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The Impact of Information-Contextual Technologies on Shaping Foreign Language Teaching Proficiency in Prospective Educators

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ABSTRACT

Technological innovations are transforming language teaching, moving from traditional to modern teaching methods. This study examines the impact of information and communication technologies on the teaching proficiency of future teachers using a quasi-experimental design. Participants were divided into an experimental group and a control group. The experimental group received specialized training, including interactive digital platforms, AI-based language applications, and context-based learning scenarios, while the control group followed the traditional curriculum. The results indicate a significant increase in language proficiency scores for the experimental group. Paired *t*-tests and effect size calculations (Cohen's d = 1.05) confirmed substantial improvements, highlighting the practical effectiveness of the intervention. In contrast, the control group demonstrated only marginal gains, underscoring the limitations of traditional methods. The findings suggest that information and communication technologies-based instruction enhances not only linguistic competence but also pedagogical adaptability and digital literacy among future educators. The study's diagnostic tools can

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support teacher training, professional development programs, and curriculum improvement. In conclusion, the integration of information and communication technologies plays a key role in enhancing the teaching proficiency of future teachers. These results highlight the potential of innovative pedagogical approaches in preparing educators for the challenges of today's dynamic classrooms, equipping them with the necessary digital and methodological skills for effective instruction.
Keywords: Information-Contextual Technologies; Foreign Language Teaching; Teacher Training; Educational Technology; Professional Development

1. Introduction

The need for highly qualified and professionally competent specialists is growing in a rapidly evolving technologically advanced society[1]. Modern educational paradigms and new technologies are having a major impact on preparing prospective educators for foreign languages[2]. Prospective educators actively learn current trends in technology rather than passively following them[3–5]. In the age of digital opportunities, the combination of technologies, interactive teaching methods, and increased access to educational resources creates a new reality for those who want to become fluent in a foreign language[6–8]. Hence, preparing educators for life and work in the new information-driven world is one of the primary issues confronting the educational system[9–11].

Rapidly growing technological innovations in education determine a paradigm shift from traditional teaching to modern technologies. Modern technologies open up numerous new educational opportunities and approaches that make learning more effective, enrich it, and facilitate the processes of personalization of learning. In this regard, among the problems solved by researchers today are the issues of improving the professional training of future foreign language teachers[12–15]. Future educators' ability to perform their future professional tasks will depend on how well-versed they are in the various facets of using contextual and information technologies[16–18]. This circumstance sets the task for universities to prepare highly qualified teachers of foreign languages who possess a system of knowledge, skills, and abilities at the level of modern requirements. In the educational process, the emphasis is not on the unlimited enrichment of students with knowledge but on the development of creative abilities and on teaching methods of searching for new knowledge. In this sense, the formation of students' knowledge and skills in using information and contextual technologies to solve professional problems becomes an integral part of the readiness of future teachers for professional activities[19–21].

The use of information-context technologies in education has been the subject of increased research activity in recent years[22, 23]. According to data collected on technology use in training, the educational system has embraced the integration of information-context technologies into the learning process. Of direct importance for our study are studies on the problems of organizing foreign language teaching using information and contextual technologies and on the formation of foreign language teachers' readiness to use technologies in the educational process. Researchers find that the foreign language teaching methodology has flaws that result in students receiving insufficient professional training[24, 25]. The development of methods and improvement of curricula require serious modifications and revisions. Researchers believe that the goal of professional training should be to develop teachers with independence, pedagogical skills, and developed cognitive activity. Even though teachers are expected to meet higher standards in today's society, many teachers lack the necessary skills and are unable to implement innovative ideas in training. Analysis of the studies allows us to speak about the timeliness of continuing research in this area.

Unfortunately, studies of this problem in the Kazakhstani segment have revealed their fragmentation and heterogeneity, despite the declared increase in the competitiveness of specialists in the international arena[26–28]. The problem of forming the readiness of future foreign language teachers to use information-contextual technologies in their professional activities remains insufficiently resolved. At this stage of development of the theory and practice of professional training, there are no studies of the methodological foundations of this process and its impact on the professional development of students[29–31]. A growing awareness of the

difficulties prospective educators face when learning foreign languages has led to calls for a more thorough investigation into how to update the formats and subject matter of training[32–34]. Nevertheless, this procedure is being implemented without considering the resources and capacities of particular educational establishments. In this regard, there are often significant differences between professional training in particular and the real-world strategies used by aspiring teachers in general to address the issue of foreign language proficiency.

