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From Tradition to Innovation: Pre-Service Teachers' Perceptions of Digital Transformation in Language Learning

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ABSTRACT

The study aims to determine: (a) pre-service teachers' attitudes toward digital transformation; (b) their attitudes toward digital transformation and teaching strategies; (c) whether their comfort with digital transformation varies by age or academic year; and (d) whether attitudes toward digital transformation differ based on grade level. This research was conducted using a survey model, with 420 students participating during the 2023–2024 academic year. The findings indicate that, despite certain challenges, overall attitudes toward digital tools are positive, as reflected in weighted averages and standard deviations across different dimensions. The data suggest that digital tools enhance engagement and motivation in language learning. The study provides practical insights into preparing non-linguistic university students for effective foreign language acquisition using digital resources. By examining their attitudes and readiness, the research offers an evidence-based framework that enhances the theoretical understanding of digital pedagogy while informing practical strategies for teacher training and curriculum development. This dual contribution supports the evolution of modern language teaching methods and guides policymakers in implementing digital reforms in education. By highlighting pre-

service teachers' positive attitudes toward digital transformation, the study underscores the need to integrate digital literacy and innovative teaching methodologies into teacher education programs. Such preparation is crucial for empowering future educators to effectively navigate and leverage digital resources in foreign language classrooms.

Keywords: Attitudes; Foreign Language Learning; Digital Transformation; Digital Technology; Strategies

1. Introduction

Digital tools become increasingly integral to modern education, and understanding how future educators view and integrate these technologies is crucial. Digital tools are revolutionizing language learning on a global scale by enabling interactive, immersive, and personalized educational experiences. They break down traditional classroom boundaries, facilitate access to diverse linguistic resources, and foster collaborative communication among learners from different cultural backgrounds. This technological shift not only enhances teaching methodologies but also equips students with the skills needed to thrive in a rapidly digitalizing world. Researchers believe that mastering a foreign language at the level of international standards is unthinkable today without the use of digital technologies[1, 2]. Therefore, understanding how prospective teachers feel about digitalization is essential given the importance of technological advancement in foreign language learning (FLL). Future teachers will be more than just tech users; they will be integrators who can assess DT's pedagogical potential and adapt it to meet the needs of individual students and learning objectives[3, 4]. However, this shift requires educational systems to address challenges such as digital equity, teacher preparedness, and curriculum redesign[5–7]. Enhancing teaching abilities and acquiring the technical know-how to use platforms and tools efficiently are both necessary to prepare educators for work in a digital world. The digital educational environment raises concerns about how teachers and students are developing their digital competencies while also providing new opportunities for the successful acquisition and development of professional and communicative competencies[8, 9]. In addition to updating their technical and material bases, educational institutions must now include activities that help teachers become digitally competent as part of their digital transformation strategy.

Kazakhstan's educational modernization policy, exemplified by initiatives such as the Digital Kazakhstan program, sets a forward-looking agenda for integrating digital tools into every facet of the education system. This policy aims to enhance digital literacy among educators, modernize teaching methodologies, and ultimately raise the nation's global competitiveness by aligning educational practices with international standards[10]. However, while these policy initiatives lay the groundwork for a digital transformation in education, they also reveal significant challenges. One key issue is the continued reliance on traditional teaching methods, such as the grammar-translation approach, which does not effectively harness digital technologies to improve communicative competence[11]. Additionally, many educators currently lack the necessary training to seamlessly incorporate digital tools into their teaching practices. This issue is compounded by the nation's low level of English proficiency, which reflects broader challenges in the educational system. According to the EF English Proficiency Index report, the level of English proficiency among citizens of our country still requires improvement. Thus, in 2025, Kazakhstan took 103rd place out of 116 countries. This level is considered very low. The level of English proficiency correlates with other indicators of economic and human development: income, education, innovation, welfare, and competitiveness of the country. The data provided indicate that there is no systematic approach and formalism of reforms[12, 13]. For instance, the nation's extensive use of three-month English courses to train teachers to teach specialized subjects in English has not yielded the high-quality results expected[14–16]. This illustrates the importance of consistently improving educational programs that prioritize foreign language competency to boost Kazakhstani professionals' competitiveness globally. Researchers emphasize the significance of preparing future teachers to address issues related to foreign language acquisition while accounting for the distinctive features of the local mindset.

