

AI SUPPORTED LINGUOCULTURAL TRAINING IN KARAKALPAK-RUSSIAN BILINGUALISM

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Abstract

This study explores the development of linguocultural competence among first-year non-philological students studying Russian as a foreign language in a Karakalpak-Russian bilingual context. The research is grounded in the premise that effective language acquisition requires not only linguistic knowledge but also an understanding of cultural meanings embedded in communication.

A mixed methods research design was employed, combining quantitative and qualitative approaches. The study involved pre- and post- testing, questionnaires, classroom observations, and an experimental teaching intervention. The instructional model incorporated linguoculturally oriented tasks, authentic materials, comparative cultural analysis, and artificial intelligence (AI) supported tools to enhance personalized learning and feedback.

The results demonstrate statistically significant improvements in students' linguocultural competence, including vocabulary acquisition, pragmatic usage, and interpretation of culturally marked language units. The experimental group outperformed the control group, confirming the effectiveness of the proposed methodology. In addition, a reduction in negative language transfer was observed, indicating improved differentiation between linguistic systems in a bilingual environment.

Keywords: linguocultural competence; Russian as a foreign language; bilingualism; Karakalpak–Russian context; intercultural communication; artificial intelligence in education; digital learning; non-philological students

Introduction

The expansion of intercultural interaction and the growing importance of multilingual education have significantly increased the role of linguocultural competence in teaching Russian as a foreign language. This type of competence goes beyond the acquisition of linguistic forms, as it also involves understanding culturally specific norms, values, and patterns of communication inherent in the target language.

In the context of Karakalpak-Russian bilingualism, first-year students of non-philological specializations encounter a range of learning difficulties. These challenges are often associated with language interference, frequent code-switching, and a limited level of cultural awareness. As a result, students may experience problems when interpreting culturally bound lexical units, idiomatic expressions, and pragmatic features of speech.

At the same time, conventional teaching practices tend to prioritize grammar and vocabulary instruction, while paying insufficient attention to the cultural dimension of language. This imbalance can lead to a discrepancy between students' theoretical knowledge and their ability to use the language appropriately in authentic communicative situations.

Against this background, the application of innovative teaching strategies, particularly those involving digital and artificial intelligence (AI) technologies, becomes increasingly relevant.

AI-based tools provide opportunities for individualized learning, immediate feedback, and the integration of multimodal authentic resources, all of which support a more profound understanding of cultural contexts.

Consequently, there is a clear need to design and implement pedagogical approaches that effectively combine linguistic and cultural components, taking into account the bilingual characteristics of learners. The present study seeks to contribute to this objective by investigating methods for enhancing linguocultural competence among first-year non-philological students studying RFL in a Karakalpak–Russian bilingual environment.

Methods

The research was designed within a mixed methods paradigm, combining quantitative measurement with qualitative interpretation to obtain a multidimensional understanding of linguocultural competence development. Such an approach ensures methodological triangulation and enhances the validity and credibility of the results (Rakhmonov, 2024; Cherginskaya, 2024).

The empirical base of the study consisted of first-year non-philological students studying Russian as a foreign language in a Karakalpak-Russian bilingual environment. The selection of participants was carried out using a purposive sampling method, which made it possible to include learners with approximately similar levels of language proficiency and comparable educational backgrounds (Abdurakhmanov, 2024).

To collect empirical data, a set of complementary methods was employed. Quantitative indicators were obtained through diagnostic testing before and after the pedagogical intervention, allowing for the assessment of changes in students' linguocultural competence. In parallel, structured questionnaires were used to identify learners' motivation, attitudes toward culturally oriented learning, and difficulties associated with interpreting culturally specific language units (Nosirov, 2025).

Qualitative data were gathered through systematic classroom observations, as well as reflective teacher notes documenting the characteristics of classroom interaction, the level of student engagement, and their dynamics of their speech behavior. This made it possible to capture not only measurable outcomes but also the process-related aspects of competence development (Yeryomina, 2025).

A central component of the study was a pedagogical experiment, during which an original set of linguoculturally oriented tasks was introduced into the learning process. The instructional process included authentic texts, culturally marked vocabulary, elements of comparative cultural analysis, as well as AI-supported tools that provided adaptive content delivery and immediate feedback. The integration of digital technologies is consistent with recent trends in modern language education (Lagay, 2024).

To determine the effectiveness of the proposed methodology, statistical procedures were applied, including descriptive statistics and comparative analysis of pre- and post-intervention results. In addition, qualitative data were processed using thematic analysis, which allowed for the identification of stable patterns in students' linguocultural development and changes in their intercultural awareness.

Results

The comparative analysis of the experimental and control groups revealed noticeable differences in the development of linguocultural competence. While both groups demonstrated some level of progress, the improvement observed in the experimental group was substantially higher, confirming the effectiveness of the proposed methodology.

At the initial stage, the results of the pre-test indicated that both groups had approximately equal levels of linguocultural competence, which ensured the validity of further comparison. However, after the implementation of the experimental teaching approach, significant differences emerged.

Students in the experimental group, who were exposed to linguoculturally enriched materials and AI-supported learning tools, showed a more pronounced increase in all measured indicators, including vocabulary acquisition, pragmatic competence and interpretation of culturally specific language units.

