Article

The impact of innovative approaches on prospective primary teachers' quality of education: An exploration of practice

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Abstract: This study examines innovative teaching approaches' effect on the quality of education for prospective primary teachers. A mixed-methods approach combining qualitative and quantitative data collection techniques was employed. Initially, the two data sets were analyzed separately—qualitative data through thematic analysis and quantitative data through statistical methods. The themes emerging from the qualitative analysis were then cross-referenced with the quantitative findings to evaluate whether the trends supported each other. For instance, if a qualitative theme indicated that teachers felt more confident using innovative methods, this was supported by quantitative data showing improvements in teacher performance scores or student outcomes. The study had 200 participants, and the study findings revealed a significant positive impact of innovative teaching approaches on the quality of education for future primary teachers. Participants reported increased engagement, improved critical thinking, and enhanced adaptability in classroom settings. The study findings reveal that innovative approaches significantly improve the quality of education for prospective primary teachers by fostering more interactive, technology-enhanced, and student-centered learning environments. To maintain these improvements, it is essential to invest in infrastructure, provide ongoing support for teacher educators, and continuously update curricula to reflect emerging educational technologies and practices. These findings emphasize the importance of innovation in teacher training to meet the evolving demands of primary education.

Keywords: impact; innovative approaches; prospective primary teachers; quality of education

1. Introduction

The quality of education is a crucial component in the global advancement of educational systems, with teachers playing an important role in affecting this quality (Day, 2019; Garira, 2020). Innovative approaches, such as the integration of technology, inquiry-based learning, and collaborative teaching strategies, are increasingly recognized globally for their potential to enhance teacher preparedness. However, most of the existing studies assume the availability of resources and the readiness of educational institutions to adopt these new approaches—assumptions that may not fully apply to the Kazakhstani context (Tajibayeva et al., 2023). The specific challenges encountered by developing countries, such as Kazakhstan, require great attention. Challenges like uneven access to technology, limited infrastructure, and the slower pace of pedagogical reform in Kazakhstan are often

overlooked in international studies (Nurgaliyeva et al., 2023). Moreover, teacher turnover rates in Kazakhstan present a substantial challenge to the education system, particularly in primary education. Recent studies have shown that the country experiences high attrition rates among teachers, with a substantial percentage leaving the profession within the first five years. Contributing factors to this turnover include low salaries, difficult working conditions, and limited professional development opportunities (Ratova et al., 2024).

In Kazakhstan, national assessments such as the Unified National Test (UNT) and other standardized exams administered at various educational stages reveal considerable variations in student performance, particularly in subjects like mathematics and literacy. These results often highlight a performance gap between students in urban and rural areas, with rural schools frequently underperforming. Such disparities underscore the need for a more effective and equitable teacher education system to improve the overall quality of teaching and learning across the country (Mingisheva, 2023).

The Programme for International Student Assessment (PISA), conducted by the Organisation for Economic Co-operation and Development (OECD), measures 15-year-old students' performance in reading, mathematics, and science every three years. PISA findings reveal that Kazakhstan's recent PISA results have consistently fallen below the OECD average, showing challenges in students' critical thinking, problem-solving, and analytical skills. These results show the urgent need for innovation in teacher training programs, as current approaches may not be adequately preparing teachers to develop students' essential skills. Addressing these achievement gaps requires a comprehensive overhaul of teacher education that integrates evidence-based practices and innovative methodologies (Nurgabyl et al., 2023).

Traditional teaching methods, although still prevalent, are increasingly inadequate in preparing future educators for the dynamic and rapidly evolving demands of 21st-century classrooms (Ospankulov et al., 2023). This instructional style typically involves the teacher as the primary source of information, with students passively receiving knowledge rather than actively engaging in the learning process. Lessons often highlight rote memorization, where students are expected to recall and reproduce facts during assessments, rather than develop critical thinking or problem-solving skills. Rooted in historical practices and a strong emphasis on authority, this views the teacher's role as transmitting knowledge rather than facilitating interactive or student-centered learning experiences. Thus, student participation is often limited to answering teacher-posed questions or completing repetitive assignments, with little opportunity for analysis, creativity, or deeper engagement. Despite efforts by the Ministry of Education of the Republic of Kazakhstan and international partners to introduce more student-centered approaches, several educators find it challenging to move away from traditional practices. Factors such as large class sizes, limited access to training in modern pedagogical methods, and insufficient classroom technology contribute to the continued use of these conventional methods. Additionally, there is often resistance among educators, as many have been trained and have taught using these approaches for years, making it difficult to shift to new and unfamiliar techniques.