Unfortunately, studies of this issue in the Kazakhstani segment have revealed that they are fragmented and heterogeneous, despite the declaration of increasing the competi-

tiveness of Kazakhstani specialists in the international arena. At this stage, there are no studies of the methodological foundations of this process. Growing awareness of the difficulties faced by learners when learning foreign languages has led to calls for more thorough research. However, this process is accelerated without considering the capabilities and resources of particular educational institutions. Because of this, practical measures to address the issues of future teachers' acquisition of FL overall and the digitization of professional training in particular frequently diverge greatly from one another [17, 18].

This research is important because it provides empirical evidence of how pre-service teachers perceive digital transformation as a beneficial evolution in foreign language instruction—a critical yet unexplored area in Kazakhstani higher education. While previous studies have primarily focused on general curriculum effectiveness or graduate employability, this study examines how to integrate digital literacy and innovative teaching methodologies into teacher education programs. The novelty of this research lies in its focus on the relationship between digital transformation and foreign language skills development, an area that has been largely unexplored in Kazakhstan. Using digital transformation and innovative teaching methodologies in teacher education programs and survey analysis, this study provides a quantitative, evidence-based perspective for developing curricula that blend traditional methods with modern digital tools. Hence, the following question guides our research:

Q1: What are the attitudes of the pre-service teachers toward digital transformation?

Q2: What are the attitudes of the pre-service teachers towards digital transformation and teaching strategies?

Q3: Do the attitudes of the pre-service teachers towards comfort with digital transformation differ according to the age or year of study?

Q4: Do the attitudes of the pre-service teachers towards digital transformation differ according to the grade variable?

Accordingly, the study aims to determine: (a) pre-service teachers' attitudes toward digital transformation; (b) their attitudes toward digital transformation and teaching strategies; (c) whether their comfort with digital transformation varies by age or academic year; and (d) whether attitudes toward digital transformation differ based on grade level.

2. Theoretical framework

The theoretical framework for this study builds on existing literature that highlights the crucial role of digital literacy and ICT in modernizing foreign language instruction. Key studies [19, 20] argue that as digital platforms facilitate intercultural contacts and access to diverse resources, foreign language teaching must evolve to incorporate these tools effectively. Research indicates that digital literacy is not only essential for navigating modern information spaces but also interdependent with foreign language proficiency [21]. This dual competency is increasingly viewed as a prerequisite for effective language instruction in a digital age. Studies [22–24] emphasize that without specialized digital training, language instructors struggle to leverage ICT effectively, even when technical infrastructure is available. Our framework posits that modern teacher training programs must update both general professional skills and subject-specific strategies to meet the demands of digital transformation. The integration of digital content, environmental solutions, and big data analysis tools is transforming language classrooms. These technologies enhance engagement, provide authentic communication experiences, and support personalized learning—outcomes that are central to our study.