The study of the impact of information-contextual technologies on the shaping proficiency in prospective educators in Kazakhstan, a developing country, contributes to this topic. The data can be compared with the results of studies in developed countries. The starting point of this study is to find out how information-contextual technologies impact the shaping of proficiency in prospective educators.

Although the study was conducted in Kazakhstan, its findings may apply to other developing and multilingual countries facing similar challenges in developing prospective educators' foreign language teaching proficiency. This is an example of how regional research can influence international best practices. The novelty of the study lies in identifying and substantiating the main ways to improve proficiency in prospective educators based on the integration of information-contextual technologies. This issue is important in the context of studying the transformative potential of methods, programs, and tools for teaching a foreign language, taking into account the process of digital transformation in education.

1.1. Research Objectives

This study aims to assess the impact of information-contextual technologies on the shaping of foreign language teaching proficiency in prospective educators.

1.2. Research Questions

Q1: Does the integration of information-contextual technologies enhance the foreign language teaching proficiency of prospective educators?

Q2: How do prospective educators perceive the effectiveness of information-contextual technologies in their teacher training?

Q3: What differences in teaching proficiency are observed between the experimental group (EG) (using technologies) and the control group (CG) (traditional curriculum)?

2. Methodology

2.1. Research Methods

This study uses a quantitative research design to assess how incorporating information-contextual technologies into teacher preparation affects prospective teachers' teaching proficiency.

2.2. Research Design

The study used a quasi-experimental design with a pre-test/post-test methodology. The control group, which followed the traditional teacher training curriculum, and the experimental group, which used information-contextual technologies, were divided at random. A controlled comparison of the two groups' teaching proficiency results was made possible by this design. The study is divided into multiple phases (see **Figure 1**).

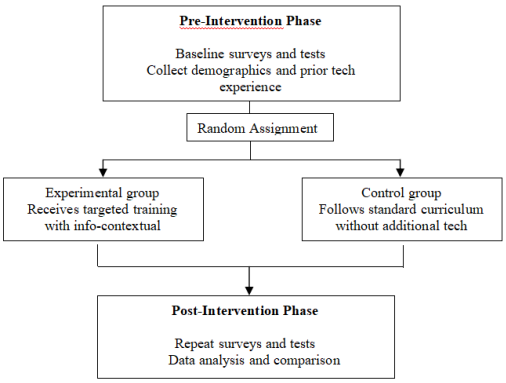

Figure 1. Phases of the study's execution.

2.3. Participants

The sample group of the research consists of 322 pre-service teachers of the Philological Faculty of Khoja Akhmet Yassawi International Kazakh-Turkish University, Turkestan, Kazakhstan in the 2023–2024 academic year, who voluntarily agreed to participate in the study. Participants must have a basic understanding of computers and be enrolled in a teacher training program. 161 participants in the experimental group used information-contextual technologies that were

incorporated into their teacher preparation program. 161 participants in the control group followed the conventional curriculum for teacher preparation without the addition of technology.

Table 1 presents the demographic characteristics of the 322 prospective educators who participated in the study.

Table 1. Demographic characteristics of prospective educators.

Demographic Characteristic	Category	Frequency (*n*)	Percentage (%)
Gender	Male	129	40.1
	Female	193	59.9
Age	18–22	193	60.0
	23–27	97	30.1
	28 and above	32	9.9
Year of study	1st year	129	40.1
	2nd year	112	34.8
	3rd year	48	14.9
	4th year	33	10.2
Prior technology exposure	Low	64	19.9
	Moderate	161	50.0
	High	97	30.1

The data shows that a larger proportion of the participants are female (59.9%) compared to male (40.1%). This gender distribution may reflect broader trends in the field of education, where female candidates often predominate in teacher training programs. Sixty percent (60.0%) of participants fall within the 18–22 age range, indicating that most prospective educators are likely at the beginning of their higher education journey. A smaller segment (30.1%) is aged 23–27, and the smallest group (9.9%) is 28 and above, suggesting that younger individuals are more represented in these programs. The distribution across the years of study shows a balanced representation, with the highest number of participants in the 1st year (40.1%). This is followed by a gradual decrease in frequency in subsequent years, which may reflect either the attrition over time or the initial intake numbers being higher in earlier years. Most participants have a moderate level of prior technology exposure (50.0%), while a significant number have high exposure (30.1%). A smaller group (19.9%) reported low exposure. This variation in technological familiarity could influence how quickly and effectively participants integrate new information-contextual technologies into their learning and teaching practices. These demographic insights provide valuable context for understanding the baseline characteristics of the participants. Recognizing these trends is essential, as they may affect how participants interact with the intervention.