Hence, adoption and implementation of innovative approaches in teacher training programs in Kazakhstan remain limited, with their impact on the quality of education yet to be extensively studied (Abildina et al., 2024). While many international studies emphasize the benefits of modern pedagogies, they often fail to account for the structural, cultural, and economic factors that hinder their adoption in regions with different educational histories (Timotheou et al., 2023). This gap presents a critical problem: Without a comprehensive understanding of how innovative methods impact the development of prospective primary teachers, educational institutions in Kazakhstan may continue to rely on outdated practices. This reliance can limit the professional growth of future educators and negatively affect the learning outcomes of primary students (Zhumash et al., 2021).

The central question remains whether the use of innovative approaches effectively improves students' quality of education. If so, how does this improvement take place? Unfortunately, while the potential of innovative teaching approaches to foster students' educational quality has been widely discussed, the existing literature has not adequately examined how these methods contribute to such improvements. The methodology for improving students' quality of education through innovative teaching approaches, particularly in Kazakhstan, is still in its infancy and requires further examination.

1.1. Study rationale

The education of future primary teachers plays a critical role in shaping the foundation of a nation's educational system (Grassini, 2023), particularly in Kazakhstan, where primary education is considered essential for the intellectual and social development of young learners (Nurgaliyeva et al., 2024). However, the effectiveness of traditional teacher preparation methods is increasingly being questioned in light of the diverse challenges facing modern classrooms (Nagima et al., 2022). The rapid advancement of technology, the growing emphasis on inclusive education, and the shift toward student-centered pedagogies all call for a more innovative approach to teacher training (Muganga and Ssenkusu, 2019). In Kazakhstan, despite efforts to reform the education sector, the integration of cutting-edge methods, including technology-enhanced learning, collaborative teaching strategies, and inquiry-based learning, remains in its early stages (Kerimbayev et al., 2023).

By examining the impact of these methods, this study aims to contribute to the ongoing dialogue on how to better equip future teachers with the skills, knowledge, and adaptability required for contemporary classrooms. The study is relevant not only for teachers and policymakers in Kazakhstan but also provides valuable insights for other countries undergoing similar educational transformations. Ultimately, the rationale for this study is to promote the modernization of teacher education programs, ensuring they meet the evolving needs of both future teachers and the students they will serve.

1.2. Questions for research

Q1: How do innovative teaching approaches impact the quality of education for prospective primary teachers in Kazakhstan?

1.3. Objectives

This study aims to examine the impact of innovative teaching approaches on the quality of education for prospective primary teachers.

1.4. Significance of study

The significance of this study lies in its potential to affect both policy and practice in teacher education. As educational systems worldwide prioritize more dynamic and responsive teaching strategies, the findings of this study could help shape the teacher training programs' future. By highlighting the value of innovative teaching approaches, the research underscores the need to reform teacher education to equip future educators for the demands of 21st-century classrooms. This makes the study important for educational institutions, policymakers, and teacher educators seeking to improve the overall quality of primary education (Benitt et al., 2019). Additionally, while there is growing interest in integrating technology into classrooms across Kazakhstan, limited studies have been conducted to examine how these innovations affect the education of prospective teachers. This study aims to address this gap by critically evaluating the effects of innovative approaches within the specific cultural and educational context of Kazakhstan. It will contribute to the literature by providing localized evidence on how these methods affect teacher education, offering valuable insights for policymakers and educators looking to modernize teacher training programs in Kazakhstan.

2. Literature review

Innovative approaches in teacher education, such as technology integration, inquiry-based learning, and collaborative pedagogies, have been the subject of numerous global studies. Research by Keiler (2018), Rögele et al. (2022) and Zhang et al. (2021) emphasizes the positive effects of student-centered pedagogies on teacher preparedness, arguing that these methods cultivate critical skills such as critical thinking, problem-solving, and adaptability. Dörnyei and Muir (2019) and Mulcahy et al. (2015) highlight how future teachers benefit from learning environments that reflect the dynamic and interactive nature of modern classrooms. Similarly, Serrano et al. (2019) reported that technology-enhanced learning promotes greater engagement and efficacy in teacher training, enabling prospective teachers to better connect theory with practice through the use of digital tools and resources.

Several studies have examined the role of innovative teaching approaches in improving teacher education, particularly in developed countries where technology integration and student-centered pedagogies are widely adopted (Chen and Tsai, 2021; Czajka and McConnell, 2019). Research by Lombardi et al. (2024) and Tang et al. (2020) shows that these methods significantly improve teacher preparedness by fostering critical thinking, creativity, and problem-solving skills. For instance, studies by Chen (2021) and Siphukhanyo and Olawale (2024) emphasize the

effectiveness of inquiry-based learning and collaborative teaching strategies in developing reflective and adaptable educators. Similarly, Benitt et al. (2019) highlight the benefits of technology-enhanced learning in teacher education, suggesting that digital tools not only improve pedagogical skills but also allow future teachers to engage students more effectively. This growing body of evidence underscores the importance of innovative pedagogies in shaping effective and adaptable educators.