Our study examines pre-service teachers' perceptions of digital transformation in foreign language learning. The framework suggests that these perceptions are shaped by the interplay of digital literacy, the adequacy of digital training, and the actual use of digital tools in educational settings. Drawing from the framework, our investigation focuses on variables such as teachers' comfort levels with digital tools, the extent of digital training received, and the perceived impact on teaching practices. These elements are critical for understanding how digital transformation is experienced in the context of language instruction. The framework allows us to interpret our findings in light of existing theories on digital literacy and teacher training. For example, differences in comfort levels based on age or year of study can be linked to varying levels of exposure and training in digital technologies. Below is a simplified diagram that illustrates the relationships among the key components of our theoretical framework (see **Figure 1**).
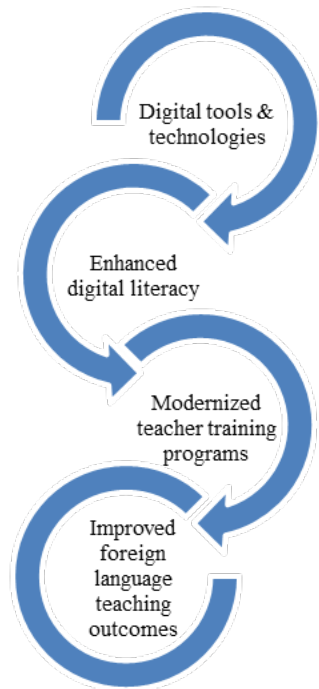
Figure 1. Conceptual framework for digital transformation in foreign language teaching.

Digital tools & technologies represent the array of digital resources (e.g., interactive platforms, digital content, big data analysis) that are transforming the educational landscape. Enhanced digital literacy reflects the necessity for teachers to develop digital skills that are interdependent with their language teaching abilities. Modernized teacher training programs emphasize the need for continuous, comprehensive digital training integrated into pre-service teacher education. Improved foreign language teaching outcomes indicate the end goal of digital transformation—achieving better student engagement, increased communicative competence, and overall enhanced language learning. This integrated approach not only reinforces the rationale for our research objectives but also provides a clear model for analyzing the impact of digital training and the effective use of digital tools in the classroom.

3. Methodology

3.1. Research Methods

This research was carried out using the survey model. In this method, the current situation is revealed as it is. It allows working with larger sample groups compared to other research methods. Consequently, the survey model was deemed appropriate for assessing pre-service teachers' opinions regarding the digitization of foreign language instruction.

The study followed a quantitative descriptive research approach, which aims to describe the current state of a phenomenon by systematically gathering numerical data[25]. A structured questionnaire was used as the primary data collection tool, ensuring consistency in responses and facilitating statistical analysis. The survey model is particularly suitable for capturing diverse perspectives on educational technology adoption, as it allows for the examination of patterns, trends, and relationships among variables[26].

3.2. Participants

The sample group of the research consists of 420 pre-service teachers of the Philological Faculty of Alikhan Bokeikhan University (Semey), Kazakh Ablai Khan University of International Relations and World Languages (Almaty), and L. Gumilyov Eurasian National University (Astana) in the 2023-2024 academic years, who voluntarily agreed to participate in the study. **Table 1** shows the frequency and percentage distribution of the participants by the department of education, grade of education, and gender. The average age of the participants was 23 ± 3.48 years. Distribution of respondents by form of study: full-time (100%); by gender: 5.66% men, 94.34% women. The gender imbalance in the sample reflects broader trends in the teaching profession, particularly in language education programs. Historically, teaching has been viewed as a profession dominated by women in many countries, including Kazakhstan, particularly in areas like language education and primary education. The demographic makeup of pre-service teachers is influenced by the higher percentage of female students in language and philology faculties in many higher education institutions (see **Table 1**).

3.3. Data Collection Tools

The first step in the scale development study was the literature review. During this process, studies on the use of perceptions of digital transformation in foreign language instruction were reviewed, discussed, and analyzed. The items for the scale were carefully selected to ensure they were clear, grammatically correct, and easily understandable.

Table 1. Demographic characteristics of pre-service teachers.

