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CONTENTS

Ademau Akylbekova, Mergul Kulakhmetova, Sholpan Alimova 5
METHODS OF TEACHING VOCABULARY OF A SECOND LANGUAGE: LINGUODIDACTIC ASPECTS

Assel Myrzakhmetova, Igor Khlebnikov, Arstan Satanov, Yevgenia Matorina 18
ATTITUDES TOWARD CIVIC EDUCATION PRACTICES AND CIVIC ORIENTATIONS OF UNIVERSITY STUDENTS IN KAZAKHSTAN

Gulnaz Tleuzhanova, Gulim Karimova, Anna Palina 33
ASSESSING PROFESSIONAL FOREIGN LANGUAGE COMPETENCE AMONG STUDENTS OF LINGUISTIC AND NON-LINGUISTIC SPECIALTIES

Umitzhan Kossybayeva, Indira Kauymbek, Aigerim Seitimbetova 40
METHODOLOGICAL FEATURES OF WORKING WITH STUDENTS WITH SPECIAL EDUCATIONAL NEEDS IN TEACHING MATHEMATICS IN GENERAL SECONDARY SCHOOLS

Baurzhan Bokayev, Zulfiya Torebekova, Nurbek Aizharykov 55
PARTICIPATION OF KAZAKHSTANI UNIVERSITIES IN GLOBAL RANKINGS: ANALYSIS OF DYNAMICS, PROBLEMS, AND PROSPECTS

Sayagul Bakhtiyarova, Zhaksat Kenzhin, Khanat Kassenov, 63
Gulnar Khazhgaliyeva, Aitolkyn Turginbayeva
THE EXPERIENCE OF OLYMPIC EDUCATION FOR UNIVERSITY STUDENTS

Damira Jantassova, Zhuldyz Tentekbayeva, Daniel Damiyev 74
DEFINING THE LINGUISTIC MEANS OF SCIENTIFIC AND TECHNICAL COMMUNICATION IN THE TRAINING OF ENGINEERS

Kairat Moldashev, Askat Tleuov 92
UNDERGRADUATES' PERSPECTIVES ON TEACHING AS A CAREER: EVIDENCE FROM KAZAKHSTAN

Andrii Biloshchytskyi, Oleksandr Kuchanskyi, Aidos Mukhatayev, Yurii 107
Andrashko, Adil Faizullin, Aidar Ispussinov
FORMATION OF MULTI-UNIVERSITY SCIENTIFIC AND EDUCATIONAL COMMUNITIES BASED ON SCIENTOMETRIC ANALYSIS

Ainash Kudysheva, Askar Azhenov, Aizhan Temerbayeva, Indira Saparbekova 120
INNOVATING CAREER SUPPORT IN HIGHER EDUCATION FOR PERSONALIZED PROFESSIONAL DEVELOPMNET

Gulnara Rizakhojayeva 131
THE EFFECT OF GAMIFICATION IN EDUCATION:
THE META-ANALYSIS OF THE IMPACT OF IMPLEMENTATION ON STUDENT ENGAGEMENT AND LEARNING OUTCOMES

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METHODS OF TEACHING VOCABULARY OF A SECOND LANGUAGE: LINGUODIDACTIC ASPECTS

Abstract. In the context of multilingual education in Kazakhstan, the study of a second foreign language takes on special significance since the formation of a multilingual personality is an important direction of the language policy in Kazakhstan. University teachers face the issue of updating the methodology of teaching a second foreign language within the allocated hours for this discipline. The article is devoted to the study of some methods of teaching the vocabulary of a second foreign language to students with the state language of instruction. The article discusses the linguodidactic principles of teaching vocabulary and word formation of the German language, such as morphological, lexical and conceptual differences between the Kazakh and German languages. These features affect the selection of active vocabulary and require the use of methods that facilitate the process of mastering vocabulary. The purpose of research is to study effective methods of assimilation of lexical units and methods of word formation in the German language. Specific attention is paid to the importance of considering cognitive and linguacultural phenomena when choosing methodological approaches that help adapt the learning process to students. The article presents three effective methods identified through testing during the experiment: contextual learning, the method of interlinguistic associations and contrastive analysis.

The results of the methodological experiment display the efficiency of the proposed methods for the formation of an active vocabulary in the experimental group compared to the control group. The use of these methods allows to reduce the level of difficulties that arise while studying vocabulary in German and contribute to the successful implementation of new lexical units and word-formation models.

The novelty of the study lies in the adaptation and testing of these methods in the context of Kazakhstani multilingual education. The results of the study have practical importance and can be used in the preparation of curricular, massive open online courses and teaching aids for students with the state language of instruction.

Key words: teaching vocabulary and word formation, linguistic aspects, contextual teaching, cognitive approach, interlinguistic associations

Introduction

In the context of a multilingual society and rapidly developing global socio-economic transformations, knowledge of one foreign language becomes insufficient. The language policy of the Republic of Kazakhstan also reflects the intention to develop a multilingual personality who speaks several languages (State Program, 2019). The importance of communicative intercultural competence for professionals across different levels and fields is increasing due to the expansion of international cooperation. Proficiency in foreign languages and their practical application are becoming valuable assets in the professional sphere. A review of scientific studies conducted by both domestic and international research highlights the growing significance of second foreign language instruction within the framework of multilingual education.

The act of teaching vocabulary and word formation in the context of a second foreign language seems to be a very complex and multifaceted process that requires not only the

concentration of certain linguistic, psychological, cognitive and other competencies, but also linguocultural, cultural and background knowledge (Fulcher, 2003). For students with the Kazakh language of instruction, this task is complicated by interlingual differences between the native and foreign languages such as Russian, English and German, and possibly others as well. The problem of teaching a second foreign language (FL2), using German as an example, is developing rapidly. An analysis of the studied literature shows that teaching FL2 and other subsequent languages differs significantly from teaching the first foreign language (FL1).

For the formation and development of skills in FL2, linguomethodological, linguocultural, sociolinguistic, and other linguistic and methodological prerequisites are laid (Hymes, 1972: 272). Thus, the effectiveness of mastering FL1 demonstrates the following indicators:

- experience of learning a foreign language has been acquired, i.e. educational experience.
- speech experience has been formed, i.e. the ability to switch from the native language code to the studied one.
- linguistic thinking has been significantly developed.
- language guesswork and language intuition have been developed.
- mechanisms of self-assessment and reflection have been developed.

Despite the above-mentioned indicators, there are a number of difficulties that arise when studying FL2:

- weak authentic content of teaching aids for students in FL2,
- lack of domestic teaching aids taking into account students developed linguistic and educational experience,
- the existence of interfering linguistic phenomena of the Russian and English languages, including an educational multilingual environment.

In recent years, the teaching of German in secondary schools and universities in Kazakhstan has gained popularity, driven by public demand, bilateral cultural cooperation. The effectiveness and success of multilingual education depended on the integration of is components trough shared methodological principles (Bim, 2001). In this study, we follow the principles of second foreign language teaching outlined by the German linguist G. Neuner (Neuner, 2003). According to his concept, five basic principles are distinguished in the context of multilingualism: the principle of cognitive comparison and discussion; the principle of conscious learning; the principle of the content of the educational material corresponding to the interests of students; the principle of orientation to the text and the principle of saving time in the educational process. These principles holistically reflect the consistency that must be taken into account when teaching a foreign language.

Since in our study the main aspects of learning are teaching vocabulary and word formation, we consider different points of view of the authors dealing with this problem. However, the methodology of teaching a second language does not sufficiently highlight how important and necessary it is to consider the influence of FL1 and the native language.

In teaching vocabulary and word formation of FL2, problems arise for both teachers and students. At this stage, reflection plays a crucial role in expanding foreign knowledge, as students compare the studied languages, explore auxiliary tools for mastering German vocabulary and structure, and analyze their learning strategies to avoid incorrect borrowings from English or Russian expressions. It is essential that reflection is not overly concise, allowing learners to fully grasp the comparisons they make, their rationale, and the conclusions they draw. The principle of cognitive learning makes students be active participants in the learning process. Intrinsic motivation in studying FL2 affects the students' purposeful search for their own strategies for learning a new language, the search for linguistic patterns of the second FL2, the use of previous knowledge and experience, skills and abilities (Ballweg, 2005).

Since we believe that cognitive approaches must be considered FL2, in particular vocabulary and word formation. Therefore, in our study we touch upon the principle of cognitive learning.

Teaching German as a second foreign language has its own traditions and history, however, the process of teaching FL2 requires methodological research in this area, since it is not oriented towards students with Kazakh as the language of instruction and for whom German is the third language. When acquiring a second foreign language, mastering the strategy of comparative analysis is essential for developing speech skills and competencies. In the process of learning German grammar after English, the application of comparative methodology becomes indispensable. Given the linguistic proximity of both languages within the German family, a systematic contrastive approach facilitates the identification of structural and functional correspondences, enhancing grammatical awareness. Moreover, this strategy allows learners to leverage their prior linguistic knowledge, optimizing cognitive processing and accelerating language acquisition. Consequently, integrating in the development of both linguistic competence and metalinguistic awareness. (Dörnyei, 2014).

However, the relevance of this study lies in the fact that the problem has not been sufficiently studied in Kazakh linquodidactics, especially when teaching German as a second foreign language and is due to the requirements of high-quality preparation of students studying German for intercultural communication and the need to develop a scientifically sound methodology that takes into account both the didactic principles of teaching a foreign language and the specifics of studying German the presence of cognitive experience gained in the learning process FL1.

Thus, taking into account the identified contradictions and the lack of teaching materials adapted to the multilingual context, the present study aims not only to determine effective methods that facilitate the acquisition of German vocabulary and word formation as a second foreign language, but also to analyze the linguistic and cognitive barriers that impede this process. In this regard, the study addresses the following research questions: (1) What difficulties most significantly complicate the acquisition of German vocabulary by Kazakh-speaking students? (2) Which methods – contextual learning, interlinguistic associations, or contrastive analysis – prove to be the most effective in mastering vocabulary and word formation? (3) How can these methods be adapted to the conditions of multilingual education in Kazakhstan?

Literature review

Foreign authors Jack C. Richards, Theodore S. Rodgers (2001) in their works emphasize that vocabulary is a central component of language and is of great importance for a foreign language learner, since without sufficient vocabulary it is impossible to communicate effectively or express thoughts, vocabulary plays a key role in the process of language proficiency.

Tirado R. notes that it is not enough to learn a language; it is important to know its socio-cultural reality, reflected in words, and understanding the development of language and consciousness are connected at the cognitive level (Tirado, 2019).

“The sociocultural perspective sees a language not as a static set of rules but as a system that is deeply intertwined with learners’ social practices and interactions” (Johnson, 2009). This suggests that vocabulary learning goes beyond memorization and rules to emphasize interactions in culturally significant contexts. This informed the choice of vocabulary teaching methods in our study, allowing learners to connect vocabulary learning with relevant social practices rather than isolated lexical items. This is in line with the need for methods that integrate Kazakh cultural context when teaching FL2.

