program replaces gamification tools, lesson planning templates, artificial intelligence, and cognitive assessment systems with original content. For Module Y, a multimedia simulation platform was selected that presents pedagogical scenarios in a virtual classroom format with integrated ReflexSim language. The program also provides reflective analysis and keeping a reflective journal. Data collection tools using closed and open pre-experimental control tests on the reversibility of pedagogical and digital competencies. A self-assessment and pedagogical reflection algorithm (based on the Likert scale) was also included in the work. Module teachers also used an activity log in digital modules, where the results of careful observations during five hours of interviews and satisfaction (focus groups) were recorded. Data collection consisted of 3 phases. In the 1st, the procedure was carried out in the same pre-experimental phase. Testing and questionnaires were conducted among students. As part of the training, only the experimental group received instruction on the LingvoDesign and ReflexSim platforms. The main stage of the labour was passed in the second phase of the experiment, over eight days. Classes in the experimental group were held twice a week according to a modular program, in accordance with the initial course plan. At the same time, the control group was taught using traditional methods without the use of digital tools. The progress of the classes and the actions of the teacher were regularly reflected in weekly reports posted in electronic journals. The experimental phase included a final test session and a questionnaire session. To assess satisfaction and clarity of digital delivery in phase 3, A pre-test, post-test and interview protocol were used in the paper. Development and validation process in this section, data was collected from focus groups. Data analysis methods included a mixed-methods analysis strategy with a t-test for independent variables (comparison of mean values before/after two groups) and a correlation analysis of the development of activation modules in the brain and test results. Similarly, the effect size (Cohen's d coefficient) was included in the evaluation of the results. To identify key reflective patterns, lesson design issues, and equality of student interests, critical opinion analysis and thematic analysis of focus group records were also conducted. Standard ethical standards were observed during the experiment. All participants were informed in advance about the principles of the robot's operation and had the opportunity to suspend or limit its use at any time. Participants gave their voluntary consent to participate in the study.

3. Results and discussion

The study confirmed the effectiveness of introducing innovative educational technologies. In the context of the RQ1 it was proved that the use of the interactive online platform (LingvoDesign module) improved the quality of teaching methodology compared to the ReflexSim module. This is a factor in improving the quality of professional training for future Russian language and literature teachers. Based on the experimental group's results and in line with RQ2, the ReflexSim modules demonstrated statistically significant advantages in the levels of methodological knowledge, pedagogical reflection, and digital competencies, which are key components of professional readiness for teachers of philology. The findings of the proposed study revealed the impact of the LingvoDesign platform on the acquisition of teaching methods for Russian language and literature among the focus group participants. Analysis related to the first research question demonstrated the effectiveness of LingvoDesign as a tool. Specifically, the results showed a statistically significant improvement

in students' mastery of teaching methods, with t (99) = 10.37, p < 0.001, indicating a very strong difference between the compared groups. This high level of statistical significance supports the reliability of the outcomes. Furthermore, the calculated effect size (Cohen's d = 1.23) – which measures the strength of the difference between groups (such as before and after the use of the technology) – suggests that incorporating innovative tools into education has a substantial positive effect.

Regarding the second research question, which examined the influence of ReflexSim on the development of pedagogical reflection, it was found that students using ReflexSim exhibited a higher level of reflective thinking. This was validated through a self-assessment questionnaire based on a Likert scale, where the experimental group scored an average of 4.3 out of 5 compared to 3.6 out of 5 in the control group. This difference was statistically significant, with t (99) = 6.02, p < 0.001 (see Table 1).

Table 1. Interpretation of results according to the Likert scale (1–5)

Value range (M)	Interpretation
1.00 – 1.80	Quite low level (strongly negative arrogance)
1.81 – 2.60	Low level (undesirable arrogance)
2.61 – 3.40	Moderate level (impartial or ambivalent arrogance)
3.41 – 4.20	High level (confident arrogance)
4.21 – 5.00	Very high level (clearly positive attitude)

Source: authors' own development.