Category	Frequency (n)	Percentage (%)
Age		
18–20 лет	112	26.7%
21–23 лет	140	33.33%
24 -26	88	20.93%
27 +	80	19.04%
Total	420	100%
Gender		
Male	18	5.66%
Female	402	94.34%
Total	420	100%
Studying at the grade level		
First grade	100	23.39%
Second grade	103	24.30%
Third grade	107	25.61%
Fourth grade	110	26.70%
Total	420	100%
Department of Education		
Foreign Language Teaching	420	100%
Total	420	100%
Academic Background		
General Secondary Education	280	66.67%
Vocational Secondary Education	110	26.19%
Other	30	7.14%
Exposure to Digital Transformation in Education		
No prior training	120	28.57%
Basic training	200	47.62%
Advanced digital competency	100	23.81%
Access to Digital Tools at Home		
Limited	90	21.43%
Moderate	180	42.86%
Extensive	150	35.71%

This screening process led to the creation of a pool of 22 items, which was later refined into a final 12-item scale form. The validity and content of the scale were assessed based on expert opinions. The questionnaire collected demographic information from the participants, including their gender and grade level, before providing a concise overview of the findings. A total of 260 teacher candidates participated in the pilot application of the research.

3.4. Structured Training Program on DT for Foreign Language Instruction

Table 2 provides a structured approach for the participants to gradually build their understanding and skills in using various DT for FLL. Each week focuses on a different aspect, with specific tools and activities to encourage active learning and engagement.

3.5. Data Collection Process and Analysis

The statistical software SPSS 25.0 was used to analyze the research data. First, Cronbach's Alpha was calculated, and the results showed a value of 0.7, which is considered acceptable, indicating that the items on the survey reliably measure the perception of digital transformation. Based on this outcome, the data set was found to have a normal distribution. Consequently, parametric tests, including the T-test, one-way analyses of variance (ANOVA), and descriptive statistics, were performed on the data set.

4. Results

Table 3 shows the weighted average and standard deviations of the digital tools attitude scale of the pre-service

Table 2. Structured training program.

Week	Topic	Key Focus Areas	Tools/Activities
1	Introduction to DT in FLL	Overview of DT, importance of technology in FLL.	- Introduction to learning management systems (LMS)
2	Interactive tools for engagement	Using interactive tools for fostering student engagement.	- Kahoot! Quizlet, Padlet
3	Virtual classrooms & Online collaboration	Implementing video conferencing and collaborative tools for group activities.	- Zoom, Microsoft Teams, Google Meet
4	Multimedia in FLL	Integrating videos, podcasts, and audio for immersive learning.	- YouTube, Vimeo, Audacity
5	Assessments & Feedback with DT	DT for assessing students' progress and providing feedback.	- Google Forms, Turnitin, Padlet

Table 3. Descriptive statistics for survey responses.

| Survey Item	Mean (M)	Median (Mdn)	Mode	Standard Deviation (SD)
1. Item 1	4.0	4	4	1.01
2. Item 2	4.0	4	4	1.02
3. Item 3	3.0	3	3	1.12
4. Item 4	3.0	3	3	1.05
5. Item 5	3.0	3	3	1.17
6. Item 7	4.0	4	4	0.98

teachers.

Table 3 indicates that Items 1, 2, and 7 received higher ratings (mean = 4.0) with low variability (SDs around 1.0), suggesting a strong and consistent agreement among respondents regarding these aspects. These items may represent digital tools or strategies that are widely recognized for their ease of use, effectiveness, or clear relevance in enhancing language learning—factors that contribute to the positive consensus. In contrast, Items 3, 4, and 5, with mean ratings of 3.0 and moderate variability (particularly Item 5 with an SD of 1.17), suggest a less uniform perception. This variability may indicate that these aspects—possibly related to more complex or less familiar digital technologies—are viewed more critically or with less certainty by pre-service teachers.

Table 4 shows the Pearson's correlation, we would first need to perform a correlation analysis between the variables (e.g., comfort level with DT, age, and grade level).

According to the results of the correlation of 0.35, there is a weak to moderate positive correlation between comfort with digital tools and age. As age increases, there is a slight tendency for participants to feel more comfortable using digital tools. The p-value of 0.001 indicates that this correlation is statistically significant.