Based on N.A. Shchukin (2004), teaching of foreign languages requires students to master the cultural life of its speakers, without which adequate participation in intercultural communication is very difficult.

"From this point of view, the purpose of language education changes. Now perfect (at the level of native speaker) mastery of one or two and even three languages spoken separately from each other is not goal. The goal is developing a linguistic repertoire in which all linguistic skills have a place" (Osiyanova, 2005). According to her statements, modern language education should focus on knowledge of several foreign languages. The goal of language education is to teach foreign languages in interconnection with each other. It is necessary not only to start learning a new foreign language, but also to improve the previous one. L.M. Borisenkova notes that "the influence of the first foreign language on the study of the second can be both positive and negative. In any case, it affects knowledge, skills, memory, communicative abilities of the individual, the awareness of the use of a particular construction" (Borisenkova, 2009). Based on U. Weinreich, the interaction of language systems in the process of studying two different languages in an educational environment is expressed in a deviation from the norm and the system of the second language under the influence of the first language, or the native language (Sycheva, 2015). A similar idea was expressed by the author T.A. Pustovalova: "thus, the perception of a linguistic unit is perceived through the prism of the first foreign language or one's native language when it is involved in two or more linguistic systems" (Pustovalova, 2014). Galskova (2009) notes that "the formation of lexical skills and abilities does not involve only taking into account information of a formal-structural nature, but also knowledge of situational, social and contextual rules, which adhered to by native speakers" (Galskova, 2009). This aspect is emphasized in this study, and we adhere to this point of view.

O.A. Dorokhova asserts "mastering vocabulary when teaching foreign languages is of system-forming importance" (Dorokhova, 2014). She emphasizes that the problem of developing lexical skills is a key aspect of foreign language instruction and one of the most important in teaching a foreign language and mastering vocabulary has a system-forming significance, since it is in vocabulary that the meanings are embedded that encourage communication between individuals. In her work, she highlights the following aspects such as lexical knowledge. It is an important part of cognitive activity of students and provides a solid lexical basis for language acquisition. The acquired knowledge about various aspects of a foreign language affects the correct choice of the appropriate meaning of a foreign language word from its entire structure to express the specified concept the ability to combine lexical units with each other the ability to express thoughts with exiting lexical structures.

Lexical units in foreign language teaching mean nothing more than a certain set of lexical material, both productive and passive, allowing one to demonstrate the development of language competencies. That is why learning a second foreign language plays an important role in the development of a linguistic personality.

However, the relevance of this study lies in the fact that in Kazakhstani linguodidactics the problem has not been sufficiently studied especially in teaching German as FL2. This fact is due to the requirements of high-quality preparation of students studying FL2 for intercultural communication and the need to develop a scientifically based methodology that considers both the didactic principles of teaching a foreign language and the specifics of studying FL2. It consists in the presence of cognitive experience gained in the process of learning FL1.

Modern educational and methodological complexes, textbooks and self-study guides for the German language available on the Kazakhstani market are mostly designed for learners who are starting to study the language from scratch. However, they do not take into account students accumulated academic and linguistic experience, as well as the interference influence jo previously learned languages, particularly Russian and Englich. In the context of Kazakh-

medium education, German is the third language, which requires specialized methodological approaches. Therefore, the key objective of this study is so identifying effective methods that contribute to the successful acquisition of German vocabulary and word formation as a second foreign language for students with Kazakh as their language of instruction.

Although multilingualism and second foreign language acquisition have been extensively studied, the Kazakhstani context remains underexplored in international linguodidactic research. This study seeks to address this gap by combining cognitive and intercultural approaches with the practical insights of domestic scholarship. In doing so, it contributes to the global discussion on models of multilingual education and offers a new perspective on vocabulary instruction in higher education.

Methods and organization of research

The study was conducted during one semester with participation of 68 students of specialty "Foreign language: two languages". The experimental group (n=36) was trained using three methods: contextual, interlinguistic, and contrastive, while the control group (n=32) was trained using a traditional program. The program included work with text, tasks for recognizing and using words productively, analyzing internationalisms and comparing grammatical structures. At the ascertaining stage, an entrance lexical test was conducted. The nonparametric Mann-Whitney U-test was used for statistical verification.

During our study, the observation method was formed at the initial stage, allowing us to record the types of lexical work and tasks that are the most effective for students with the Kazakh language of instruction. This method was used to identify the effectiveness of tasks and exercises that contribute to the acquisition of both active and passive lexical vocabulary. During one semester, the educational process was observed in the control and experimental groups, the results of which demonstrate certain aspects for further research at subsequent stages. The method of comparative analysis in the study of vocabulary and word formation of the German language in relation to the Kazakh language, which involves a thorough comparison of language units and structures, was used at the final stage, due to this method it was possible to identify both similarities and differences that contribute to the successful acquisition of vocabulary and word formation by students with the Kazakh language of instruction. To compare the level of proficiency of the control and experimental groups, the Mann Whitney U-test was used at the ascertaining stage. The experiment was conducted during the 4th semester of 2023-2024 academic year. The chosen period and duration of the experiment were dictated by a number of conditions. Since the second language is introduced, according to the curriculum, from the second semester of the academic year, the formation of students' lexical baggage in the second foreign language requires a certain amount of time.

One of the factors that directly and indirectly influence students' vocabulary usage is the time and number of credits assigned. In this semester, 45 credits are allocated for studying the second foreign language, which is not enough to master the stated level in the syllabus, thereby once again proving the need to use effective methods for learning vocabulary within the stated number of credits. The use of these methods allows to understand which aspects of vocabulary and word formation cause difficulties for students, what potential difficulties they encountered when studying German, and on this basis, practical tasks and work programs can be developed that take these features into account and correspond to Kazakhstani realities.

Research results and discussion

The acquisition of vocabulary in a foreign language is one of the central components of the language learning process. For students with Kazakh as the language of instruction, this process is accompanied by a number of linguistic challenges caused by the structural and typological differences of the languages being studied. Among the key difficulties are:

- phonetic differences: one of the first difficulties that Kazakh-language students encounter when learning vocabulary in German is phonetics. There are significant phonetic differences between Kazakh and German, which makes it difficult to correctly perceive and pronounce new words. German has a number of sounds that are absent in Kazakh, for example, [ʃ], [ç], [ɛ:]. This leads to problems with the perception and pronunciation of new words. For example, for students with Kazakh language of instruction, the sound "ü" in the German word *müssen* may seem difficult, since there is no similar sound in Kazakh; sounds specific to German, such as [ø] (ö) and [y] (ü), are not present in Kazakh and Russian, which makes them difficult to articulate. In German, stress often falls on the first syllable of a word, whereas in Kazakh it mostly falls on the last syllable: "Parkplatz" (parking), "қалам" (pencil).

- morphological differences: Kazakh is an agglutinative language, while German uses inflectional morphology. This leads to difficulties in understanding the word-formation patterns of the German language, especially in such aspects as verb conjugation and noun declension. For instance, Kazakh uses suffixes to express cases and tenses, while German may use articles and changes in the root part of the word for this purpose (for example, *Haus - Häuser*).

Students with Kazakh language of instruction have difficulty mastering the concept of gender and case, which is an important part of German grammar and vocabulary. German has a complex system of declensions (Table 1): "der Hund" (dog) → "des Hundes" (genitive case). Kazakh uses case endings without changing the stem: "ит" (dog) → "иттің" (genitive case). Table 1 shows some examples:

Table 1

Some lexical aspects of declension and plural formation in the German and Kazakh languages

Examples in German	Examples in Kazakh
Glas – Gläser	*стақан – стақан*
Baum – Bäume	*ағаш – ағаштар*
Tuch – Tücher	*орамал – орамалдар*
Kuss – Küsse	*сүйісу – сүйісу*
Buch - Bücher	*кітап – кітаптар*
der Vater – des Vaters	*әке – әкенің*
der Freund – des Freundes	*дос-достың*
das Gericht – des Gerichtes	*тағам – тағамның*
das Kind – des Kindes	*бала – баланың*
der Mann – des Mannes	*ер адам – ер адамның*

- lexical difficulties: the German language has many compound words (Composita), which can be difficult for students accustomed to a different word formation system.

The German language is known for its highly developed word formation system, which relies heavily on prefixes, suffixes, and compound words. For students with the Kazakh language of instruction, where word formation is based on the agglutinative principle, mastering the German morphological system causes significant challenges. Richards's work shows that successful word formation learning requires a systematic approach with an emphasis on regular repetition and practice (J. C. Richards, 2001: 76). For example, the word *Donaudampfschifffahrtsgesellschaftskapitän* is a long compound word that is difficult to understand and remember. For example, the word "Lebensmittelgeschäft" (grocery store) consists of three components: *Leben* (life), *Mittel* (means), *Geschäft* (store), which requires analytical skills. For example, the word "Fußballspieler" (football player) consists of three

parts: *Fuß* (leg), *Ball* (ball) and *Spieler* (player) (Table 2). For students with the Kazakh language of instruction, this can be difficult because the Kazakh language rarely uses such compound words. It is important for students to learn to recognize the constituent parts of such words, which will facilitate the process of their acquisition. Examples of the formation of compound nouns in German and their translation into Kazakh are demonstrated in Table 2.

Table 2

Examples of the formation of compound nouns in German and their translation into Kazakh

Compound nouns in German	Equivalents in Kazakh
das Lehrbuch	*оқулық*
die Sommerferien.	*жазғы демалыс*
der Parkplatz	*тұрақ*
die Taschenlampe	*үстел шамы*
der Schreibtisch	*жазу үстелі*
der Geschirrspüler	*ыдыс жуғыш*
der Zahnarzt	*тіс дәрігері*
der Fahrstuhl	*көтергіш*
die Wohnungssuche	*пәтер іздеу*
die Sprechstunde	*консультация сағаттары*

- prefixes and suffixes in German play an important role in the formation of new words and changing their meaning. For example, the prefix *be-* in the word *bekommen* (to receive) changes the meaning of the root *kommen* (to come), the prefix *ver-* in the word *verstehen* (to understand) changes the meaning of the root *stehen* (to stand) (Table 3). Kazakh students accustomed to agglutinative morphology need time to adapt to this word-formation system. The table 3 shows some examples of this aspect of word-formation in German:

Table 3

Prefixal formation of verbs in German and their equivalents in Kazakh

Examples in German	Examples in Kazakh
gehen	*жүру*
eingehen	*кіру*
ausgehen	*серуенге шығу*
aufgehen	*күн көзінін шығу*
losgehen	*кету*
vorgehen	*бәрінен алда жүру*
nachgehen	*біреудің соңынан жүру*
heimgehen	*үйге қайту*
weggehen	*кету*
vorbeigehen	*өтіп кету*

The German language has separable and inseparable prefixes of verbs, which can also be difficult to learn. For example, the verb *aufstehen* (to stand up) includes the prefix *auf*, which is separated in the sentence, creating new syntactic requirements. This frame construction in sentences is unique to the German language. For example:

Der Schüler steht jeden Morgen um 7 Uhr auf.