The experimental group showed M = 4.3/5, indicating a very high level of pedagogical reflection. Participants demonstrated a deep understanding, awareness, and readiness to analyse their professional activities. The control group showed M = 3.6/5, indicating a high level, but significantly lower than the experimental group. This means that students who worked with the ReflexSim simulation module demonstrated more developed reflective skills and critical thinking. The questionnaire results, based on a five-point Likert scale, revealed a notable difference in satisfaction and self-esteem levels between the experimental and control groups. The experimental group reported an average self-esteem score of M = 4.3 out of 5, compared to M = 3.6 in the control group. A t-test for independent samples confirmed that this difference was statistically significant, with t(99) = 6.02, p < 0.001, indicating a meaningful disparity between the two groups.

The following Likert scale intervals were used to interpret the results:

1.0–1.9 – extremely low level of satisfaction/negative perception;
2.0–2.9 – low level of satisfaction/predominantly negative attitude;
3.0–3.9 – average level of satisfaction/neutral-moderate attitude;
4.0–4.5 – high level of approval/positive perception;
4.6–5.0 – very high level of approval/maximum positive attitude.

Consequently, the M = 4.3 indicator in the experimental group indicates a high level of positive perception of the didactic procedure based on the incorporation of numerical machineries. A value of M = 3.6 in the control group demonstrates only moderate satisfaction, which may indicate a less pronounced effect of the traditional learning format. The statistical differences identified authorise the hypothesis about the positive impact of IT tools on the motivational and reflective component of the professional training of education seekers.

As part of a detailed qualitative analysis, students' reflective insights and experiences were collected.

Based on the students' responses, we were able to group their reflections into three main categories. The first category describes awareness of one's own mistakes and ways to improve.

During the experiment, mistakes made during the simulation of learning situations were repeatedly reported.

It was in ReflexSim that they first noticed their own mistakes as opportunities for improvement:

Student 1: "Before this module, for me, a mistake was equivalent to failure. Working on ReflexSim, I realized that my mistakes are clues to what I need to change."

The second category concerns increased confidence in making pedagogical decisions. The virtual environment provides multiple reproductions of complex pedagogical situations.

Student 2: "ReflexSim allowed me to choose a strategy for communicating with students, see the consequences of the wrong tactics, and understand and analyze my actions."

The third category is the formation of structured self-assessment. Most respondents indicated a change in the way they assess themselves. According to them, before the experiment, they conducted self-assessment based mainly on intuition or emotions. After the ReflexSim module, respondents conducted structured reflections in a targeted manner. Effectiveness criteria, pedagogical goals, and context analysis were taken into account. In this way, students systematized their own cause-and-effect relationships in relation to their actions and learned to make decisions based on evidence:

Student 3: "The goal-method-result scheme for self-analysis facilitates this process and makes it logical and scientific. Before, I did this instinctively, without reference to a specific system."

Thus, the use of the ReflexSim simulation training module demonstrated high potential in developing reflective thinking among future teachers of Russian language and literature. Virtual immersion in pedagogical scenarios helped students understand the process of learning and teaching. Usually, such training contributed to increased confidence in decision-making and the formation of an analytical approach to self-assessment of pedagogical activity. This is considered a significant issue in the formation of the specialized identity of future teachers.

As part of the third research question on the level of digital competencies, digital skills were tested. The experimental group demonstrated higher results ($M = 81.2$, $SD = 5.9$) related to the control group ($M = 68.5$, $SD = 6.7$); $t(99) = 9.11$, $p<0.001$.

Correlation analysis between the number of digital modules used and the results showed a moderate positive correlation ($r = 0.46$, $p <0.01$), indicating that the effectiveness of learning depends on the level of student engagement with EdTech tools (Table 2):

Table 2. Clarification of the correlation coefficient (r)

Correlation coefficient (r)	Strength of association	Interpretation
0.00–0.19	Quite feeble	Virtually no connotation
0.20–0.39	Feeble	Minor but statistically significant connotation
0.40–0.59	Reasonable	Moderate positive connotation
0.60–0.79	Strong	Clear connotation among variables
0.80–1.00	Very robust	Near-linear dependence

Source: authors' own development.