The correlation of 0.50 shows a moderate to strong positive correlation between comfort with DT and the year of study. This suggests that students in higher years of study tend to feel more comfortable using DT. The p-value of

0.0001 indicates this correlation is also statistically significant (see **Figure 2**).
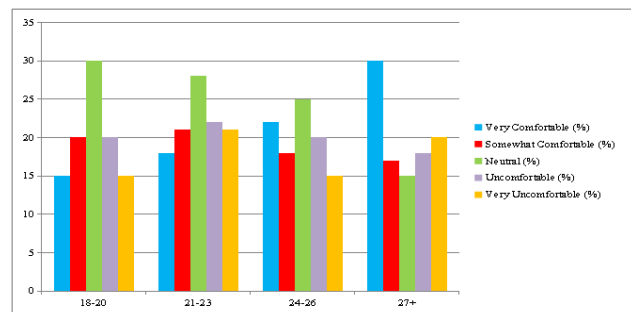
Figure 2. Comfort with digital tools across different age groups.

Referring to **Figure 1**, a positive correlation is observed between age and comfort with digital tools, with older participants (27+) reporting the highest percentage of being very comfortable (30%). This suggests that experience with digital tools over time may play a crucial role in increasing confidence, rather than age alone being a determining factor. The proportion of neutral responses declines with age, from 30% in the 18–20 age group to 15% in the 27+ group. This trend implies that as individuals gain more exposure, they are more likely to develop a clear opinion—either feeling more comfortable or more uncomfortable with digital tools. The younger age groups (18–23) show higher percentages of uncomfortable and very uncomfortable responses, suggesting that digital literacy may be unevenly distributed among

Table 4. Pearson correlation analysis.

Variable 1	Variable 2	Pearson's Correlation (r)	Significance (p-Value)
Comfort with DT	Age (converted)	0.35	0.001
	Year of Study	0.50	0.0001

younger participants. This could indicate a lack of prior training or access to digital tools at earlier stages of education. The 27+ age group shows the lowest percentage of uncomfortable (18%) and very uncomfortable (20%) responses. This supports the hypothesis that prolonged exposure and usage of digital tools contribute to greater comfort over time.

Table 5 provides an overview of the ANOVA results.

Referring to **Table 4**, the participants' use of DT varied from one another. First, the use of DT is influenced by age and academic year. It was discovered that senior respondents felt at ease using DT. The F-ratio of 73.88 with a very small p-value (<0.001) indicates that there is a statistically significant difference in the grades between the different grade levels.

Table 5. ANOVA results for by grade levels.

Source	Sum of Squares (SS)	df	Mean Square (MS)	F-Ratio	p-Value
Between Groups	53183.62	3	17727.87	73.88	< 0.001
Within Groups	100000	416	240.38		
Total	153183.62	419			

5. Discussion

This study demonstrates that digital tools hold considerable promise for enhancing foreign language instruction. Pre-service teachers generally perceive these tools positively, as reflected by a high average score for improved teaching practices (mean = 4.0). This indicates that digital resources are seen as valuable for increasing engagement and fostering communicative competence—a finding that aligns with prior research in this field [27–29].

Sufficient DT Training produced a neutral stance with a mean score of 3.0. This shows a clear lack of readiness: some teachers are confident, but others think they have not gotten enough training. The relatively higher standard deviation (1.05) supports this finding, highlighting that there are diverse opinions on the level of digital training provided to pre-service teachers. These findings suggest that more comprehensive training and support might be necessary to enhance teachers' abilities to use DT effectively in the classroom [30–32].

However, the standard deviation of 1.03 suggests some variability, indicating that while many teachers see improvements, there are still some who may not have fully integrated these tools into their teaching practices. Access to digital resources is perceived differently by each respondent (SD

1.17). They fall into two groups: (1) institutions provide adequate resources, and (2) access is limited. As a result, substantial institutional support is needed to incorporate digital resources into university classrooms. The respondents' confidence in using DT is demonstrated by a relatively low standard deviation (0.98) and a strong positive trend (mean value 4.0). It was discovered, nevertheless, that not every respondent is a confident user, which further suggests possible deficiencies in education or experience.