Despite the substantial literature on innovative teaching approaches in developed countries, there is a notable gap in research exploring their application in developing nations, particularly in post-Soviet countries like Kazakhstan. Existing studies on educational reform in Kazakhstan (Karabassova, 2021; Yakavets et al., 2023) primarily focus on policy-level changes but do not critically examine the practical implementation of these innovative teaching methods within teacher education programs.

This study expands on previous research that highlights the effectiveness of innovative teaching methods, such as student-centered approaches, in improving educational outcomes (Mingorance Estrada et al., 2019; Tang, 2023). By applying these methods specifically within the context of primary teacher education in Kazakhstan, this study not only confirms their effectiveness but also provides localized evidence that aligns with the global trend, reinforcing the importance of such approaches in different educational environments.

While most of the existing research supports innovative teaching methods (Fletcher et al., 2023), some studies show that their implementation can be challenging in environments where traditional methods are deeply embedded (Sivarajah et al., 2019). This study challenges the assumption that innovative approaches are universally applicable by examining the unique cultural, institutional, and economic barriers within Kazakhstan's education system. Furthermore, while existing studies focus on student outcomes as the primary measure of effectiveness, this study broadens the scope by examining the effect on teacher retention and professional satisfaction. This provides a more holistic perspective on how innovative approaches benefit the education system beyond academic performance alone.

The literature shows inconsistencies regarding the long-term impact of innovative teaching methods on student achievement and teacher retention. While some studies report positive outcomes, others present mixed results, especially in developing or transitional education systems (Zhang et al., 2020). By critically engaging with these aspects, this study not only builds upon existing knowledge but also challenges, refines, and addresses gaps in the literature. Ultimately, it contributes to a more nuanced understanding of how innovative teaching methods affect primary teacher education in Kazakhstan.

3. Method

3.1. Research design

A mixed-methods combining both qualitative and quantitative data collection techniques was employed in this study. Creswell and Clark (2017) classify mixed-

methods designs into different types, each applied in different contexts and purposes. For example, the convergent design involves collecting data from both qualitative and quantitative paradigms, and then merging them for comparison. The explanatory sequential design, uses qualitative research to support and explain quantitative findings, making it useful when researchers aim to deepen their understanding of the data at hand. The exploratory sequential design is typically utilized when research questions are unclear, starting with qualitative research and followed by quantitative research to refine the analysis. This study employs the explanatory sequential design, where qualitative insights are used to complement and clarify the quantitative data.

In this study, the integration of qualitative and quantitative data was achieved through data triangulation, a process where both types of data complement and enrich each other. Qualitative data, collected from interviews and focus groups, provided in-depth insights into the experiences and perceptions of prospective primary teachers regarding innovative teaching approaches. These qualitative findings helped explain the rationale behind certain behaviors, attitudes, and outcomes observed in the classroom, offering a deeper understanding of the impact of innovative teaching methods. The quantitative data, collected through surveys and assessments, provided measurable evidence of the impact of these approaches on student learning outcomes and teaching competencies. By analyzing statistical correlations, patterns, and trends, the study was able to make broader generalizations about the effectiveness of these teaching methods. The two data sets were analyzed separately, with qualitative data examined through thematic analysis and quantitative data through statistical methods. The themes that emerged from the qualitative analysis were then cross-referenced with the quantitative findings to evaluate whether the trends aligned. For example, if a qualitative theme indicated that teachers felt more confident using innovative methods, this was supported by quantitative data showing improvements in teacher performance scores or student outcomes.

3.2. Study sample formation

**Table 1.** Descriptive information provided by respondents.

Descriptive information about a respondent's		Quantity	Sample
Gender	Female	192	94%
	Male	8	6%
The areas of study	Pedagogical	200	100%
Student training course	2 courses	200	100%
EG	Abai Kazakh National Pedagogical University	100	50%
	Male	8	6%
	Female	92	44%
CG	Kazakh national women's teacher training university	100	50%
	Male	0	0
	Female	100	50%

The study sample consists of prospective teachers specializing in education from two Kazakhstani universities: Abai Kazakh National Pedagogical University and Kazakhstan National Women's Teacher Training University. A total of 200 prospective primary school teachers participated, aged between 18 and 27, with a mean age of 24.66 ± 1.1 years (SD 4.2). Students from Abai Kazakh National Pedagogical University formed the experimental group (EG) ($n = 100$), while the control group (CG) ($n = 100$) consisted of students from Kazakhstan National Women's Teacher Training University (see **Table 1**).