Оқушы әр таңертең сағат 7-де тұрады.

Sie haben keine Fahrkosten, deshalb geben sie nicht so viel Geld aus.

Олардың жол ақысы жоқ, сондықтан көп ақша жұмсамайды.

For our experiment, we analyzed three methods used to improve vocabulary acquisition and word formation. Contextual learning is one of the most effective methods for vocabulary acquisition. According to the research of N. Chomsky (2002), new knowledge is better learned if it is integrated into an existing cognitive structure through context. Contextual learning not only uses context, but also emphasizes personal, social and cultural contexts of the learners. This method considers the cognitive, emotional and sociocultural factors that influence vocabulary acquisition. For example, the research of P. Bimmel (2000), B. Hufeisen (2005) emphasizes the importance of contextual learning, in which students associate new words with specific situations or images, which makes them much easier to remember and use in speech. Therefore, for students with the state language of instruction, it is necessary to use materials from everyday life that illustrate the use of German vocabulary. For example, dialogues that include a description of traditions may be more understandable and memorable for students.

For students with the state language of instruction, contextual learning can be particularly useful when learning German vocabulary and word formation.

Contrastive analysis enables the examination of both the differences and commonalities between the linguistic systems of FL1 and FL2. This approach facilities more effective acquisition of new vocabulary and word-formation patterns by allowing students to compare language structures and apply previously learned rules. For example, comparing English and German compounds such as “breakfast” and “Frühstück” helps to better understand word formation in German.

The method of interlinguistic associations, based on the search for similarities between linguistic units of FL1 and FL2. Many words may have common roots and similar forms (internationalisms), which makes them easier to remember. For example, words with Latin roots, such as “information” in English and “Information” in German, may be easier for students to perceive.

To consolidate vocabulary and word formation rules, practical tasks using the word in context can be used. They can create sentences or short texts using both FL1 and FL2 lexical units. For example, students work with texts that include new lexical units in German and already known ones in English to create a common meaning. Using the above methods helps to integrate the study of FL2 vocabulary and word formation through existing knowledge of FL1, which makes the learning process more effective and accelerates it.

During the study, a methodological experiment was conducted, in which 68 students of the educational program “Foreign Language: Two Foreign Languages” took part at the ascertaining stage. Both groups were determined on the basis of rating control indicators of the discipline “Second Foreign Language (B1)”.

The application of statistical significance testing the non-parametric Mann-Whitney U-test method in mathematical statistics confirmed the results of the control and experimental groups. This test demonstrates the lack of significant differences at the ascertaining stage of the methodical experiment between the control and experimental groups. The statistical data for this criterion are presented as follows:

$$U = n_1 * n_2 + \frac{n_x * (n_x + 1)}{2} - Tx$$

The total rank sum for the experimental group is 386, while for the control group, it is 441. Let us denote the largest sum by $T_x = 441$.

The test statistics enable us to formulate hypotheses:

H_0: The level of the feature in group 2 is not lower than the level of the feature in group 1.

H_1: The level of the feature in group 2 is lower than the level of the feature in group 1.

Using the proposed formula, we received:

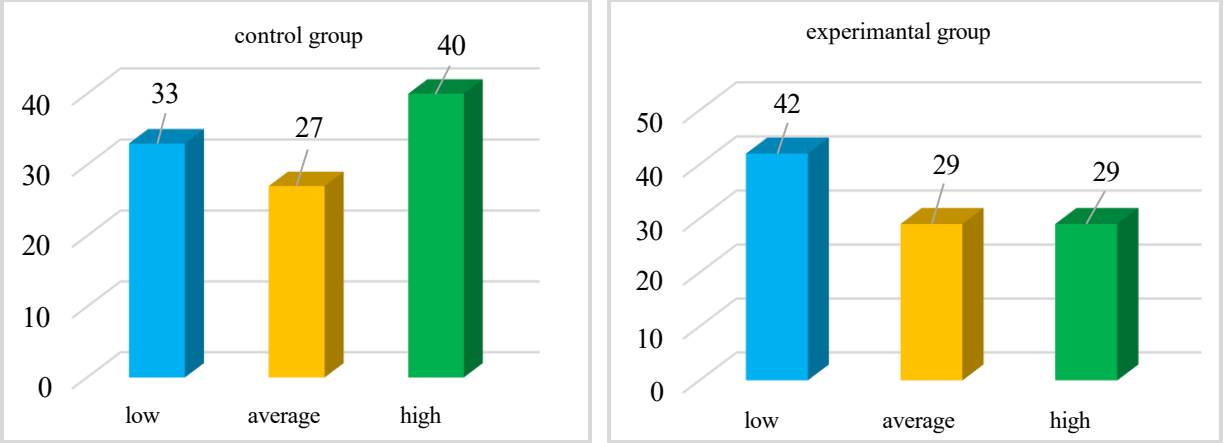
Uemp=512

Thus, $U_{Crit} = p \leq 0{,}01, p \leq 0{,}05$, as a result, statistics show samples of insignificant differences H_0 (null), which proves that the experimental and control groups are homogeneous at the ascertaining stage. The obtained empirical value *Uemp (512)* is in the zone of insignificance.

Thus, it was proven that at the ascertaining stage the experimental group did not outperform the control group in terms of vocabulary acquisition. The monitoring results presented in Figure 1 clearly demonstrate the levels of vocabulary proficiency in the CG and EG at this stage.

Figure 1

Results of monitoring the acquisition of lexical units according to the language level (B1) in the control group and in the experimental group at the ascertaining stage of the methodological experiment

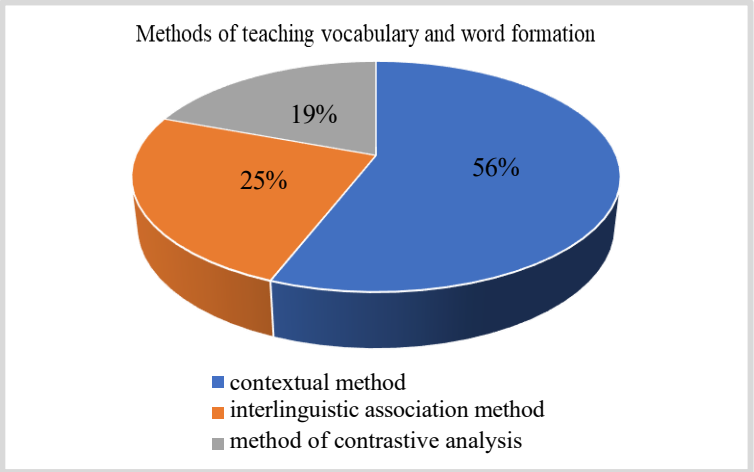


The low rate in the control group (33%) and in the experimental group (42%) indicates that the classes used methods that did not take into account cognitive aspects and did not contribute to the effective acquisition of vocabulary at this stage of learning.

To evaluate the effectiveness of the aforementioned methods, a final test was administered to the students of the experimental group to identify the approaches that contribute to the successful acquisition of German vocabulary (Figure 2). The effectiveness of the proposed methods is reflected in Figure 2, where the contextual method takes the leading position, thereby once again proving that vocabulary acquisition is successful when learning in context, rather than memorizing individual lexical units.

Figure 2

Monitoring data of test assignment results of students in the experimental group, containing assignments using the listed methods (n=17)



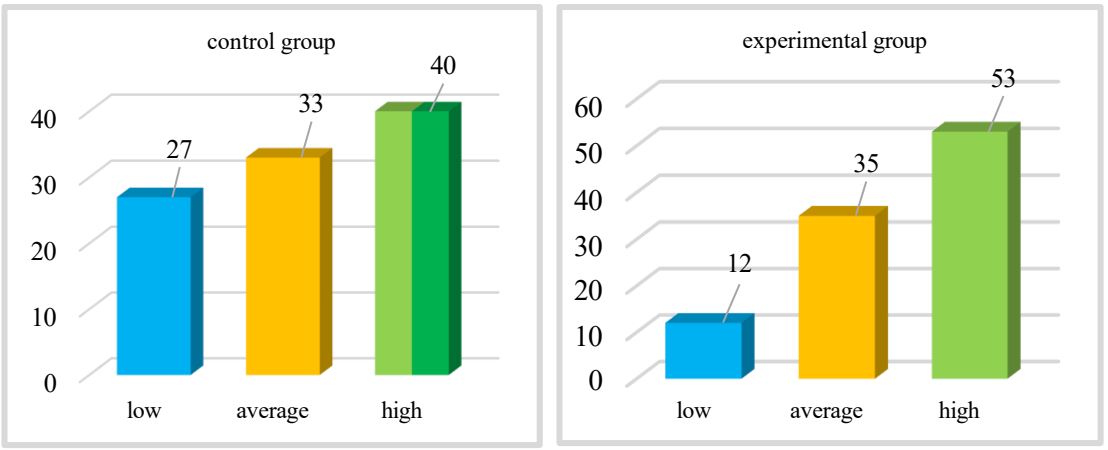
During the observation of the educational process, our research study revealed that the main problems for students are memorizing new words and using them in the right context. There are also difficulties in the Kazakh and German languages. As for word formation, there is a difficulty in understanding German phraseological units, which is associated with cultural and linguistic differences between Kazakh prefixes and suffixes and difficulties in forming compound words. The use of verbs with separable and inseparable prefixes also causes difficulties for students. The results of the final tests according to the thematic plan of the syllabus demonstrated that the acquisition of vocabulary is more effective in tasks where the contextual method is used (56%), which confirms the importance of the cognitive approach to learning. The results of the use of interlinguistic associations (25%) and the method of contrastive analysis (19%) in tests also confirm the effectiveness of these methods for acquiring vocabulary in the educational process for students with the state language of instruction.

At the final stage, test tasks were developed in consideration of the above-mentioned methods in order to determine the effectiveness of these methods for mastering the lexical vocabulary of the corresponding level of training. The sets of tasks and exercises developed within the scope of the topic “Studium im Ausland” according to the thematic plan of the syllabus were tested and consolidated in the experimental group. In order to summarize the feasibility of using the above methods, a final cut was conducted, which was presented in the form of test tasks with 4 answer options.

The monitoring data on the level of vocabulary acquisition in the control and experimental groups at the final stage are presented in Figure 3.