2.4. Experimental Setting

Table 2 provides a concise overview of the experimental setting, ensuring clarity on the location, participant details, schedule, subject areas, group interventions, and evaluation procedures.

Table 2. Experimental setting and participant characteristics.

Aspect	Details
Experimental Site	Khoja Akhmet Yassawi International Kazakh-Turkish University
Specific Location	Faculty of Philology – designated classrooms for teacher training experiments
Participant Characteristics	Prospective educators with similar age, gender, number, and learning ability
Time Frame	September 2024 to December 2024
Total Class Hours	32 class hours
Program Duration	16 weeks
Class Schedule	Tuesdays and Thursdays from 14:00 to 16:50 (50-minute classes)
Subject Areas	Foreign language teaching methodologies, lesson planning, classroom management, and integration of digital tools
Group Interventions	Experimental group: Targeted training with information-contextual technologies
Diagnostics & Evaluation	Diagnostic tests administered pre- and post-intervention; documentation of classroom conditions during the experiment

2.5. Intervention Phase: Procedures and Schedule

Table 3 outlines the weekly activities for both the EG and CG during the 16-week intervention period.

2.6. Research Instruments: The survey's format and content

Table 4 provides a clear overview of the survey's structure, ensuring that all key areas relevant to the study are addressed and facilitating both quantitative and qualitative analyses.

2.7. Data Analysis

Descriptive statistics provided a summary of the baseline scores and participant characteristics, as well as the main characteristics of the data set. For the demographic variables (age, gender, and year of study) and baseline teaching skills scores, means, standard deviations, ranges, and frequency distributions were computed. To assess improvement, pre- and post-intervention scores in each group were compared using paired *t*-tests. The differences in teaching proficiency between the experimental and control groups were assessed using ANOVA after the intervention. This data analysis plan ensures a thorough and systematic evaluation of the intervention's effectiveness, providing robust evidence to support the study's conclusions.

Table 3. 16-week intervention phase schedule for EG and CG.

Week	EG Activities	CG Activities
1	Introduction to information-contextual technologies and digital tools.	Introduction to the course curriculum and traditional teaching methods.
2	Multimedia integration workshop for language lessons.	Lecture on lesson planning using conventional methods.
3	Hands-on session: Creating digital presentations for language lessons.	Discussion on effective traditional presentation techniques.
4	Workshop on online collaboration tools (Google Classroom) for lesson planning.	Group work on lesson planning without technological aids.
5	Training on virtual classroom platforms (Zoom, Teams) for remote teaching.	Session on traditional classroom management strategies.
6	Simulation: Conducting an online lesson using digital tools with peer feedback.	Observation and analysis of recorded lessons using traditional methods.
7	Workshop on integrating language learning apps and interactive digital tools into lesson design.	Traditional language exercises and classroom activities.
8	Mid-intervention evaluation and feedback session on digital practices.	Mid-intervention evaluation using standard assessments and feedback.
9	Advanced training: Using data analytics to monitor student progress in digital environments.	Workshop on traditional student assessment methods.
10	Project: Design a technology-enhanced lesson plan; peer review and discussion.	Project: Design a traditional lesson plan; peer review and discussion.
11	Workshop on creating multimedia content (videos, podcasts) for language teaching.	Lecture on curriculum development using conventional materials.
12	Collaborative session: Integrating social media and blogs for language practice and engagement.	Collaborative session: Developing group teaching strategies without digital tools.
13	Simulation: Conducting a live virtual class with real-time feedback.	Simulation: Conducting a live class using traditional methods.
14	Workshop on reflective practices using digital portfolios to document professional development.	Group discussion on reflective teaching practices without digital aids.
15	Final project preparation: Refining digital lesson plans and incorporating peer feedback.	Final project preparation: Refining traditional lesson plans and incorporating feedback.
16	Final presentations: Technology-enhanced lesson projects; comprehensive review and feedback session.	Final presentations: Traditional lesson projects; comprehensive review and feedback session.