3.3. Designing experiments and evaluating performance

Experimental setting

The experimental sites for this study were Abai Kazakh National Pedagogical University and Kazakhstan National Women's Teacher Training University, both located in Almaty, Kazakhstan. The experiment took place over two university courses, from September 2023 to December 2023, spanning a total of 32 class hours. The program lasted 16 weeks, with classes held on Tuesdays and Thursdays from 2:00 pm to 4:50 pm, with each class lasting 50 minutes. The study utilized both an EG and a CG to conduct teaching experiments. Diagnostic assessments of participants' results were administered before the experiment began and after its completion, with detailed documentation of the specific classroom conditions for each group throughout the study. In this study, an innovative approach is defined as a method or strategy that introduces new, creative ways of teaching and learning, moving beyond traditional, teacher-centered methods. This approach focuses on improving student engagement, improving learning outcomes, and enriching the overall teaching experience in the EG using technology-enhanced learning (TEL) and collaborative learning activities (CLA) (**Figure 1**). Meanwhile, the CG continued with traditional, lecture-based methods.
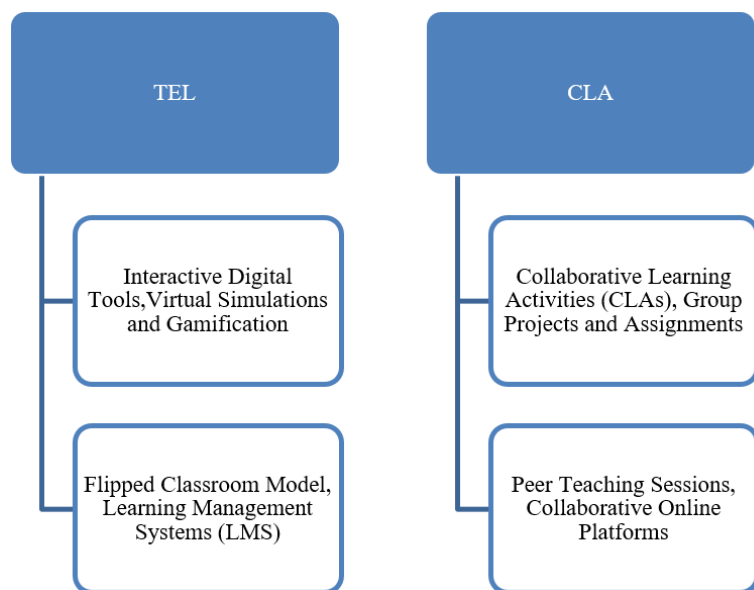
Figure 1. Technology-enhanced learning (TEL) and collaborative learning activities (CLA).

(1) Preparatory stage

The purpose of this stage is to capture the interest of EG participants in the value of innovative teaching approaches. The tasks include: (1) introducing participants to the key principles and benefits of innovative teaching methods through engaging presentations or demonstrations, (2) involving participants in a practical session where they can experience these innovative methods firsthand, such as using technology-enhanced learning tools or gamified learning activities, and (3) presenting case studies of successful implementations of innovative teaching methods in educational settings, highlighting their positive impact on learning outcomes. At this stage, the teacher's primary responsibilities include: organizing workshops where participants can apply innovative teaching techniques in small groups, allowing them to explore and adapt these methods to their own teaching practices; providing opportunities for participants to ask questions and share ideas on how they can incorporate these approaches into their current practices; offering resources such as toolkits, guides, or platforms that participants can use to implement innovative teaching methods in their classrooms; and assigning participants to develop a brief plan or proposal for integrating innovative approaches into their teaching, which they will present at the next stage or session.

(2) Search stage

The goal of the second stage was to organize student activities aimed at improving the quality of education. The tasks include: (1) developing initial ideas about what constitutes quality education, and (2) exploring the substantive aspects of educational quality by introducing technology-enhanced activities, such as the use of educational apps, gamified learning platforms, or virtual labs, to make learning more dynamic and accessible. These tasks are designed to encourage students to become active participants in their education, empowering them to take responsibility for their learning and ultimately fostering a higher standard of educational outcomes.

At this stage, the teacher's primary responsibilities are to: organize collaborative workshops where students teach or share knowledge on specific topics, encourage peer learning and engagement; facilitate group projects or activities where students work together to solve real-world problems or case studies, enhance collaboration and critical thinking; set up feedback sessions or surveys to gather students' insights and suggestions for improving the quality of education, empowering them to contribute to educational improvements; and organize academic competitions or challenges that promote learning, creativity, and critical thinking in an enjoyable and engaging way.

(3) Evaluation stage

The purpose of this stage is to assess the effectiveness of promoting students' quality of education through innovative teaching approaches. The tasks include: (1) determining the levels of development in participants' quality of education, and (2) assessing the impact of the innovative teaching approaches on the educational quality of prospective primary teachers. At this stage, the teacher's main responsibilities are to repeat the standardized tests, surveys, and classroom observations conducted during the pre-intervention assessment, to determine any changes in the teaching skills, knowledge, and practices of participants in both the experimental and control groups. Compare the results of the experimental group with

those of the control group to identify statistically significant differences attributable to the innovative interventions. Collect additional qualitative data through interviews and reflective journals from participants in both groups to gain deeper insights into their learning experiences and perceptions of the teaching approaches. Analyze the data to identify factors that either facilitate or hinder the long-term adoption of innovative teaching methods among prospective primary teachers.