Figure 3

Comparative table of monitoring the acquisition of vocabulary in the CG and EG in percentage terms at the final stage of the experiment



The data presented in the figures reveal certain differences in vocabulary acquisition among students in the experimental group where the above-mentioned methods were used. At the end of the methodological experiment, no significant changes in the acquisition of vocabulary were found in the control group in accordance with the statistical process. On the contrary, the experimental group demonstrated an increase in high and average levels (Figure 3).

The results of the study provide empirical evidence that students taught through contextual learning achieved the highest gains in vocabulary acquisition. This finding supports the hypothesis that integrating cognitive and sociocultural dimensions significantly enhances the effectiveness of language instruction. By contrast, the relatively lower outcomes observed for interlinguistic associations and contrastive analysis suggest that the success of these methods is contingent upon learners' prior linguistic experience and their capacity to transfer knowledge from previously acquired languages.

While these findings highlight the effectiveness of contextual learning and its cognitive and sociocultural integration, certain methodological constraints of the study must be acknowledged.

Although the findings of the present study demonstrate the effectiveness of cognitively oriented methods in mastering German vocabulary, several limitations must be acknowledged. First, the research was conducted in the format of a pilot study with a limited size (N=68), which reduces the generalizability of the results. While the statistical analysis confirmed the significance of the observed improvements, the restricted scope prevents broader extrapolation to other groups of learners, second, the short duration of the intervention does not allow for the evaluation of long-term retention of lexical material. Finally, the study was carried out within a single institutional context which may have influenced the outcomes due to specific curricular and organizational conditions.

These limitations highlight the need for future research that includes larger and more diverse samples, longitudinal designs, and gross-institutional settings. Such studies would not only ensure the reproducibility oof the present results but also provide deeper insights into the mechanisms by which contextual learning, interlinguistic association in multilingual settings.

Conclusions

The linguistic aspects of teaching vocabulary and word formation of the second foreign language to students with the Kazakh language of instruction are associated with additional barriers such as internal linguistic factors, including a number of difficulties associated with differences in phonetics, morphology, and vocabulary. However, using effective teaching methods such as contextual learning, the method of interlinguistic associations and the method of contrastive analysis, it is possible to significantly facilitate the process of mastering vocabulary and word formation in German. It is also essential to consider the linguocultural, sociocultural, intercultural, background knowledge of students to create optimal conditions for their language development in the process of learning FL2. Vocabulary and word formation are among the most important aspects of the development of language competence, which is one of the important competencies according to the Dublin descriptors. For the students of language specialties with the Kazakh language of instruction the assimilation of vocabulary and word formation in German has its own characteristics and this should be taken into account when compiling syllabuses and forming learning outcomes.

In conclusion, the study confirms that the deliberate integration of cognitively oriented methods reinforces the acquisition of German as a second language in a multilingual context. Despite the limitations of the pilot design and a small sample size, the obtained findings provide a valuable foundation for future longitudinal and large-scale research, as well as for the development of teaching materials and MOOCs that integrate cognitive and linguodidactic approaches. The prospect of the study is the application of these methods not only for mastering vocabulary, but also for the formation and development of grammatical and phonetic skills in foreign language speech.

Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

Author Contributions

Ademau Akylbekova: Conceptualization, Methodology, Data curation, Writing-Original draft preparation. Mergul Kulakhmetova: Reviewing and Editing. Sholpan Alimova: Data curation, Writing-Reviewing and Editing.

References

Ballweg S., Drumm S., Hufeisen B., Klippel J., & Pilypaityte L. (2013). Wie lernt man die Fremdsprache Deutsch? Klett-Langenscheidt

Bim I. L. (2001). The concept of teaching a second foreign language (German based on English). Tver.

Bimmel P., & Pampillion U. (2000). Lernautonomie und Lernstrategien, Langenscheidt

Borisenkova L. M. (2005). Cognitive aspects of word formation (based on the German language): Specialty 10.02.04 "Germanic languages". Doctoral dissertation abstract. Tver.

Chomsky N. (2002). On nature and language. Cambridge University Press.

Dorohova O. A. (2014). Application of the cognitive approach in teaching foreign language vocabulary. Psychology and Pedagogy: Methods and Problems of Practical Application, 35(2), 108-116.https://cyberleninka.ru/article/n/primenenie-kognitivnogo-podhoda-pri- obuchenii-inoyazychnoy-leksike

Dörnyei Zoltán. (2014). Motivation in Second Language Learning. Teaching English as a second or foreign language: Textbook. 33, 518-531.

Fulcher G. (2003). Testing a second language speaking. Longman Pearson Education.

Galskova N.D., & Gez N.I. (2009). Theory of teaching foreign languages. Publishing Center "Akademia".

Government of the Republic of Kazakhstan. (2019). State Program for the implementation of language policy in the Republic of Kazakhstan for 2020 – 2025. https://adilet.zan.kz/rus/docs/P1900001045

Gureeva A. V. (2022). Development of methods for teaching a second foreign language to students: Using the example of the German language.

Hufeisen B., & Neuner G. (2005). Mehrsprachigkeitskonzept – Tertiärsprachenlernen – Deutsch nach Englisch. Council of Europe Publishing.

Hymes D. (1972). On Communicative Competence. In J.B.Pride & J.Holmes (Eds.), Socioliguistics (pp. 269-293). Penguin.

Johnson E. (2009). Second language teacher education. (1st ed.). Routledge.

Neuner G. (2003). Handbook of Intercultural German Studies. In A. Wierlacher & A. Bogner (Eds), Handbuch interkulturelle Germanistik. (pp. 417-424) J.B. Metzler Verlag, 417-424.

Osiyanova O.M. (2005.) Multilingualism as a defining approach of language policy in modern linguistic education. Bulletin of OGU, 1, 102-106.

Pustovalova T. A. (2014). On the issue of psychological and linguistic content of interference in mastering a second foreign language. Proceedings of the Regional Scientific Conference on Humanities. Yelets: Yelets State University named after I.A. Bunin.

Shukin A.N. (2004). Teaching foreign languages. Theory and practice. Filomatis.

Tirado R. G. (2019). Features of translating fiction from Russian into Spanish. Bulletin of the Peoples' Friedship University of Russia. Series: Linguistics, 23(2), 473-486. https://doi/10.22363/2312-9182-2019-23-2-473-486

Sycheva M.N (2015). The phenomenon of interference from the standpoint of psycholinguistics: place and role in the study of foreign languages. Ural Philological Bulletin. Series: Language. D9System. Personality: Linguistics of Creativity, 1, 161-165.

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ATTITUDES TOWARD CIVIC EDUCATION PRACTICES AND CIVIC ORIENTATIONS OF UNIVERSITY STUDENTS IN KAZAKHSTAN

Abstract. This article examines university students' attitudes toward the practice of civic education in the Republic of Kazakhstan, as well as the extent to which their civic attitudes and patriotic self-awareness have formed. Based on a quantitative study encompassing a representative sample of students from various regions, it is shown that a majority of respondents demonstrate strong civic attitudes and identify with the concept of a civic nation. At the same time, significant differences were found in the perception of civic identity depending on the language of instruction and type of locality. The data obtained indicates an overall successful influence of state policy on the formation of civic values among university students. However, the results also point to the need for a more differentiated approach to civic education at universities, considering regional, linguistic, and sociocultural characteristics of the youth. The scientific novelty of the study is determined by the comprehensive analysis of the structure and factors of the formation of civic identity of Kazakhstan youth. The practical significance lies in the potential use of the results for developing educational programs and youth policy aimed at strengthening intercultural dialogue and national unity.

Keywords: civic identity; higher education; patriotism; civic education; multi-ethnic society; survey; contemporary history of Kazakhstan.

Introduction

The challenge of fostering a stable civic identity among youth comes to the forefront in the context of globalization and intensive sociocultural transformation of society. For multi-ethnic states such as Kazakhstan, strengthening the civic self-awareness of young people is seen as a key factor in ensuring interethnic concord and social cohesion. Contemporary realities in Kazakhstan are characterized by active and multidirectional modernization processes, against which the question of civic identity becomes particularly acute. It is crucial for the young generation to find an anchor in a system of values, avoiding the influence of destructive ideologies while maintaining commitment to national ideals. In these conditions, the higher education system bears a special responsibility for cultivating citizenship in students. Nevertheless, it is noted that amid ongoing reforms, Kazakhstan's higher education places greater emphasis on narrow professional specialization, whereas issues of social-humanitarian and ideological training remain peripheral in the curriculum (Asyltaeva et al., 2023). This imbalance in education can hinder the successful socialization of young people and the development of an integrated civic stance.

The aim of this study is to fill existing gaps in the research on civic identity of Kazakhstan university youth through a quantitative analysis of a broad sample of university students across the country. Despite the importance of this topic, scholarly literature lacks a unified opinion regarding the theoretical model and factors in the formation of youth civic identity. International studies offer a variety of approaches: from evaluating the influence of academic curricula and service-learning on students' civic competencies (Martini et al., 2023) to analyzing the role of history education in fostering citizenship (Kuş & Mert, 2023). This range

of emphasis reflects the culturally specific characteristics of different countries and educational systems. A universal model of civic identity has not yet been developed, leading to differences in how the concept is operationalized and research results interpreted. In Kazakhstan, the issue of youth civic identity has also been studied, but predominantly through qualitative methods and limited regional samples (Asyltaeva et al., 2023). This makes it difficult to generalize findings at the national level. The present study is designed to overcome these limitations through a representative quantitative approach, which will provide an objective picture of the civic attitudes of students across the country.

We proceed from the premise that the formation of civic identity is a complex, multi-layered process determined by both the influence of institutional environments (educational and governmental) and the interplay of individual and group identities formed during socialization. In modern conditions, young people's value orientations are shaped under the simultaneous influence of global trends and local cultural traditions (Friedrich-Ebert-Stiftung, 2021). For example, in Kazakhstan's multi-ethnic society, youth assimilate the idea of a civic nation alongside ethnic values, while also absorbing elements of a global "cosmopolitan" identity. At the same time, strong intra-ethnic ties can reinforce ethnonational sentiments (Sharipova et al., 2017, p. 204). Thus, the hypothesis of our study is that students' views on civic values are influenced primarily by their language of instruction and sociocultural environment (urban or rural), whereas basic patriotic attitudes are broadly shared by most of the youth. This study is aimed at clarifying the structure of students' civic identity and identifying factors that facilitate or hinder its formation in the conditions of Kazakhstan's multi-ethnic society.