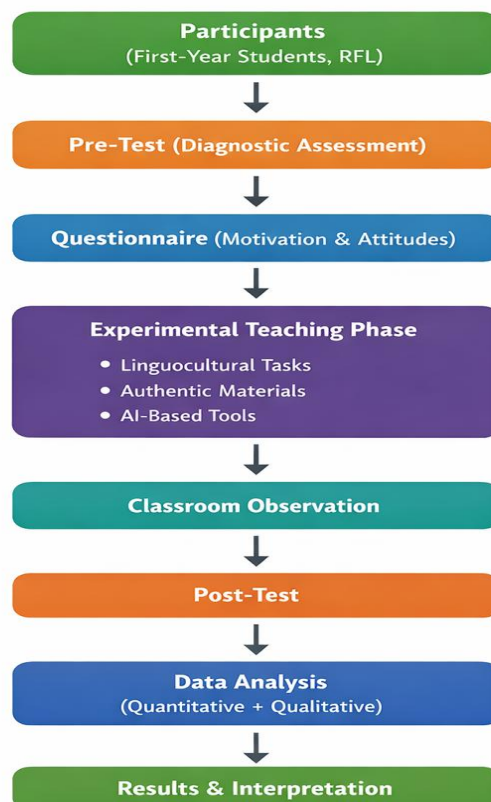


Figure 1. Research Design and Methodological Framework

Table 1. Comparative Results of Experimental and Control Groups

Indicator	Experimental Group (Pre-test)	Experimental Group (Post-test)	Control Group (Pre-test)	Control Group (Post-test)
Mean Score				
(Overall Competence)	57.9	79.3	58.2	66.1
Vocabulary Acquisition (%)	55%	83%	56%	68%
Pragmatic Competence (%)	52%	84%	53%	65%
Cultural Interpretation Skills (%)	50%	85%	51%	63%
Interference Errors (%) ↓	43%	17%	42%	31%

Further statistical verification was conducted using an independent samples t-test to compare post-test results between the two groups:

$t=5.94, p<0.001$ $t=5.94, \text{quad } p<0.001$ $t=5.94, p<0.001$

This confirms that the difference between the experimental and control groups is statistically significant.

The **effect size (Cohen's $d = 1.12$)** indicates a strong practical impact of the intervention. In contrast, the control group, which followed traditional instruction methods, showed only moderate improvement, mainly limited to formal language knowledge.

In addition, the reduction of interference-related errors was considerably higher in the experimental group, suggesting that linguocultural and AI-integrated instruction helps students better differentiate between language systems in a bilingual context.

Qualitative observations further support these findings: learners in the experimental group demonstrated higher engagement, more active participation, and increased confidence in intercultural communication tasks.

Discussion

The results obtained in the study indicate that the formation of linguocultural competence in the process of teaching Russian as a foreign language is most effective when it is based on deliberately structured pedagogical interventions that reflect the bilingual nature of learners. The findings suggest that without targeted instructional support, students tend to develop linguistic knowledge in isolation from its cultural dimension.

One of the central elements contributing to the success of the experimental model was the systematic inclusion of culturally authentic learning materials. These resources exposed students to real communicative contexts and culturally embedded meanings, allowing them to interpret language not only at the lexical or grammatical level but also within its sociocultural framework.

The application of contrastive cultural techniques also proved to be highly beneficial. By engaging students in the comparison of native and target cultural patterns, the instructional

process facilitated deeper awareness of intercultural differences and similarities. This, in turn, reduced the frequency of transfer-related errors and improved the appropriateness of language use in communicative situations.

Furthermore, the implementation of **interactive instructional formats** significantly influenced learner involvement. Activities that required active participation, discussion, and problem-solving contributed to more meaningful engagement and supported the internalization of linguocultural knowledge. The shift from passive reception to active construction of meaning appears to be a critical factor in competence development.

A notable contribution of the study lies in the integration of **AI-assisted learning tools**, which enhanced the overall effectiveness of instruction. These technologies enabled individualized learning trajectories, timely feedback, and access to diverse multimodal content. As a result, students demonstrated improved learning outcomes and greater autonomy in the educational process.

The findings correspond with contemporary theoretical perspectives that emphasize the interdependence of language and culture, as well as the importance of accounting for bilingual cognitive frameworks in language acquisition. At the same time, certain constraints should be acknowledged, including the relatively limited sample size and the context-specific nature of the research setting.

Conclusion

The study confirms that the integration of linguocultural components into the teaching of Russian as a foreign language represents a crucial condition for effective learning, particularly in bilingual environments. The evidence obtained shows that students achieve higher levels of communicative competence when linguistic instruction is combined with systematic cultural orientation.

The proposed instructional model, which integrates authentic materials, comparative cultural analysis, interactive learning formats, and elements of artificial intelligence, demonstrates a high level of pedagogical effectiveness. It allows learners not only to master language structures but also to develop the ability to apply them appropriately in intercultural communication.

An important outcome of the research is the confirmation that AI technologies can serve as a powerful tool for enhancing language education. Their use supports personalized learning, increases student motivation, and contributes to more efficient acquisition of both linguistic and cultural knowledge.

From an applied perspective, the results of this study may be used in the development of modern curricula, teaching resources, and digital educational platforms for RFL instruction. In addition, they highlight the necessity of preparing teachers to work effectively in multilingual and technologically enriched learning environments.

Further research may extend the present findings by involving broader participant groups, exploring long-term learning effects, and examining additional variables influencing linguocultural competence. Special attention may also be given to the expanding role of artificial intelligence in shaping future models of language education.

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