3.4. Research instrument

A questionnaire on the impact of innovative approaches on the quality of education for prospective primary teachers

Section1: Exposure to Innovative Approaches

(1) Have you been introduced to innovative teaching methods during your training program?

(2) Which innovative teaching methods have you experienced?

(3) How often do you use these innovative approaches in your practice sessions?

Section 2: Perceptions of Effectiveness

(4) To what extent do you agree with the statement: "Innovative teaching methods have improved my readiness for classroom teaching"?

(5) How effective do you find the following methods in improving your teaching skills?

(6) How confident do you feel in implementing innovative teaching methods in a real classroom setting?

Section 3: Challenges and Recommendations

(7) What challenges have you encountered while using innovative teaching methods?

(8) In your opinion, what measures can be taken to improve the integration of innovative teaching methods in teacher education programs? (Open-ended response)

(9) What specific areas do you think require more attention or improvement in your training to prepare you for modern classroom teaching? (Open-ended response)

(10) Please share any additional comments or suggestions regarding the use of innovative approaches in teacher education. (Open-ended response)

3.5. Ethical compliance

Ethical issues were among the most important considerations in organizing educational research. The first requirement for engaging students in empirical research was their voluntary consent. It was the researcher's direct responsibility to provide potential participants with comprehensive information about the risks of participating in the study in accordance with the principle of voluntary consent. Respondents were informed about the study's confidentiality and anonymity that there are no rights or wrong answers that any point of view is valuable, and that they could choose not to answer certain questions before the survey began. Respondents were given alphanumeric identifiers that they could use instead of their names in all surveys and assessments.

3.6. Data analysis

The data collected from the structured questionnaire were analyzed using both descriptive and inferential statistical methods. All analyses were performed using SPSS software, with significance levels set at $p < 0.05$ to determine the relevance of the findings. To clarify the rationale for using specific statistical methods, t-tests were used for continuous data, and chi-square tests were applied for categorical data. This combination allowed the study to effectively examine the impact of innovative teaching methods on both quantitative outcomes (e.g., test scores) and qualitative factors (e.g., engagement levels), providing a comprehensive understanding of the intervention's effects. This approach ensured that the statistical methods were appropriately aligned with the study objectives and addressed the research questions.

4. Results

Results of inferential statistics comparing EG and CG (see **Table 2**).

Table 2. Inferential statistics comparing EG and CG.

Variable	EG (Mean ± SD)	CG (Mean ± SD)	t-value (or Chi-Square)	p-value
Perceived Quality of Education	4.5 ± 0.7	3.8 ± 0.9	$t = 5.67$	< 0.001
Confidence in Implementing Methods	4.3 ± 0.6	3.6 ± 0.8	$t = 6.12$	< 0.001
Engagement in Learning	4.4 ± 0.5	3.7 ± 0.7	$t = 6.34$	< 0.001
Development of Critical Thinking	4.6 ± 0.4	3.9 ± 0.8	$t = 6.88$	< 0.001
Adaptability to Classroom Settings	4.3 ± 0.7	3.5 ± 0.9	$t = 5.94$	< 0.001
Technology Integration in Teaching	90% ($n = 90$)	35% ($n = 35$)	$x^2 = 55.12$	< 0.001

The chi-square test findings ($x^2 = 55.12$, $p < 0.001$) revealed a statistically significant difference, showing that a significantly higher percentage of the experimental group (90%) integrated technology into their teaching compared to the control group, where only 35% incorporated technology.

These results show that the use of innovative teaching methods had a significant positive impact on various aspects of the perceived quality of education for prospective primary teachers in the EG. The findings suggest that innovative methods, such as technology integration and inquiry-based learning, contribute to enhanced teacher preparedness, critical thinking, and adaptability in classroom settings.

Table 3 presents the Pearson's correlation coefficient for results frequency of innovative method use and teacher preparedness.

Table 3. Pearson's correlation coefficient results for frequency of innovative method use and teacher preparedness.

Innovative Teaching Method	Group	Pearson's r (Correlation Coefficient)	p-value
Technology-Enhanced Learning	EG	0.72	< 0.001
	CG	0.30	0.01
Collaborative Learning Activities	EG	0.68	< 0.001
	CG	0.25	0.02

Technology-Enhanced Learning: In the EG, there is a strong positive correlation ($r = 0.72$, $p < 0.001$), indicating that as the frequency of using technology-enhanced learning increases, so does the level of perceived teacher preparedness. In contrast, the CG shows a weaker correlation ($r = 0.30$, $p = 0.01$), showing a modest relationship between technology use and preparedness. This suggests that without consistent exposure to innovative methods, the impact of technology on teacher preparedness is less significant.