Research methodology

The research employs a comprehensive methodology combining historical and sociological approaches. Historical analysis was used to conceptualize the problem in dynamics: using the historical-genetic method, we traced the emergence and development of ideas of civic identity in Kazakhstan and identified historical conditions that influenced the current state of youth value orientations. The historical-comparative method allowed us to compare the formation of civic values across different generations and regions, helping to reveal persistent and changing features of Kazakhstan youth's civic identity. In addition, comparisons with data from studies in other countries (European Union, United States of America, Singapore, Turkey, CIS (Commonwealth of Independent States) provided an opportunity to understand the specificity of Kazakhstan's experience in an international context. The use of historical typological analysis enabled the classification of the main civic identity models that took shape at different historical stages, highlighting typical features and factors in their formation. Periodization as a method provided a structured view of the development of youth civic values across key historical periods, each characterized by specific socialization conditions. Taken together, the historical methods laid the foundation for interpreting the empirical data, linking the past and present in questions of civic education.

The sociological component of the study was based on a quantitative survey of university students. Primary sociological data were collected via a questionnaire survey. The questionnaire included both closed and open-ended questions. In the closed questions, respondents were offered options reflecting their position on various aspects of civic identity: notions of national affiliation (the "civic nation" concept vs. an ethnonational concept), attitudes toward patriotism and its expressions, knowledge of state symbols (text of the Constitution, National Anthem), assessment of the state's guarantee of civil rights, trust in political institutions, awareness of youth patriotic organizations, etc. The open-ended questions allowed respondents to define the concept of patriotism in their own words and to name any known youth organizations of a patriotic orientation. These qualitative responses were

subsequently subjected to thematic content analysis to identify key themes and ideas in the students' answers. The use of a combination of quantitative and qualitative methods corresponds to the mixed methods paradigm, enabling a deeper understanding of the problem. The triangulation of quantitative and qualitative results provided a richer interpretation: the quantitative data show the prevalence of particular attitudes, while the respondents' own words reveal the motivation and context behind these attitudes. Employing such a combined strategy aligns with advanced practices in sociological research (Babbie, 2015, p. 304; Creswell, 2014, p. 47) and enhances the reliability of conclusions by confirming results through multiple methods (methodological triangulation).

The primary sociological data were collected by surveying students of higher education institutions. The survey included 510 university students from five regions of the Republic of Kazakhstan in equal proportions. The sample was a simple random sample without replacement. The sample size was calculated using the formula:

$$n = \frac{z^2 s^2 N}{\Delta N + z^2 s^2},$$

Where n is the sample size, z is the confidence coefficient (z = 1.96 for 95% confidence, as chosen in this study), s^2 is the sample variance for a binomial distribution (s^2 = p q, where p is the proportion of the attribute and q = (1 – p)).

The product pq is maximal when p = 0.5, which is assumed in our case since the formula presupposes that a given question has two or more answer options from which only one is chosen. The more evenly the two options are chosen (i.e., the closer the proportion is to 50/50), the larger the required sample; therefore, if this proportion is not known in advance (as in our case), 50% is used, as we have done in this study.

N is the population size.

In our case, the total number of university students is 624,500 individuals (Zharkynbekova et al., 2025).

Δ is the margin of error (set at 0.05, i.e., 5%). Thus, the sample size was calculated as:

n = (1.96^2 * 0.25 * 624500) / (0.05^2 * 624500 + 1.96^2 * 0.25) ≈ 384 people.

Consequently, the representative sample size was 384 people. To achieve statistically significant representation of socio-geographical, sociodemographic, and ethnolinguistic characteristics, and to compensate for possible attrition (refusals to participate, invalid responses, etc.), as well as considering a combined use of quota sampling by respondent categories, the number of respondents was increased to 510. The distribution of the sample of 510 people, selected according to strict parameters, ensured statistically significant survey results.

Respondents from nearly all first-level administrative-territorial units were surveyed, providing statistically significant representation of all regions of the Republic of Kazakhstan.

The sample was formed using a multistage selection scheme: at the first stage, from the total set of universities in each macro-region, several institutions were randomly selected; at the second stage, within each selected university, students were selected for the survey by simple random sampling without replacement. Additionally, quotas by gender and language of instruction were applied to guarantee representation of key groups. As a result, the survey covered 510 full-time students from 5 macro-regions of the Republic of Kazakhstan (North, South, West, East, Center) in approximately equal shares. Respondents spanned virtually all provinces (first-level administrative units) of the country, ensuring broad geographic coverage of the data. The gender composition of the sample was balanced: 59.4% were male and 40.6% female. By language of instruction, respondents split into two comparable groups: about half

are studying in Kazakh and half in Russian (a negligible fraction are in English-medium programs, whose responses were combined with the Russian-speaking group due to the similar sociocultural environment of instruction). The average age of respondents was 20.4 years; all respondents are citizens of the Republic of Kazakhstan.

The sample was approximately evenly divided between Kazakh-speaking and Russian-speaking students (including a small English-speaking subgroup merged with the Russian-speaking category). The gender composition was 59.4% male and 40.6% female, indicating a balanced representation of male and female students in the study.

The questionnaires were checked for completeness and consistency of responses, after which the data were processed with statistical methods using SPSS (Statistical Package for the Social Sciences) software. We computed frequency distributions of answers, percentage shares for each questionnaire item, as well as cross-tabulations (two-dimensional distributions) to identify relationships between variables.

Qualitative answers to the open-ended questions (definitions of patriotism, lists of organizations) were subjected to qualitative-quantitative analysis: responses were grouped by similar themes, and the most common formulations and ideas were identified. The triangulation of quantitative and qualitative results ensured a deeper interpretation: the quantitative data indicate the prevalence of certain attitudes, whereas the respondents' own words allow us to understand the motivation and context behind these attitudes. Adherence to such a combined strategy is in line with best practices in sociological research (Babbie, 2015, p. 304; Creswell, 2014, p. 47) and increases the reliability of conclusions by confirming results with different methods. Ethical aspects of the study were observed: student participation was voluntary, the survey was anonymous, and all data were processed and are presented in aggregate form.

Results and discussion

Perceptions of national identity.

The data show that among Kazakhstan students, a worldview based on the concept of a "civic nation" predominates. In response to the question about Kazakhstan's future, 71.8% of respondents answered that they envision it as a unified nation of citizens of all nationalities, while preserving each ethnic group's culture and language. This inclusive, supra-ethnic approach reflects the successful internalization by youth of the ideas of overall civic identity promoted by the state's ideology. At the same time, roughly one-third of respondents (about 28%) adhere to an ethnocentric vision, believing that in the long run all citizens of the country will form specifically a Kazakh (ethnically defined) nation based on the Kazakh language and culture. Another 7.5% found it difficult to give a definitive answer to this question. Thus, although most students espouse an integrative civic position, a significant portion of youth maintains an orientation toward an ethnonational model of the future (Figure 1).

Approximately 63,7% of surveyed students favor an inclusive civic vision of a unified Kazakhstan nation encompassing all ethnic groups, whereas about 28,8% favor an ethnocentric vision of a future Kazakh nation defined by the Kazakh language and culture. A small segment (around 7.5%) could not give a definitive answer regarding the nation's future direction.

Analysis revealed pronounced differences by language of instruction (Figure 2). Students studying in Kazakh are significantly more inclined towards an ethnonational worldview. In this group, the idea of an ethnically homogeneous nation was 6.3 times more popular compared to students in Russian- and English-medium programs (the share of adherents of the ethnocentric approach is 35.4% among Kazakh-speaking students versus only 5.6% among Russian-speaking students).

Figure 1

Students' answers on "How would you like to see the future of Kazakhstan?"

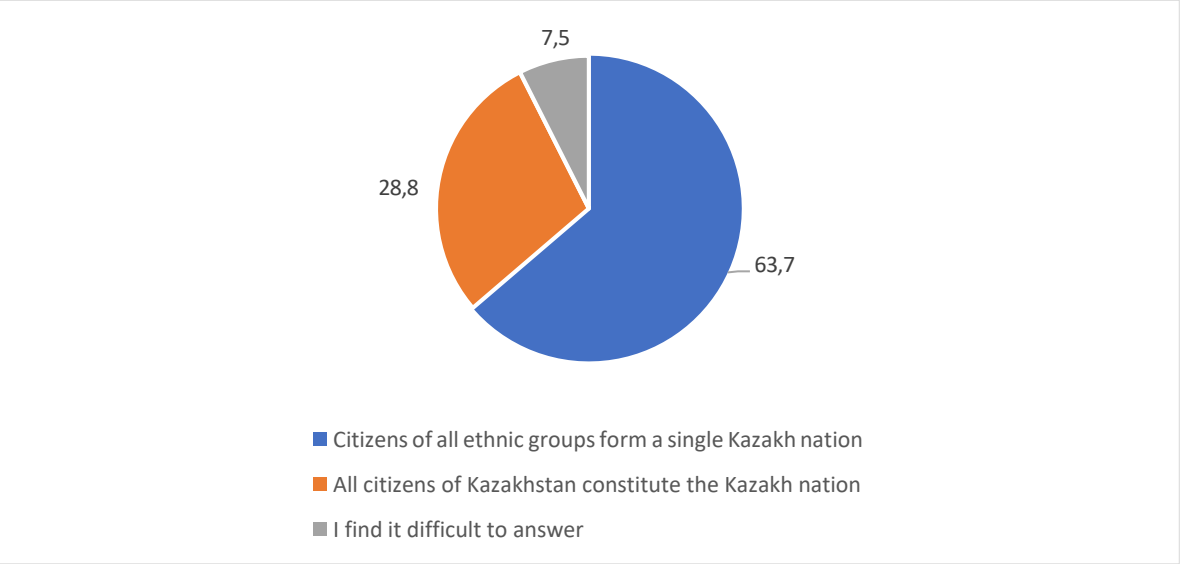
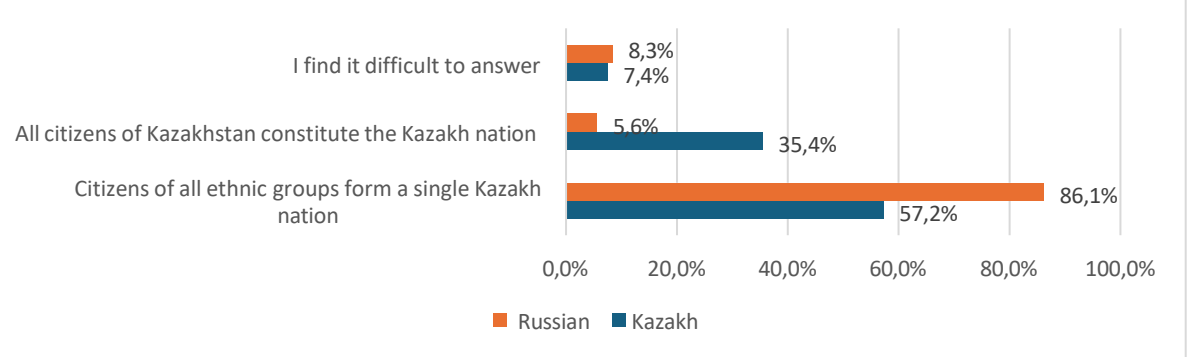