3. Results

Table 5 presents the results of descriptive statistics for participant characteristics and baseline teaching proficiency

Table 4. Survey instrument—format, content, and purpose.

Survey Section	Response Format	Items
Demographic Information	Closed-ended (numeric input and multiple-choice)	- Age - Gender - Year of Study - Prior Exposure to Technology (Low, Moderate, High)
Attitudes Toward Technology	Likert-scale items (1 = Strongly Disagree to 5 = Strongly Agree)	Using information-contextual technologies enhances foreign language teaching. I feel comfortable using digital tools in teaching. Information-contextual technologies are easy to use. Digital tools increase student engagement. I am interested in innovative teaching methods.
Self-Reported Teaching Proficiency	Likert-scale (1 = Not Confident at All to 5 = Very Confident)	I am confident in designing effective lesson plans. I can effectively manage a classroom while using technology. I am skilled in integrating digital tools into my teaching. I feel prepared to use information-contextual technologies.
Satisfaction with the Learning Process	Likert-scale (1 = Very Unsatisfied to 5 = Very Satisfied)	I am satisfied with the overall training program. The integration of technology enhanced my learning experience. The course content was delivered clearly. The training has improved my teaching proficiency.
Feedback and Suggestions	Open-ended questions	What did you find most beneficial about the training program? What improvements would you suggest for integrating technology in teacher training? Please provide any additional comments or suggestions.

Table 5. Descriptive statistics of participant characteristics and baseline scores.

Parameter	EG (n = 161)	CG (n = 161)
Age (years)	Mean = 21.5, SD = 1.8, Range: 18–27	Mean = 21.7, SD = 1.7, Range: 18– 26
Gender		
Male	60 (37.3%)	58 (36.0%)
Female	101 (62.7%)	103 (64.0%)
Year of Study		
1st Year	50 (31.1%)	48 (29.8%)
2nd Year	45 (28.0%)	47 (29.2%)
3rd Year	35 (21.7%)	38 (23.6%)
4th Year	31 (19.3%)	28 (17.4%
Baseline Teaching Proficiency	Mean = 65.2, SD = 9.8, Range: 45–85	Mean = 64.5, SD = 10.2, Range: 42–83

scores for both groups.

The descriptive statistics showed that the EG and the CG were well matched before the intervention. The nearly identical average age (21.5 vs. 21.7 years) and similar standard deviations and ranges demonstrate the sample's age homogeneity. Gender distribution is comparable, with the experimental group comprising 37.3% males and 62.7% females and the control group showing a similar split (36.0% males and 64.0% females). The distribution across years of study is also balanced between the groups, ensuring that academic experience is similar. Importantly, both groups began the study with similar skill levels, as evidenced by similar baseline teaching proficiency scores (65.2 in the EG vs. 64.5 in the CG). When all is said and done, these similarities support the study's internal validity by showing that any differences observed following the intervention can be attributed to it rather than to underlying differences in participant characteristics.

Table 6 presents the results of paired t-tests to compare pre-intervention and post-intervention proficiency scores within each group. This will determine whether significant improvements occurred over time.

In the EG, the paired t-test revealed a statistically significant improvement in teaching proficiency scores from pre-intervention (M = 65.2, SD = 9.8) to post-intervention (M = 75.6, SD = 8.5), $t(160) = 8.45$, $p < 0.001$. In contrast, the CG did not exhibit a statistically significant change, with pre-intervention scores (M = 64.5, SD = 10.2) compared to post-intervention scores (M = 66.2, SD = 9.8), $t(160) = 1.82$, $p = 0.07$. These results suggest that the integration of

Table 6. Results for pre- and post-intervention teaching proficiency scores.

Group	Pre-Intervention Mean (SD)	Post-Intervention Mean (SD)	*t*-Value (df = 160)	*p*-Value
EG	65.2 (9.8)	75.6 (8.5)	8.45	<0.001
CG	64.5 (10.2)	66.2 (9.8)	1.82	0.07

information-contextual technologies significantly enhanced teaching proficiency in the EG.

Table 7 summarizes the results (ANOVA) for comparing each group's post-intervention teaching proficiency scores.