Collaborative Learning Activities: In the EG, the correlation is strong ($r = 0.68$, $p < 0.001$), implying that the frequent use of collaborative learning activities significantly improves teacher preparedness. Conversely, in the CG, the correlation is weak ($r = 0.25$, $p = 0.02$), indicating a lower relationship between collaborative methods and preparedness, likely due to less frequent or less effective use of these methods.

Table 4 presents a clear, statistically supported comparison, showing the positive effects of innovative teaching approaches on student engagement, skill development, and overall learning outcomes.

Table 4. Comparison of student outcomes between EG and CG.

Metric	EG	CG	Difference	Statistical Significance (*p*-value)
Average Engagement Score (1–10)	8.7	5.2	+ 3.5	$p < 0.001$
Teaching Skills Development (%)	85% (Improved)	50% (Improved)	+ 35%	$p < 0.001$
Standardized Test Scores (out of 100)	78.5	65.3	+ 13.2	$p < 0.05$
Group Collaboration Frequency (per week)	4 sessions	1.5 sessions	+ 2.5 sessions	$p < 0.01$
Technology Integration Usage (% of class time)	60%	20%	+ 40%	$p < 0.001$
Retention Rate of Pedagogical Knowledge (%)	92%	68%	+ 24%	$p < 0.01$

Average Engagement Score: The EG, which utilized TEL and CLA, achieved a significantly higher engagement score of 8.7 out of 10 compared to a score of 5.2 in the CG. This difference shows the positive impact of interactive and technology-enhanced methods. In contrast, the CG, which continued with traditional lecture-based methods, showed lower engagement levels. The *p*-value ($p < 0.001$) confirms the difference is statistically significant, supporting the effectiveness of the innovative approach.

Teaching Skills Development: 85% of participants in the EG showed improved teaching skills, as assessed through standardized evaluations, compared to only 50% in the CG. The *p*-value ($p < 0.001$) shows a strong correlation between the use of TEL/CLA and the enhancement of teaching skills.

Standardized Test Scores: The average score of participants in the EG was 78.5, significantly higher than the 65.3 score in the CG. The lower scores in the CG suggest that traditional teaching methods were less effective in achieving similar outcomes. The *p*-value ($p < 0.05$) shows that the difference in test performance is statistically significant, further supporting the positive impact of innovative teaching methods on academic performance. Group Collaboration Frequency: The EG engaged in group collaboration activities more frequently, with an average of four sessions per week, compared to 1.5 sessions in the CG. The lower frequency in the CG underscores the limited application of collaborative methods in traditional teaching settings. The *p*-value ($p < 0.01$) indicates that this difference is statistically significant, highlighting the effectiveness of the CLA method in promoting group collaboration.

Technology Integration Usage: In the EG, 60% of class time was devoted to technology-enhanced learning activities, compared to only 20% in the control group. The limited use of technology in traditional classes highlights the contrast in instructional methods. The *p*-value ($p < 0.001$) confirms a statistically significant difference, supporting the role of technology in enhancing student engagement and promoting more dynamic learning experiences.

Retention Rate of Pedagogical Knowledge: 92% of participants in the EG effectively retained pedagogical knowledge after the intervention, compared to a lower retention rate of 68% in the CG. The *p*-value ($p < 0.01$) shows that this difference is statistically significant, indicating that TEL/CLA significantly contribute to better long-term retention of knowledge.

Table 5 presents the qualitative analysis of responses to the open-ended questions.

Table 5. Qualitative Analysis of Open-Ended Responses on Perceived Preparedness.

Theme	EG (*n* = 100)	CG (*n* = 100)
Challenges in Implementing Innovative Approaches	Limited access to technology (45%): Respondents expressed issues with access to reliable digital tools. Lack of professional development (30%): Inadequate training in new methods was highlighted. Resistance to change (15%): Some respondents mentioned resistance from traditional educators.	Lack of exposure to new methods (50%): Respondents cited not being introduced to innovative approaches during training. Traditional mindset (25%): Strong reliance on traditional teaching methods.
Suggestions for Improvement	More hands-on training (40%): Respondents suggested that more practical workshops and in-classroom simulations would help with implementation. Increased access to digital resources (35%): Requests for better technology infrastructure	Introduction of modern teaching methods (45%): Suggestions to update the curriculum with more modern approaches. Access to innovative teaching tools (30%): Respondents asked for more resources like apps and multimedia tools.
Impact of Innovative Approaches	Increased engagement (50%): Many respondents noted that students were more engaged with the new teaching methods. Improved classroom management (30%): Collaborative and technology-based learning made it easier to manage diverse classrooms.	Minimal change in student outcomes (55%): Many respondents noted that traditional methods led to limited engagement and mixed learning outcomes. Lack of confidence (25%): Respondents felt underprepared for modern classrooms.
Barriers to Adopting Innovation	Infrastructure limitations (50%): Poor internet connectivity and outdated equipment were common barriers. Cultural resistance (20%): Traditional views on teaching methods made adopting innovative approaches difficult.	Institutional support (40%): Respondents noted a lack of support from institutions to introduce modern methods. Limited curriculum flexibility (30%): The rigid curriculum made it difficult to incorporate innovative teaching techniques.