Figure 2

"How would you like to see the future of Kazakhstan?" (in terms of the language of instruction)

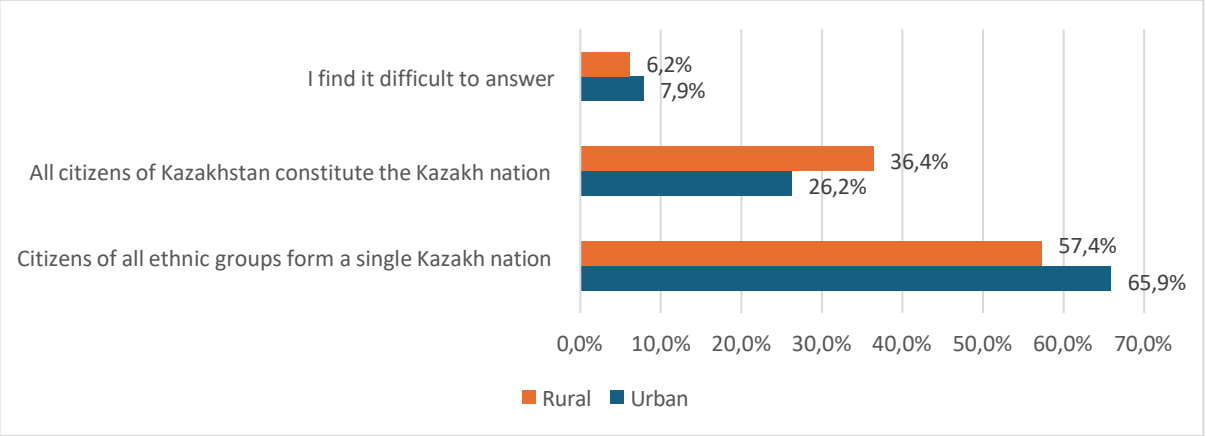


On the other hand, the vision of Kazakhstan's future as a civic nation is statistically more common among students instructed in Russian (embraced by 86.1% of that category), whereas among Kazakh-speaking students this figure was 57.2% - still a majority, but lower by about one-third. In other words, most of the Russian-speaking youth view the nation through the prism of civic identity, whereas among the Kazakh-speaking student audience, a substantial segment holds ethno-oriented views alongside the civic perspective. Regional differences also emerge students who grew up and study in cities exhibit higher ethnocultural tolerance and support for the civic nation idea than youth from rural areas.

In rural districts, ethnocentric attitudes are somewhat more common (Figure 3). This urban–rural gap, typical for many countries, can be explained by the higher level of education and more multicultural environment in cities. Meanwhile, no significant gender differences were found in views of the nation's future: male and female students equally support the predominance of a civic identity. Nor is there a statistically significant difference in responses depending on the specific university (whether public or private, metropolitan or peripheral).

Figure 3

National identity preferences by students' place of upbringing (urban vs. rural). "How would you like to see the future of Kazakhstan?"



Kazakh-speaking students are considerably more likely to favor an ethnically defined concept of the nation (35.4%) compared to Russian-speaking students (5.6%). Conversely, an overwhelming majority of Russian-speaking students (86.1%) envision Kazakhstan's future as a civic nation of all its citizens, whereas among Kazakh-speaking students this share is 57.2%. The remainder in each group were unsure. These differences highlight the influence of the language-of-instruction environment on students' views of national identity. Students from cities show greater support for the inclusive civic nation concept (approximately 65.9% in urban youth vs. 57.3% in rural youth), while ethnocentric views are more prevalent among rural students (around 36.4%, compared to 26.3% among urban students). These urban–rural disparities likely reflect differences in multicultural exposure and education level between city and countryside environments.

Patriotic self-identification.

An overwhelming majority of students characterize themselves as patriots of their country. In a direct question, "Do you consider yourself a patriot of Kazakhstan?", 92.6% answered affirmatively. Another ~5% were unsure, and only a few respondents stated that they do not consider themselves patriots. This very high level of patriotic self-identification indicates that modern university youth largely possess a well-developed patriotic identity and attachment to their homeland. Interestingly, among students with Kazakh as the language of instruction, the proportion who call themselves patriots is slightly higher than among Russian-speaking students (though the difference is not fundamental on the order of 3-4% in absolute terms). This is corroborated by differences in explanations: some Kazakh-speaking respondents explicitly link their sense of patriotism with belonging to the Kazakh people. For example, some of them wrote in open-ended responses: "I was born Kazakh, so I am by default a patriot of my country", "I'm proud to be Kazakh, therefore I am a patriot", "A patriot is someone who was born Kazakh, who speaks the Kazakh language". In these statements, patriotism is equated with ethnic identity, which for a portion of youth reflects a merging of the concepts of nation and ethnicity.

Overall, however, considering all the data, a civic understanding of patriotism dominates among the youth. Most respondents, regardless of language of instruction, describe patriotism not in terms of ethnic exclusivity but through love for their country, pride in its achievements, and a willingness to serve society. For example, some answers define patriotism as "a feeling of deep love for the Motherland, a readiness to subordinate personal interests to the good of the country and to defend the Fatherland," or as "respect for the culture and history of one's

people, and responsibility for the development and future of the country." Such formulations resonate with the modern understanding of citizenship and attest to the effectiveness of the state's policy in the realm of civic education (Law of the Republic of Kazakhstan "On State Youth Policy", 2015). Students are proud of Kazakhstan's culture and values, strive to contribute to the country's prosperity, and link their own future with the future of Kazakhstan. "I am a patriot because I am proud of the culture and achievements of my country and I want to contribute to its development," this typical sentiment was expressed in many responses.

At the same time, the patriotic feelings of some of the youths are not unconditional, respondents critically assess certain social problems that diminish their trust in the state. In the open comments, many students mentioned factors negatively affecting their sense of belonging: corruption, social injustice, incidents of hazing in the army, limited opportunities for self-realization, and so on. For example, one respondent wrote: "Sometimes I'm ready to give my life for the Motherland, but other times, seeing news about soldiers dying from hazing, I start to doubt the value of such service." Another noted, "I'm dissatisfied with the corruption; I'm still a patriot, but the government disappoints me." Some stated that they respect the people of Kazakhstan, but "not the state at all."

Such remarks show that a portion of youth adhere to critical patriotism: they love their country but feel discontent about specific problems or aspects of the social order. This stance was especially often expressed by students studying in Russian. For some of them, an ethnocentrist model of patriotism is unacceptable, yet even the implementation of a broader civic identity in practice is met with skepticism due to the mentioned problems. In their view, the existing model of civic upbringing is not sufficiently effective if it allows such negative phenomena that undermine young people's faith in justice. This points to the need for further improvement of educational work, and young people's patriotism must be reinforced by tangible positive changes in the social sphere.

To assess youth participation in civic education practice, respondents were asked an open-ended question: "Which Kazakhstan patriotic organizations or movements do you know of?" The responses showed a fairly moderate level of awareness. Most respondents managed to name 1-2 organizations, and most often they mentioned entities that are highly visible in the information space or education system. The most popular answer was the youth wing of the ruling Amanat party (many habitually referred to it by its old name Jas Otan, along with the former name of the party Nur Otan). In addition, respondents frequently named the republican movement Jas Sarbaz (a network of military-patriotic clubs for schoolchildren), the youth organization Jas Úlan, as well as simply the Armed Forces of the Republic of Kazakhstan as an institution of patriotic upbringing. Less frequently mentioned were youth associations such as Dala Qyrandary, the Jaña Adamdar ("New People") movement, and veterans' public organizations. On the other hand, a significant portion of respondents could not recall the name of any patriotic association, which indicates a weak involvement of these students in relevant types of public activity.

Notably, among the organizations mentioned were some whose activities are currently banned or discontinued in Kazakhstan. A few respondents listed radical movements of the past: for example, the youth movement Kahar, the youth league of the Alğa party, the Aibat movement, "Socialist Resistance of Kazakhstan," the anarchist association ADA Section, Abyroi movement, etc. Although such answers were rare, the very fact of their appearance suggests that a small segment of youths have an interest in radical ideas or is at least familiar with their rhetoric. This confirms the presence, albeit not widespread, of elements of political radicalization in the youth milieu.

Another subset of respondents identified as "patriotic" some organizations that in fact have ceased activities. For example, the Patriots' Party of Kazakhstan, the Azat party, and others were mentioned. Such answers can be explained either by a lack of awareness

(respondents named well-known names without knowing their current status) or by some students confusing patriotic organizations with any political parties from past years.

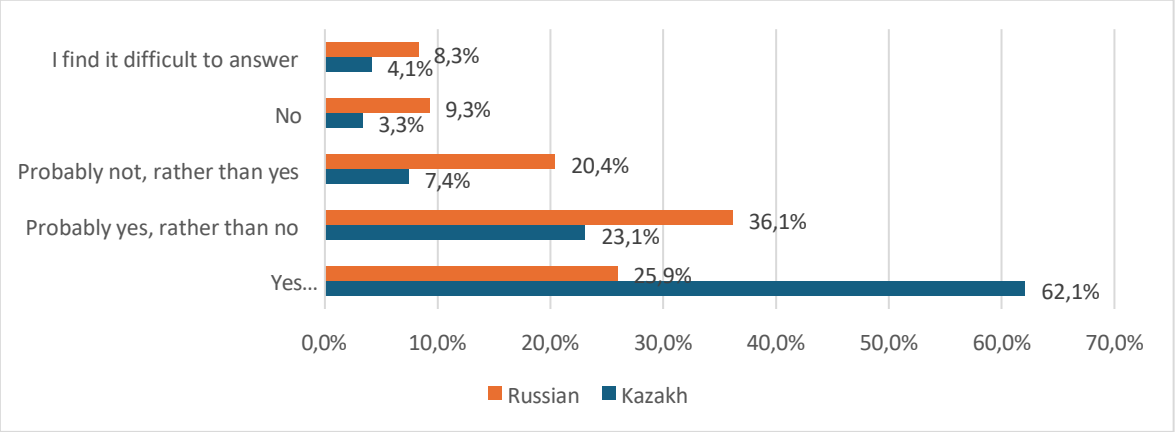
Overall, the results on this question point to the need to more actively promote modern programs and organizations engaged in civic education among youth, in order to improve their visibility and increase student involvement in public activities.

The survey showed that the majority of students possess basic civic literacy and are familiar with the key symbols of the state. The text of the Constitution of the Republic of Kazakhstan had been read or studied to some degree by 83.9% of respondents (either in full or its main provisions, according to them). The National Anthem is known by heart to 98.6% of respondents, an expectedly high figure given its regular performance at official events and in educational institutions. No substantial differences by gender, language, or region were found in knowledge of the anthem and Constitution, and these indicators are high across all groups. Among the small minority (16%) of students who honestly admitted not knowing the text of the Constitution, the main reasons given were a lack of interest in studying the fundamental law or only having a superficial acquaintance with it. Some noted that they studied the Constitution in school/university classes but do not remember its provisions in detail. This result suggests the need to introduce more engaging forms of teaching constitutional basics to increase youth interest.