Regarding **Table 7**, the between-groups analysis (with 1 degree of freedom) yielded a significant F-value of 25.67 ($p < 0.001$), indicating a significant difference in teaching proficiency scores between the EG and CG after the intervention. The within-groups error variance (320 df) supports the reliability of the results.

Effect sizes, or Cohen's d, are used to quantify the size of group differences and offer information about the intervention's usefulness (see **Table 8**).

A Cohen's d of 1.05 in the EG indicates a very large improvement in teaching proficiency scores from pre- to post-intervention. In contrast, the CG effect size of 0.18 suggests minimal change over the same period. The between-group post-intervention comparison, with a Cohen's d of 0.85, further confirms the substantial practical impact of the intervention. These effect sizes highlight the significant advantages of integrating information-contextual technologies in enhancing teaching proficiency among prospective educators.

4. Discussion and Conclusions

This study investigated the impact of information-contextual technologies on the shaping of foreign language teaching proficiency in prospective educators. The descriptive statistics indicate that the experimental and control groups were well matched before the intervention. Both groups had nearly identical average ages (21.5 vs. 21.7 years) and similar ranges, ensuring that participants were comparable in terms of maturity and academic stage. The gender distributions were also consistent, with approximately 37% male and 63% female participants in both groups, and the distribution of students across the years of study was balanced. Most importantly, the baseline teaching proficiency scores were very similar (65.2 for the EG vs. 64.5 for the CG). These findings suggest that the random assignment of participants was successful, effectively minimizing pre-existing differences that could confound the results. Consequently, any post-intervention differences in teaching proficiency can be more confidently attributed to the integration of information-contextual technologies rather than to variations in participant characteristics. This baseline equivalence enhances the internal validity of the study, supporting the conclusion that observed outcomes are a direct result of the intervention.

The paired t-test results demonstrate the efficacy of the intervention. In the EG, teaching proficiency scores improved significantly from a pre-intervention mean of 65.2 (SD = 9.8) to a post-intervention mean of 75.6 (SD = 8.5), $t(160) = 8.45$, $p < 0.001$. This substantial increase indicates that the integration of information-contextual technologies had a pronounced positive effect on the participants' teaching proficiency. In contrast, the CG, which adhered to the traditional curriculum, exhibited only a marginal improvement from a mean of 64.5 (SD = 10.2) to 66.2 (SD = 9.8), $t(160) = 1.82$, $p = 0.07$, a change that did not reach statistical significance. These results suggest that the targeted technological intervention was a critical factor in enhancing teaching proficiency. The significant gains observed in the EG reinforce the value of integrating innovative, context-specific technologies into teacher training programs. Conversely, the negligible change in the CG underscores the limitations of conventional methods in fostering comparable improvements. These findings provide robust evidence supporting the hypothesis that information-contextual technologies significantly contribute to the professional development of prospective educators.

The ANOVA results provide strong evidence for the efficacy of the intervention. Specifically, the analysis revealed a significant difference in post-intervention teaching proficiency scores between the EG and the CG, with an F-value of 25.67 (df = 1, 320) and a p-value less than 0.001. This indicates that the variance observed between the groups is

Table 7. Results for post-intervention teaching proficiency scores.

Source	SS	df	MS	*F*	*p*-Value
Between Groups	1850.25	1	1850.25	25.67	<0.001
Within Groups	23012.50	320	71.91		
Total	24862.75	321			

Table 8. Effect Sizes (Cohen's d) for teaching proficiency scores.

Comparison	Cohen's d
Experimental Group (Pre vs. Post)	1.05
Control Group (Pre vs. Post)	0.18
Between Groups (Post-Intervention)	0.85

unlikely to be due to random chance. The higher proficiency scores in the experimental group suggest that the targeted training integrating information-contextual technologies significantly enhanced teaching competencies compared to the traditional curriculum used in the control group. These findings support the hypothesis that embedding modern, context-specific technological tools into teacher training can substantially improve teaching performance. The participants of the EG, who received targeted training with information-contextual technologies, demonstrated a substantial increase in teaching proficiency scores. Paired *t*-tests and effect size calculations (Cohen's d) revealed large improvements, confirming the practical significance of the intervention.