The specific differences between the EG and the CG focused on the following key areas: The EG reported facing more practical challenges, particularly related to technology and training. Teachers in this group often struggled with limited access to digital tools, difficulties using new educational software, and a lack of ongoing support during the implementation of TEL and CLA. Participants also cited time constraints as an important barrier, as the integration of training sessions and technology requires additional time, which can be difficult to manage alongside regular teaching responsibilities. Respondents in the EG expressed a desire for more targeted professional development programs that provide hands-on, practical training, as well as improved access to technological resources such as interactive whiteboards, tablets, and educational software. The CG highlighted systemic challenges, such as curriculum rigidity and the lack of flexibility to introduce innovative methods. Several participants expressed dissatisfaction with the limitations imposed by standardized curricula, which prioritize lecture-based instruction over interactive, student-centered approaches. Respondents in the CG emphasized the need for foundational training programs that introduce innovative teaching methods, advocating for curriculum reforms to allow for more flexibility. The rigid structure of the curriculum and the limited exposure to alternative teaching practices suggest a deeper issue, where the educational system itself inhibits innovation. As a result, teachers in the CG noted lower confidence and motivation, feeling constrained by the system and unable to explore or implement new teaching strategies. These findings suggest that the EG, despite facing challenges related to the practical implementation of innovative teaching methods, acknowledged clear benefits in classroom outcomes. In contrast, the CG struggled more with systemic barriers and a lack of exposure to new approaches, highlighting the need for broader reforms in teacher training programs and greater institutional support to foster innovation in teaching practices.

5. Discussion

This study aimed to examine the impact of innovative approaches on the quality of education for prospective primary teachers. The findings revealed several key insights, both aligning with and diverging from existing research in the field (Cui and Yin, 2023; Naz and Murad, 2017).

The introduction of TEL in this study showed a positive impact on teacher preparedness, aligning with findings from international research (Elm et al., 2023; Schweighofer et al., 2019). Chiu (2022) argues that technology integration in teacher education considerably enhances teaching practices by providing interactive and student-centered learning environments. Our study echoes these findings, as prospective primary teachers reported increased confidence in utilizing digital tools for lesson planning and delivery.

However, challenges related to infrastructure and access to resources, as noted in Rossoni et al. (2024), were also evident in Kazakhstan. While participants expressed enthusiasm for utilizing technology, limitations in university resources often hindered full integration, highlighting a common barrier faced by educational institutions in developing countries.

The study results show that CLA foster higher engagement and critical thinking, aligning with the research conducted by Mebert et al. (2019). Prospective teachers in the EG showed considerable improvement in designing lessons that encouraged student inquiry, problem-solving, and collaborative learning. This is further supported by Le et al. (2018), who emphasize that CLA creates active learning environments, benefiting both teachers and students. However, some studies, such as those by Surma et al. (2022), suggest that novice teachers may struggle with implementing CLA due to its complex, open-ended nature. The findings of this study also reflect this challenge, revealing a need for additional support in training prospective teachers to effectively manage CLA in their classrooms.

Innovative teaching methods positively affected teacher confidence, particularly in managing diverse classroom situations. Bandura's self-efficacy theory underscores the importance of mastery experiences in building confidence (Pfitzner-Eden, 2016). This study supports this theory, demonstrating that participants who successfully integrated technology and CLA reported greater self-efficacy in their teaching. Similar outcomes were observed in Granero-Gallegos et al. (2022), where teachers trained in innovative methods exhibited increased confidence in classroom management and instructional practices.