While the level of student familiarity with state symbols and constitutional norms is encouraging, it is also important to consider young people's sense of security regarding their civil rights. The survey included the question: "Do you believe that your social, civil, and political rights are guaranteed by the state?" Responses were distributed as follows: 80.6% of respondents are confident that their rights are ensured and protected by the state, whereas 14.5% expressed doubts about this (the rest were unsure). Thus, the most students trust the state system of rights and freedoms guarantees, yet a significant share, roughly one in seven, is skeptical. The differences among groups were quite telling. Among students with Kazakh as the language of instruction, optimism prevails: only about 10% of them doubted that their rights are guaranteed, whereas 90% were convinced of the opposite. Among Russian-speaking students, the picture is different: nearly every third (~33%) expressed doubt as to whether their rights are truly protected despite being declared by the state (Figure 4).

Figure 4

Students' confidence in state guarantees of their rights, by language of instruction
"Do you think that your social, civil and political rights are reliably guaranteed?"



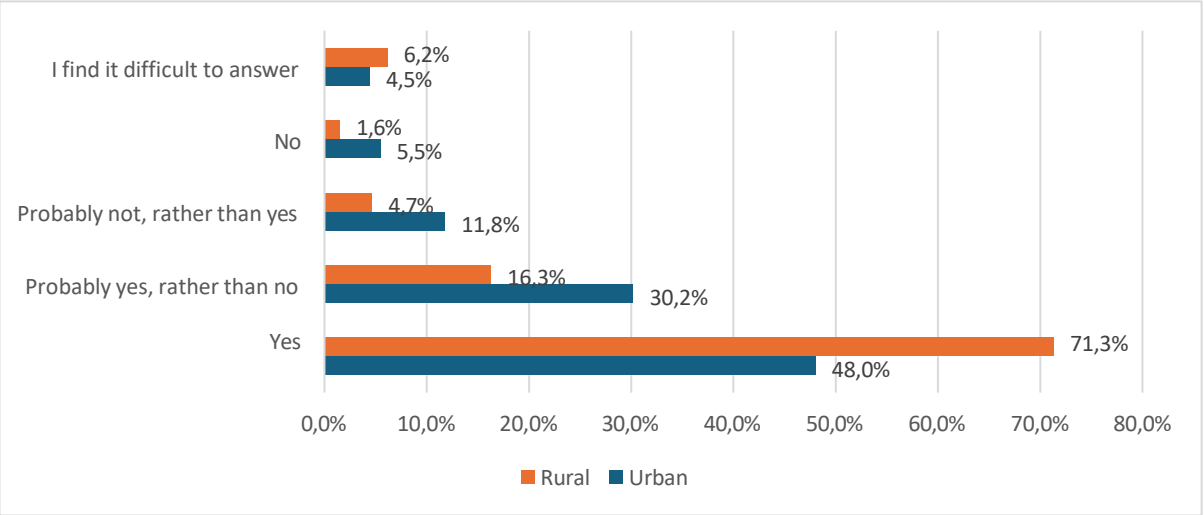
This difference correlates with earlier results on patriotic attitudes: Russian-speaking youth are simultaneously more critical in their assessment of rights protection, whereas

Kazakh-speaking youth are more confident in institutional guarantees. The reasons likely lie both in objective social differences (for example, a portion of Russian-speaking youth are urban residents with high expectations of institutional quality or are ethnic minorities potentially sensitive to issues of equality) and in the fact that the current model of civic socialization does not sufficiently engage those who have a poor command of the state language. The latter factor was noted in the context of patriotism as well: individuals who do not feel like full-fledged speakers of the state language may experience a sense of estrangement from the state ideology, which reduces their confidence in the protection of their civil rights.

Interestingly, the place of residence also affects the sense of social security. Students from cities turned out to be more critical: among them, the share doubting that their rights are guaranteed is higher than among rural youth (Figure 5).

Figure 5

Student confidence in rights guarantees by locale (urban vs. rural).
"Do you think that your social, civil and political rights are reliably guaranteed?"



Urban residents are likely more aware of instances of rights violations and better informed of their rights and therefore judge the performance of political institutions more strictly. Rural youth, by contrast, may be more inclined to trust state structures or simply perceive the issue less critically. No gender differences were found in the assessment of rights guarantees, male and female students are approximately equally likely to express trust or doubt.

Urban youth exhibit greater skepticism regarding state protection of rights: approximately 11,8% of city students doubt that their rights are fully guaranteed (with about 48% expressing confidence), whereas among rural students only around 4,7% harbor such doubts (and roughly 71,3% are confident that their rights are protected). This suggests that urban students, who are generally more informed and have higher expectations, apply more critical judgment to political institutions, while rural students tend to show higher baseline trust in state structures.

In summary, the survey results present a complex picture of university students' civic attitudes. On the one hand, there is a clear predominance of national civic values: most young people perceive the Kazakhstan political nation as a single community of citizens, declare patriotism, know and respect state symbols, and trust institutions to guarantee rights. On the other hand, cleavages were identified along sociocultural lines: primarily language and type of settlement. The Kazakh-medium segment of the student body is relatively more inclined toward ethnonational identity (though civic attitudes still prevail), whereas the Russian-medium

segment is more civic-oriented but also expresses greater skepticism about social realities. It is important to take these differences into account when developing civic education programs so that such programs reach all youth groups and help bridge potential divides.

Our study confirmed that an overwhelming majority of Kazakhstan's students perceive their nationality through the lens of a "civic nation", embracing the idea of unity among all peoples of the country. This finding is consistent with the official course of the State Youth Policy of the Republic of Kazakhstan, which is aimed at forming a nationwide identity. From the first years of independence, the state demonstrated a commitment to the internationalist rhetoric and friendship of peoples inherited from Soviet ideology. In normative acts from the Law of the Republic of Kazakhstan "On State Youth Policy" to patriotic education programs it was declared that youth should become bearers of pan-Kazakhstan values that cement a multi-ethnic society (Law of the Republic of Kazakhstan "On State Youth Policy," 2015; State Program of Patriotic Education, 2006; Concept for military-patriotic education of young people until 2030, 2023; Concept of the State Youth Policy of the Republic of Kazakhstan for 2023-2029, 2023). For example, the State Program for Patriotic Education of Citizens for 2006–2008; Concept for military-patriotic education of young people until 2030 and the Concept of the State Youth Policy of the Republic of Kazakhstan for 2023-2029 explicitly proclaimed the fostering of Kazakhstan patriotism and the strengthening of national unity as key goals of youth educational work. The data we obtained — three-quarters of students support the integrative civic concept — attest to a certain success of these efforts. The younger generation, in its majority, is proud of being citizens of the Republic of Kazakhstan: according to a relatively recent nationwide survey, about two-thirds of Kazakhstan youth are proud to be citizens of their country (Friedrich-Ebert-Stiftung, 2021). Our study recorded an even higher level of patriotic identification (over 90% declared themselves patriots), which may be explained by the fact that our sample consisted of university students who generally have a higher level of education and possibly a more developed civic identity.

At the same time, the results show that the ethnic component still plays a noticeable role in the self-identification of a significant part of the youth. About one-third of students — predominantly those in the Kazakh-language stream — hold an ethnonational worldview, prioritizing affiliation with the titular ethnic group. These results echo the findings of other studies. D. Sharipova and co-authors demonstrated that command of the Kazakh language and strong intra-ethnic ties correlate with more pronounced ethnic nationalism among youth (Sharipova et al., 2017). Our data is in line with this: students for whom Kazakh is the language of instruction (and often their native language) indeed choose an ethnocentric identity model significantly more often. This can be explained by the influence of family and school environments, where the native language and culture foster high trust in one's "own" ethnic group and, consequently, a tendency to view the nation primarily as an extended community of one's ethnicity. On the other hand, among Russian-speaking youth (many of whom are either ethnic minorities or Kazakhs educated in a Russian-speaking environment), a civic self-definition clearly predominates. These young people grew up in a more multiethnic setting, often in cities, and from an early age absorbed a supra-ethnic Kazakhstan identity. The state rhetoric about the unity of the people of Kazakhstan appears to resonate especially well with this audience for whom it is practically relevant (given their mixed ethnic surroundings). Furthermore, as noted by Sharipova's study, a higher level of trust in state institutions and a sense of security encourage youth to identify with the civic nation.

In our study, Russian-speaking students demonstrated lower trust in political institutions (every third of them doubts that their rights are guaranteed), which may partially explain why even among them 5–10% chose a neutral or ethnocentric option for the nation's future. Increasing this group's trust in the state—through successful anti-corruption efforts, ensuring equal opportunities, and respect for language rights — could strengthen their civic identity.

Language of instruction thus emerges as a significant differentiating factor. We found that young people from cities are more likely to support a multi-ethnic civic identity, whereas rural youth are more inclined toward traditional ethnonationalism. This phenomenon corresponds to general patterns known in social science: in rural areas, the population is typically more monoethnic, traditional values have greater influence, and education levels are lower, which all contribute to more conservative and ethnocentric views. By contrast, city dwellers live amidst cultural diversity and a higher level of information, which instills tolerance and supra-ethnic thinking. In Kazakhstan, internal migration in recent decades has led to some rural youth moving to cities, while simultaneously there has been an outflow of Russian-speaking youth abroad. These processes may gradually smooth out identity differences: new generations of urban residents of Kazakh origin adopt more cosmopolitan values, and the monoethnic environment of villages is slowly diminishing. Nevertheless, at present, our cross-sectional data capture a marked urban effect: urban youth are more critical but also more "civically minded" in their self-identification, whereas rural youth are more loyal to political institutions but also more ethnically oriented. Both groups equally profess patriotism, though what this concept means to them may differ.

The findings on youth criticality and trust are intriguing. Despite a high percentage of self-declared patriots, a significant portion of students (especially Russian-speaking students) critically evaluate the surrounding reality. Their comments revealed a sort of "conditional" patriotism: they love their Motherland if the Motherland (the state) behaves justly toward them. This rational approach is characteristic of a generation raised in an era of information and change. Young people expect the state to fulfill a kind of "social contract" — to secure rights, fight corruption, and act with integrity. When these expectations are not fully met, young people experience cognitive dissonance: on the one hand, they want to be proud of their country; on the other, reality gives them reasons for disappointment. This is particularly acute among the most educated and informed segment — youth in big cities. This group appears to be immersed in a global informational context that disseminates values of democracy, human rights, and critical thinking. They compare the situation in Kazakhstan with ideal models and more strongly perceive its shortcomings, resulting in a certain social skepticism. This picture aligns with the notion that a portion of Kazakhstan youth exhibit "critical patriotism" or even elements of protest civicness. Nonetheless, it is important to emphasize that even the critical respondents in our survey do not reject their civic identity. They still identify with Kazakhstan; they simply wish to see their country improve. This is an important point: their criticism stems from a desire for positive change, not alienation. Therefore, it is crucial for the state and society to pay attention to the pain points raised by youth (corruption, abuse in the armed forces, social injustice) and work to address them. Doing so would increase young citizens' trust and strengthen their sense of belonging. Research shows that trust in the state is directly linked to the formation of civic identity: when young people feel the state is fulfilling its obligations, their pride in their country and desire to be part of it grows.