Thus, the participants of the EG, who received targeted training with information-contextual technologies, demonstrated a substantial increase in teaching proficiency scores. Paired *t*-tests and effect size calculations (Cohen's d) revealed large improvements, confirming the practical significance of the intervention. The participants of the CG, following the traditional curriculum, exhibited only marginal gains, underscoring the limited effectiveness of conventional methods in enhancing teaching proficiency within the same timeframe. Integrating technology-driven, context-specific strategies in teacher training programs can significantly improve the instructional competencies of future educators. These findings contribute to the growing body of evidence that technological innovations, when aligned with pedagogical goals, can enhance teacher development and learning outcomes[35–37]. However, the successful implementation of these technologies faces several challenges. Limited technological infrastructure, particularly in remote areas, can hinder accessibility, while inadequate digital competency among educators may reduce the effectiveness of these tools. Resistance to pedagogical shifts and difficulties in integrating digital tools into existing curricula further complicate adoption. Additionally, excessive reliance on technology may lead to cognitive overload, and the long-term sustainability of such interventions depends on financial and institutional support. Addressing these barriers requires targeted teacher training, curriculum integration strategies, and sustainable implementation models. Future research should explore solutions to these challenges, ensuring the long-term effectiveness of technology-driven approaches in foreign language teacher education.

In conclusion, the data indicate that the integration of information-contextual technologies plays a pivotal role in boosting teaching proficiency among prospective educators[38–40]. These results underscore the potential of innovative pedagogical approaches to better prepare educators for the modern classroom. Further studies might explore the long-term retention of these enhanced teaching skills, examine larger or more diverse samples, and investigate additional technology-based methods to optimize teacher training.

Author Contributions

Conceptualization, D.S. and G.R.; methodology, M.A.; software, A.S.; validation, T.Y., L.I. and D.S.; formal analysis, G.R.; investigation, M.A.; resources, A.S.; data curation, T.Y.; writing—original draft preparation, L.I.; writing—review and editing, D.S.; visualization, M.A.; supervision, A.S.; project administration, T.Y.; funding acquisition, L.I. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

References

[1] Garad, A., Gold, J., 2019. The learning-driven organization: toward an integrative model for organizational learning. Industrial and Commercial Training. 51(6), 329–341. DOI: https://doi.org/10.1108/ICT-10-2018-0090

[2] Dejene, W., 2020. Conceptions of teaching & learning and teaching approach preference: Their change through preservice teacher education program. Cogent education. 7(1), 1833812. DOI: https://doi.org/10.1080/2331186X.2020

[3] Lim, J., Ko, H., Yang, J.W., et al., 2019. Active learning through discussion: ICAP framework for education in health professions. BMC medical education. 19(1), 477. DOI: https://doi.org/10.1186/s12909-019-1901-7

[4] Xu, X., Shi, Z., Bos, N.A., et al., 2023. Student engagement and learning outcomes: an empirical study applying a four-dimensional framework. Medical education online. 28(1), 2268347. DOI: https://doi.org/10.1080/10872981.2023

[5] Haleem, A., Javaid, M., Qadri, M.A., et al., 2022. Understanding the role of digital technologies in education: A review. Sustainable operations and computers. 3, 275–285. DOI: https://doi.org/10.1016/j.susoc.2022.05.004

[6] Alenezi, M., Wardat, S., Akour, M., 2023. The need of integrating digital education in higher education: Challenges and opportunities. Sustainability. 15(6), 4782. DOI: https://doi.org/10.3390/su15064782

[7] Akour, M., Alenezi, M., 2022. Higher education future in the era of digital transformation. Education Sciences. 12(11), 784. DOI: https://doi.org/10.3390/educsci12110784

[8] Selwyn, N., Hillman, T., Bergviken Rensfeldt, A., et al., 2021. Digital technologies and the automation of education—key questions and concerns. Postdigital Science and Education. 5, 15–24. DOI: https://doi.org/10.1007/s42438-021-00263-3

[9] Kang, L., 2024. Revolutionizing Vocational Education: Information-Based Instruction and the Knowledge Economy. Journal of the Knowledge Economy. 1–33. DOI: https://doi.org/10.1007/s13132-024-01797-0

[10] Zhang, H., Dai, W., He, J., 2024. An analysis of the differences in information-based teaching to improve the learning achievements of Chinese higher vocational college students. Asia Pacific Education Review. 25(5), 1305–1317. DOI: https://doi.org/10.1007/s12564-023-09855-z