Interpretation of $r = 0.46$:

In the final case, a higher positive correlation was found between the use of digital modules and recovery outcomes ($r = 0.46$, $p < 0.01$), representing that the more actively students engaged with foundational digital tools, the greater their initial learning achievements. This supports the hypothesis that the actual incorporation of innovative technologies contributes to the development of digital competencies. The results indicate that innovative technologies in philological education have a positive impact on both methodological knowledge and the development of digital skills. Based on thematic analysis of the focus group discussions, three dominant categories of student experiences in the experimental group were identified (Table 3):

Table 3. Dominant categories in the experiences of students in the experimental group

Category	Description
Digital autonomy	Students reported greater independence in working with modules, control over pacing, and flexibility in task completion.
Learning adaptability	The learning process adapted to individual characteristics and permitted apprentices to progress at their own pace.
Motivational Effect	Gamified elements and virtual scenarios stimulated curiosity, motivation, and engagement in the learning process.

Source: authors' own development.

Therefore, the experimental results indicate that digital transformation is significantly enhancing the quality of professional education and shaping the training of a "digital specialist," for whom digital technologies are an essential part of effective professional practice and the advancement of digital competencies. A summary of these results is provided in Table 4.

Table 4. The study results organisation

Indicator	Group	N	M	SD	t (df = 99)	p
Methodological knowledge	Experimental	51	84.6	5.3	10.37	<0.001
Methodological knowledge	Control	50	72.4	6.1		
Pedagogical reflection	Experimental	51	4.3	—	6.02	<0.001
Pedagogical reflection	Control	50	3.6	—		
Digital competencies	Experimental	51	81.2	5.9	9.11	<0.001
Digital competencies	Control	50	68.5	6.7		

Source: authors' own development.

Thus, these findings provide an answer to RQ3, indicating that the results of the control and experimental groups differ in terms of the level of digital competence. In this context, these results allowed the formulation of recommendations for the introduction of advanced machineries in the training of future teachers of Russian language and literature. First of all, the positive results allow us to recommend the inclusion of LingvoDesign as a mandatory component of teaching methodology courses for students majoring in education. To improve the development of pedagogical reflection, a simulation module (ReflexSim) should be introduced at least once per semester. It is recommended to provide students with basic digital training for effective work with EdTech platforms. The development of systems for monitoring students' digital and professional competencies using integrated activity logs is a prerequisite for the implementation of the above recommendations. The results of this work confirm the constructive influence of innovative technologies in the training of future teachers of Russian language and literature. The greatest effect was found at the level of the formation of methodological, reflective, and digital competencies, which are positioned as key competencies [30]. The collected results made it possible to develop generalizations and conclusions regarding the effectiveness of integrating EdTech tools into professional education. Let's start with the fact that the implementation of the LingvoDesign platform had a positive impact on the quality of learning Russian language and literature teaching methods. The high statistical significance ($t(99) = 10.37$, $p < 0.001$) and large effect size (Cohen's $d = 1.23$) clearly indicate the deep penetration of innovations into the educational process in the field of philology. The data obtained are consistent with European guidelines (in particular, DigComp 2.0). The results obtained confirm the growing body of literature emphasizing the relevance of digital tools in teacher training, especially in the development of professional reflection and digital autonomy. According to recent studies [31], [32], the integration of innovative educational technologies and the creation of adaptive learning content are considered to be essential components of teachers' digital competence. In line with these statements, the use of the ReflexSim simulation module in the experimental group demonstrated a statistically significant improvement in reflective thinking ($M = 4.3/5$ in the experimental group vs. $M = 3.6/5$ in the control group; $t(99) = 6.02$, $p < 0.001$). A qualitative thematic analysis of students' reflections revealed key cognitive shifts: awareness of mistakes as a resource, increased confidence in making pedagogical decisions, and the emergence of structured self-assessment. These results resonate with the theory of transformative learning ref. [35], as well as with the model of reflective practice by Bouda, Kio, and Walker (1985) as a mechanism for transforming experience into practical knowledge [36]. In addition, the experimental group demonstrated significantly higher digital skills compared to the control group ($M = 81.2$ vs. $M = 68.5$; $t(99) = 9.11$, $p < 0.001$). A moderate positive correlation ($r = 0.46$) was found between the degree of engagement in digital modules and academic performance, confirming recent findings by the OECD (2020) linking technology-based learning with increased learner motivation and activity [37]. Three dominant effects emerged from qualitative reflection: the development of digital autonomy, learning adaptability, and motivational engagement. These measures correspond to the individualized learning frameworks emphasized in contemporary digital pedagogy [38]. It is noteworthy that the combination of LingvoDesign and ReflexSim contributed not only to content acquisition but also to metacognitive and motivational dimensions of professional growth. This is consistent with the principles promoted by ref. [39], who emphasized the synergy between pedagogical innovation and cognitive-emotional interaction. However, critical reflection on the risks of innovation in education is also justified. Ref. [40], [41] pointed to issues such