Age and comfort with digital language learning resources have a moderately positive correlation, as indicated by the 0.35 correlation. Compared to younger participants, older participants showed higher levels of comfort. Older participants may use digital language learning resources with greater assurance [33]. The notion that age significantly affects comfort levels is supported by the statistical significance (p = 0.001). A correlation coefficient of 0.50 between the year of study and the degree of comfort using DT indicates a moderate to strong positive correlation. The higher-year students may have felt more at ease and confident using DT for language learning during the study because they had practiced on a variety of digital platforms and used them more frequently than students in the first and second years [34].

These findings emphasize how crucial it is for all courses to provide ongoing, progressive instruction in digital

literacy. This guarantees that every student, irrespective of age or year, is suitably equipped for the expanding role of digital technologies in education. This result aligns with previous research that suggests older students may have had more exposure to and experience with digital technology, either in their educational or professional lives, which may make them more confident in using these tools [35, 36].

The results of the ANOVA also reveal a significant difference in comfort with DT across years of study (F = 9.50, p = 0.0001), with students in later years (third and fourth years) expressing higher levels of comfort compared to those in the first and second years. This suggests that the longer students are engaged in their programs, the more confident they become in using DT.

The results indicate a positive correlation between age and digital tool comfort, with older participants reporting higher levels of confidence. The research's implications for instructional strategies and the use of digital resources in the classroom include the following: Early-stage pre-service teachers should receive specialized digital literacy training from educational programs because younger participants (18–23) exhibit higher levels of discomfort. Workshops on specialized digital tools could be created, with more complex applications for older, more seasoned participants and introductory sessions for younger students. The high standard deviation of responses indicates significant variation in familiarity with digital tools. To bridge this gap, educational institutions should provide flexible learning pathways that allow students to progress at their own pace. Offer mentorship programs where experienced students assist peers in developing digital competencies.

6. Limitations and Future Research Directions

The sample consists predominantly of female participants (94.34%), limiting the generalizability of findings across diverse populations. Participants voluntarily joined the study, which may skew results toward individuals more interested in digital tools. The study captures a single point in time, making it difficult to assess how digital comfort evolves. Differences in digital infrastructure across universities may influence responses. Future studies should ensure a more balanced gender distribution and include a wider range

of institutions.

7. Conclusions

In conclusion, the findings confirm that while digital tools are widely regarded as beneficial for foreign language instruction, there is a notable gap in digital training and resource accessibility among pre-service teachers. The study provides empirical evidence that pre-service teachers perceive digital transformation as a beneficial evolution in foreign language instruction. This supports theoretical models that integrate technology acceptance with language learning, challenging traditional paradigms and advocating for a more innovative, digitally enriched approach to pedagogy. Although rooted in Kazakhstan, the research offers insights that extend to other developing and multilingual contexts. This cross-regional relevance emphasizes the universal applicability of digital tools in education and suggests that localized studies can contribute significantly to international best practices in digital education. The findings highlight that digital tools play a pivotal role in boosting student engagement and motivation. This practical insight suggests that incorporating such tools into language teaching strategies can directly improve learning outcomes. By revealing positive attitudes toward digital transformation among pre-service teachers, the study underscores the need to integrate digital literacy and innovative teaching methodologies into teacher education programs. This preparation is crucial for empowering future educators to navigate and leverage digital resources effectively in foreign language classrooms. The research offers a framework for developing curricula that blend traditional methods with modern digital tools. This integration can help non-linguistic university students overcome learning challenges and acquire foreign language skills more effectively, ensuring that educational practices remain current and adaptive to technological advancements.

Author Contributions

Conceptualization, G.K. and T.K.; methodology, G.K.; software, B.A.; validation, T.S., S.N. and G.K.; formal analysis, T.K.; investigation, G.K.; resources, B.A.; data curation, T.S.; writing—original draft preparation, S.N.; writing—review and editing, G.K.; visualization, T.K.; supervision, S.N.; project administration, B.A.; funding acquisition, T.S. All

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The authors declare no conflict of interest.

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