While the findings of this study reflect trends observed in other countries, particularly in the emphasis on technology and inquiry-based learning, the unique context of Kazakhstan adds additional layers to the discussion. Studies from Spain (Sánchez and Gutiérrez-Esteban, 2023) and Ghana (Abedi, 2023) highlight similar challenges in integrating innovation within teacher education, particularly regarding infrastructural limitations and traditional pedagogical mindsets. In Kazakhstan, these challenges are further intensified by a relatively conservative education system that is gradually transitioning to more student-centered methodologies. However, the progressive nature of Kazakhstan's recent educational reforms, including the focus on digital literacy and critical thinking in the National Curriculum, provides a promising context for the future of teacher education. The success of innovative approaches showed in this study suggests that, with ongoing support and infrastructure development, Kazakhstan has the potential to fully integrate these methods into primary teacher education. However, some challenges remain. One notable limitation is the potential bias introduced through self-reported data. Much of the qualitative information relied on interviews and surveys where participants reported their own experiences and perceptions, which introduces the risk of social desirability bias—teachers may have felt pressure to present their use of innovative methods in a more favorable light. Furthermore, participants may have had varying interpretations of what constitutes "innovative" teaching, which could skew the data. Consequently, there is an awareness of the inherent subjectivity in self-reported data, necessitating careful consideration when interpreting the findings.

Another challenge lies in measuring educational quality. Defining and quantifying educational quality, particularly in the context of innovative teaching approaches, is a complex process. While the study utilized both qualitative and quantitative measures to assess educational quality, it is important to acknowledge that this quality is affected by various factors outside the scope of this research, including socioeconomic conditions, available resources, and institutional support.

Furthermore, the cultural factors specific to Kazakhstan affected the implementation and reception of innovative teaching methods. Educational practices are often shaped by local traditions, beliefs, and policies. In Kazakhstan, the hierarchical structure of the education system and the emphasis on standardized exams have created resistance to adopting new, more flexible teaching approaches. By expanding on these areas, future studies could provide a more balanced reflection of their contributions and limitations, adding depth to the interpretation of the results and enhancing the overall rigor of the research.

5.1. Recommendations for practice

(1) Professional Development and Training: Teachers need access to ongoing professional development focused on innovative teaching methods. Workshops, seminars, and collaborative learning communities can provide teachers with the skills and confidence necessary to experiment with new approaches. For example, Kazakhstan could adopt models from countries like Finland, where teachers are allocated time for peer collaboration and reflective practice. Introducing training programs that focus on blended learning, project-based learning, or inquiry-based approaches can help teachers effectively adapt these methods to their teaching practices.

(2) Integration of Technology: The successful implementation of innovative methods often depends on the effective integration of technology. Schools should provide the necessary infrastructure, such as access to computers, the internet, and interactive tools, along with training for teachers to utilize these resources effectively. One successful initiative in Kazakhstan has been the introduction of digital classrooms, which offer platforms for students to engage with online resources and participate in collaborative digital projects. Expanding such programs to more schools can create a conducive environment for innovation in teaching and learning.

(3) Contextualizing Global Models: While global models can offer valuable insights, it is essential to adapt them to fit Kazakhstan's unique cultural and educational landscape. For instance, Singapore's use of problem-based learning (PBL), where students collaborate to solve real-world problems, can be adapted to Kazakhstan by incorporating locally relevant challenges, such as environmental issues or community projects. By tailoring these global approaches to local contexts, educators can improve the relevance and engagement of the learning experience for students.

(4) Involvement of Stakeholders: Engaging local educational stakeholders, such as parents, community leaders, and policymakers, is important for supporting the long-term adoption of innovative teaching methods. Involving these stakeholders in discussions about the benefits of new approaches can help overcome resistance to change and ensure the sustainability of these methods over time.

5.2. Study limitations

(1) Potential Biases: An important limitation of the study is the potential bias introduced through self-reported data. Participants may have unintentionally exaggerated their use of innovative teaching methods or provided responses they

perceived as more socially desirable, which can affect the objectivity and accuracy of the data. Future studies could address this issue by incorporating additional objective measures, such as classroom observations or performance metrics, to complement self-reported data, thereby improving the reliability of the results.

(2) Sample Representativeness: Another limitation of the study is the representativeness of the sample. The participants may not fully represent the broader population of prospective primary teachers, particularly given variations in geographical, cultural, and institutional contexts. This limitation could affect the generalizability of the results. To enhance the applicability of the findings, future research should aim for a larger and more diverse sample, providing a more comprehensive perspective that can be generalized to a wider audience.

(3) Additionally, time and resource limitations might have limited the ability to gather longitudinal data, which could provide valuable insights into the long-term effects of innovative teaching methods. Future research could address these limitations by employing more diverse sampling techniques, utilizing multiple data sources, and allocating additional time and resources for data collection.

6. Conclusions

In conclusion, the findings of this study strongly suggest that innovative teaching methods significantly enhance the quality of education for prospective primary teachers in Kazakhstan. By integrating technology, fostering collaboration, and providing more hands-on training, teacher education programs can better prepare future educators for the demands of modern classrooms. However, to fully realize these benefits, a concerted effort is needed to address practical challenges, such as infrastructure limitations and insufficient institutional support, particularly in rural areas. This study contributes to the ongoing dialogue about modernizing teacher education in developing regions and underscores the importance of innovation in shaping the next generation of teachers.

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