[11] Harushimana, I., 2022. Preparing educators who save lives: what can US schools of education do? Journal for Multicultural Education. 16(3), 225–236. DOI: https://doi.org/10.1108/JME-11-2021-0198

[12] Kylyvnyk, V., Malyshevska, I., Pavelkiv, K., et al., 2022. Professional Training of Future Foreign Language Teachers: Socio-Cultural Aspect. Revista Romaneasca Pentru Educatie Multidimensionala. 14(1), 176–195. DOI: https://doi.org/10.18662/rrem/14.1/513

[13] Havrilova, L., Beskorsa, O., Ishutina, O., et al., 2021. Introduction of Intercultural Communication Studies into the Curriculum of Pedagogical University. Revista Romaneasca Pentru Educatie Multidimensionala. 13(3), 448–467. DOI: https://doi.org/10.18662/rrem/13.3/461

[14] Keshavarz, M., Ghoneim, A., 2021. Preparing educators to teach in a digital age. The International Review of Research in Open and Distributed Learning. 22(1), 221–242. DOI: https://doi.org/10.19173/irrodl.v22i1.4910

[15] Guri-Rosenblit, S., 2018. E-teaching in higher education: An essential prerequisite for e-learning. Journal of new approaches in educational research. 7(2), 93–97. DOI: https://doi.org/10.7821/naer.2018.7.298

[16] Abulibdeh, A., Zaidan, E., Abulibdeh, R., 2024. Navigating the confluence of artificial intelligence and education for sustainable development in the era of industry 4.0: Challenges, opportunities, and ethical dimensions. Journal of Cleaner Production. 437, 140527. DOI: https://doi.org/10.1016/j.jclepro.2023.140527

[17] Southworth, J., Migliaccio, K., Glover, J., et al., 2023. Developing a model for AI Across the curriculum: Transforming the higher education landscape via innovation in AI literacy. Computers and Education: Artificial Intelligence. 4, 100127. DOI:

https://doi.org/10.1016/j.caeai.2023.100127

[18] Vasiutina, T., Kondratiuk, O., Lukianchenko, O., et al., 2022. Competence approach to teaching future primary school teachers. Revista Tempos e Espaços em Educação. 15(34), e16598. DOI: https://doi.org/10.20952/revtee.v15i34.16598

[19] Brianza, E., Schmid, M., Tondeur, J., et al., 2024. Is contextual knowledge a key component of expertise for teaching with technology? A systematic literature review. Computers and Education Open. 7, 100201. DOI: https://doi.org/10.1016/j.caeo.2024.100201

[20] Lind, J., Pelger, S., Jakobsson, A., 2020. Students' knowledge of emerging technology and sustainability through a design activity in technology education. International Journal of Technology and Design Education. 32, 243–266. DOI: https://doi.org/10.1007/s10798-020-09604-y

[21] Çoban Sural, Ü., Yaşar Sağlık, Z., 2024. Next-generation learning experience: The effect of technology-assisted and printed context-based vocabulary activities on vocabulary knowledge and learning motivation. Education and Information Technologies. 29, 20823–20853. DOI: https://doi.org/10.1007/s10639-024-12688-x

[22] Muchacki, M., 2022. Peculiarities of Personality Development of the Future in the Context of Information and Communication Technologies and Education System Reform (Polish Experience). Futurity Education. 2(1), 55–67. DOI: https://doi.org/10.57125/FED.2022.25.03.6

[23] Baako, I., Abroampa, W. K., 2024. Context matters: exploring teacher and learner contexts in ICT integration in slum public basic schools in Ghana. Cogent Education. 11(1), 2342637. DOI: https://doi.org/10.1080/2331186X.2024.2342637

[24] Imran, M., Almusharraf, N., Abdellatif, M.S., et al., 2024. Teachers' perspectives on effective English language teaching practices at the elementary level: A phenomenological study. Heliyon. 10(8), e29175. DOI: https://doi.org/10.1016/j.heliyon.2024.e29175

[25] Winson, V.R.V., Arunkumar, V., Rao, D.P., 2023. Exploring the Landscape of Teaching and Learning English as a Second Language in India. Assyfa Learning Journal. 1(2), 104–111. DOI: https://doi.org/10.61650/alj.v1i2.123