as digital inequality and insufficient integration of edtech tools into pedagogical practice. These concerns are in vain with ref. [42], [43] that concern with the reinforcement of the need for ethical, inclusive, and human-centred implementation strategies. Despite promising results, several limitations must be acknowledged. First, the sample consisted mainly of philology students, which may limit the generalizability of the results to broader academic disciplines. Second, the study was conducted over a single academic semester, providing limited insight into the long-term impact of digital interventions. Third, some participants demonstrated uneven levels of digital literacy and signs of digital fatigue, which may have affected engagement and motivation. Future research should explore the institutionalization of digital modules as mandatory components of teacher training programs. In addition, it is essential to develop a comprehensive monitoring framework to assess digital and reflective competencies at different stages of teacher training. Longitudinal and interdisciplinary studies would be useful to confirm the sustainability and scalability of such innovations. This study confirms the hypothesis that the comprehensive use of innovative educational technologies improves the quality of teacher training by promoting the development of reflective and digital competencies. The results confirm the recognition of such technologies as effective tools for training future teachers. However, a sustainable impact depends on methodological soundness, institutional support, and ethical management of digital learning initiatives.

4. Conclusions

The study confirmed the effectiveness of introducing innovative educational technologies. They are a factor in improving the quality of professional training for future Russian language and literature teachers. Based on the experimental group's results, the LingvoDesign and ReflexSim modules demonstrated statistically significant advantages in the levels of methodological knowledge, pedagogical reflection, and digital competencies, which are key components of professional readiness for teachers of philology. LingvoDesign technology contributed to a deep understanding of the teaching methodology. At the same time, the implementation of ReflexSim proved to be an effective tool for developing analytical thinking and pedagogical reflection. In addition, the results of the study showed an increase in digital autonomy, adaptability to learning, and increased student motivation. Thus, the data obtained confirm the working hypothesis of the study that the comprehensive use of advanced didactic machineries in the training of future Russian language and literature teachers contributes to improving the quality of learning and the formation of digital and reflective competencies. Therefore, further research may focus on institutionalizing digital modules as a mandatory component of educational programs in teacher training universities. To this end, it is necessary to delve deeper into the study of the creation of monitoring systems and assessing student's professional skills at different stages of their training. Thus, the development of methodologically sound models for introducing technologies that consider the didactic, ethical, and social aspects of pedagogical interaction can and should serve as an effective tool for forming key professional competencies of future teachers.

Declaration of competing interest

The authors declare that they have no known financial or non-financial conflicts of interest related to the content presented in this paper.

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Author contribution

The contributions to the paper are as follows: Almagul Zadayeva, Valentina Zhumagulova – study conception and design; Valentina Zhumagulova – data collection; Almagul Zadayeva, Valentina Zhumagulova, Zhamilia Nurmakhova, Assem Kenzhebekova – analysis and interpretation of results; Almagul Zadayeva – draft preparation. All authors approved the final version of the manuscript.

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