[26] Nurgaliyeva, S., Zeinolla, S., Aben, A., et al., 2025. Kazakhstan's universities: global challenges and local duties improving education quality. International Journal of Evaluation and Research in Education. 14(1), 768–776. DOI: http://doi.org/10.11591/ijere.v14i1.31852

[27] Tajibayeva, Z., Nurgaliyeva, S., Aubakirova, K., et al., 2023. Investigation of the psychological, pedagogical and technological adaptation levels of repatriated university students. International Journal of Education in Mathematics, Science, and Technology. 11(3), 755–774. DOI: https://doi.org/10.46328/ijemst.3336

[28] Nurgaliyeva, S., Zhumabayeva, A., Kulgildinova, T., et al., 2025. Evaluating student satisfaction of terminological apparatus with natural and mathematical textbooks in Kazakhstani schools. Cogent Education. 12(1), 2468563. DOI: https://doi.org/10.1080/2331186X.2025.2468563

[29] Nurgaliyeva, S., Bolatov, A., Abildina, S., et al., 2024. COVID-19 online learning challenges: Kazakhstan secondary schools case study. Frontiers in Education. 9, 1448594. DOI: https://doi.org/10.3389/feduc.2024.1448594

[30] Izat, M., Kyyakbayeva, U., Nurgaliyeva, S., et al., 2024. The implications of educational games on the development of children's intellectual abilities. International Journal of Innovative Research and Scientific Studies. 8(1), 126–136. DOI: https://doi.org/10.53894/ijirss.v8i1.3578

[31] Karibaev, Z., Zhumabayeva, A., Kurbonova, B., et al., 2024. Subjective Well-Being of Students with Disabilities in Kazakhstan: An Exploration of Practice. Journal of Curriculum Studies Research. 6(2), 88–103. DOI: https://doi.org/10.46303/jcsr.2024.12

[32] Cortina-Pérez, B., Andúgar, A., 2021. Exploring the ideal foreign language teacher profile in Spanish preschools: teacher education challenges. Teachers and Teaching. 27(8), 713–729. DOI: https://doi.org/10.1080/13540602.2021.2004112

[33] Madalińska-Michalak, J., Bavli, B., 2018. Challenges in teaching English as a foreign language at schools in Poland and Turkey. European Journal of Teacher Education. 41(5), 688–706. DOI: https://doi.org/10.1080/02619768.2018.1531125

[34] Li, Q., Xie, Z., Zeng, G., 2023. The Influence of Teaching Practicum on Foreign Language Teaching Anxiety Among Pre-Service EFL Teachers. Sage Open. 13(1). DOI: https://doi.org/10.1177/21582440221149005

[35] Panakaje, N., Ur Rahiman, H., Parvin, S.R., et al., 2024. Revolutionizing pedagogy: navigating the integration of technology in higher education for teacher learning and performance enhancement. Cogent Education. 11(1), 2308430. DOI: https://doi.org/10.1080/2331186X.2024.2308430

[36] Al-Adwan, A.S., Meet, R.K., Kala, D., et al., 2024. Closing the divide: Exploring higher education teachers' perspectives on educational technology. Information Development. 1–27. DOI: https://doi.org/10.1177/02666669241279181

[37] Akram, H., Abdelrady, A.H., Al-Adwan, A.S., et al., 2022. Teachers' perceptions of technology integration in teaching-learning practices: A systematic review. Frontiers in psychology. 13, 920317. DOI: https://doi.org/10.3389/fpsyg.2022.920317

[38] Sarzhanova, D., Kulgildinova, T., 2022. Enhancing

professional competence in foreign language teaching: practicing information and contextual technologies. Bulletin. Series: Pedagogical Sciences. 64(1). DOI: https://doi.org/10.48371/PEDS.2022.64.1.016

[39] Hiratsuka, T., Nall, M., Castellano, J., 2024. Transspeakerism: A trioethnographic exploration into diversity, equity, and inclusion in language education. Language and Education. 38(6), 1044–1060. DOI: https://doi.org/10.1080/09500782.2023.2223565

[40] Zhang, H., Koda, K., Han, Y., et al., 2019. Word-specific and word-general knowledge in L2 Chinese lexical inference: An exploration of word learning strategies. System. 87, 102146. DOI: https://doi.org/10.1016/j.system.2019.102146