Another aspect is the presence of elements of political radicalization among youth. The fact that some respondents mentioned banned or marginal organizations indicates that, albeit very small, some young people is acquainted with radical ideologies. Our data cannot determine whether they support these ideas or are simply aware of them. However, the mere knowledge of the names of extremist movements suggests that such information has penetrated the youth environment, likely via the internet and social networks. This signal echoes findings of other researchers who note the emergence across Central Asian youth of small groups influenced by radical views (whether religious-extremist or ultra-nationalist) (Friedrich-Ebert-Stiftung, 2021). In Kazakhstan, such cases are isolated, but they cannot be ignored. Government bodies and NGOs should intensify efforts to prevent extremism among youth, including through counter-propaganda in the online space and engagement of respected opinion

leaders. Involving young people in constructive civic movements and volunteer initiatives could serve as an alternative to involvement in radical ideologies.

The results should also be viewed through the prism of the multiple identity of modern youth. Young Kazakhstan people are simultaneously influenced by several levels of identification — local, ethnic, national-civic, and global. According to a survey conducted in 2021, the majority of Kazakhstan youth feel primarily connected to their locality (city/village), place national affiliation (Kazakhstan citizenship) in second place, and region (province) in third place (Friedrich-Ebert-Stiftung, 2021). Moreover, the younger generation increasingly thinks in terms of global citizenship: about one-third of 14–24-year-olds reported that they consider themselves "citizens of the world" to some extent, and this figure is higher than among older youth (25–29 years). Our student sample is likely even more globally oriented, given their active internet use and often knowledge of foreign languages. This means that in shaping civic identity, it is necessary to connect the national and the global. The new form of patriotism should not be set in opposition to universal humanistic values. On the contrary, a successful modern Kazakhstan citizen can be simultaneously proud of their country and feel part of the global community. Educational programs at universities could emphasize this idea: patriotism through contributing to one's country's development while also respecting other cultures and global values. The concept of «global citizenship» (Global Citizenship Education) is actively promoted today by UNESCO and other international organizations, and it aligns well with Kazakhstan's model of multi-ethnic patriotism.

In the higher education system, according to the State Compulsory Standard of Higher Education of the Republic of Kazakhstan (State mandatory standard for higher education, 2022), these issues are addressed by a cycle of general education disciplines (more than 50 credits). This cycle includes such disciplines as the history of Kazakhstan, philosophy, Kazakh (Russian) language, foreign language, information and communication technologies, physical culture, and a module on socio-political knowledge (political science, sociology, cultural studies, psychology). Upon completion of these disciplines, it is expected that students will demonstrate civic engagement based on a deep understanding and scientific analysis of the main stages, patterns and peculiarities of Kazakhstan's historical development and will be able to develop their own moral and civic position, etc. For comparison, in other countries, civic education is implemented in three ways: through the introduction of a specific subject (e.g., in Japan – the compulsory course «Public», Singapore – «Social Studies») (Liguo Zhang et al., 2022; Sim J. B.-Y. et al., 2024), through integration into various subject areas through interdisciplinary links (e.g., Estonia) (Toots, A. et al., 2021), or through a combination of a specialized course with elements of integration of the civic component into other subjects (Lithuania – «Knowledge of the World», «Nature and Man», «Fundamentals of Civic Education») (Dukynaitė, R. et al., 2021).

Our study also highlighted gaps and opportunities for improving the practice of civic education at universities. First, a more targeted approach to different groups of students is clearly needed. Kazakh-speaking youth, especially those from rural backgrounds, should be inculcated with values of tolerance and multiculturalism, demonstrating the importance of all ethnic groups in a unified civic nation. Russian-speaking youth, on the other hand, should be more actively involved in state programs and communication in the state language, so that they do not feel like "second-class" citizens. It may be worth expanding the practice of bilingual patriotic events and encouraging the learning of Kazakh in a friendly way to overcome the language barrier in civic education. Second, the practical side of patriotic education needs to be strengthened. Students should not only hear slogans but also see real positive changes. For example, successful reforms in combating corruption and increasing transparency in the army and universities would significantly strengthen young people's trust and their pride in their country. Social justice is what concerns young patriots and ensuring it would be the best lesson

in citizenship. Third, modern forms of volunteering, service learning, and participation in youth organizations should be more actively promoted among students. Our data showed insufficient awareness of civic associations: half of young people could not name a single real organization engaged in patriotic education. Universities should establish cooperation with youth NGOs, hold meetings and presentations of movements, thereby drawing students into real civic activity. The research demonstrates that involving youth in volunteer and similar projects increases their civic competence and commitment to democratic values.

Finally, we note the significance of the results for the scholarly understanding of the problem. Our analysis confirmed a number of theoretical propositions: the influence of the language environment of socialization on the type of national identity, the influence of the level of social trust on the willingness to identify with the civic nation, and the plurality of identity levels among youth. It also revealed an interesting phenomenon of critical patriotism that requires further study—what factors (e.g. education, overseas experience, media) lead some youth to combine patriotic feelings with a critical view of the state. From a practical standpoint, the results can be used by education authorities and youth policy makers to adjust educational programs. State youth policy in Kazakhstan is currently evolving to address new challenges — in particular, special emphasis is placed on the "hearing state," working with youth, and engaging in dialogue. Our data provide succinct feedback: youth are largely loyal to the state and share the idea of a unified nation, but they expect real action to solve existing social problems. In this sense, indicators like those presented in this article (the share who trust/distrust, who support one concept or another) can serve as metrics of the effectiveness of youth policy. For example, an increase in the proportion of youth confident that their rights are guaranteed would indicate a strengthening of civic identity. Thus, integrating practical research results into decision-making can improve the justification and effectiveness of policy actions.

Conclusion

In this study, we systematized the results of a quantitative analysis of the civic identity of university youth in Kazakhstan. It was found that most students share the values of an overarching civic identity and view the people of Kazakhstan as a single civic nation. At the same time, a significant portion (around one-third) adhere to ethnonational attitudes, indicating the continued influence of traditional ethnic identity. A factor that substantially influences differences in attitudes is the language of instruction: Kazakh-speaking students are many times more likely to display ethnocentric views, whereas Russian-speaking students are more civically oriented. Regional characteristics also play a role: youth from major cities are more tolerant in interethnic relations and support the idea of a civic nation, whereas rural youth are more conservative. An absolute majority of respondents consider themselves patriots of Kazakhstan; however, the nature of their patriotism is predominantly civic rather than ethnocentrist. Students are proud of the country's culture and achievements and are ready to contribute to its development, yet they are also critical of certain negative phenomena (corruption, manifestations of social injustice) that, in their view, hinder the full realization of the patriotic potential of youth. Thus, the study shows the need to improve state policy in the sphere of civic education, considering the linguistic and sociocultural characteristics of youth. University extracurricular programs are advised to differentiate their approach to different categories of students, reinforcing pan-national values while also engaging in open dialogue with young people to address their pressing issues. Only in this way can further strengthening of civic harmony and patriotism in the younger generation be ensured.

The scholarly value of this work lies in clarifying the structure and determinants of youth civic identity in Kazakhstan society, thereby contributing to the development of theories of intergroup relations, youth sociology, and contemporary history of Kazakhstan. The practical significance is due to the possibility of using the obtained empirical data by education

authorities and youth policy makers to devise targeted measures aimed at consolidating society and fostering a stable civic position among youth. The results of the study can be implemented in university educational processes and serve as a basis for training programs that strengthen Kazakhstan civic identity and intercultural dialogue.

Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

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Assel Myrzakhmetova: Conceptualization, Methodology, Supervision, Project Administration, Writing Review and Editing; Igor Khlebnikov: Methodology, Formal Analysis, Investigation, Resources, Visualization, Writing-Original Draft; Arstan Satanov: Literature Review, Validation, Data Collection and Preparation, Grading Students' Works, Methodology; Yevgenia Matorina: Literature Review, Methodology, Formal Analysis, Discussion.

References

Asyltaeva, E. B., Urankhaeva, G. T., Altynbek, A. A., & Karabchuk, T. S. (2023). Osobennosti formirovaniya grazhdanskoy identichnosti v sisteme obrazovaniya [Features of the formation of civic identity in the education system]. Bulletin of Turan University, (4), 441–453. https://doi.org/10.46914/1562-2959-2023-1-4-441-453

Babbie, E. (2015). The Practice of Social Research (14th ed.). Boston, MA: Cengage Learning. https://archive.org/details/isbn_9780495598428/page/n7/mode/2up

Concept for military-patriotic education of young people until 2030 (2023). Astana, Kazakhstan: [Government of the Republic of Kazakhstan]. https://adilet.zan.kz/rus/docs/P2300001039.

Concept of the State Youth Policy of the Republic of Kazakhstan for 2023-2029 (2023). Astana, Kazakhstan: [Government of the Republic of Kazakhstan]. https://adilet.zan.kz/rus/docs/P2300000247.

Creswell, J. W. (2014). Research Design: Qualitative, Quantitative and Mixed Methods Approaches (4th ed.). Thousand Oaks, CA: Sage. https://doi.org/10.5539/ELT.V12N5P40

Dukynaitė R., Orintenė G., Gerulaits Š., Iziumcevas M. Contributions of the IEA’s Civic and Citizenship Studies to Educational Discourse in Lithuania: The Past Three Decades // Influences of the IEA Civic and Citizenship Education Studies: Practice, Policy, and Research Across Countries and Regions. – Springer, 2022. – P. 113-125. https://epublications.vu.lt/object/elaba:140120196/index.html

Friedrich-Ebert-Stiftung. (2021). Youth in Kazakhstan: Nationwide survey report. Almaty, Kazakhstan: Author. https://library.fes.de/pdf-files/bueros/kasachstan/18450.pdf

Kuş, Z., & Mert, H. (2023). Citizenship education through high school history in Turkey. *Citizenship, Social and Economics Education*, *22*(2), 85-99. https://doi.org/10.1177/14788047231190385.

Law of the Republic of Kazakhstan "On State Youth Policy" dated 9 February 2015 No. 285-V ZRK. (2015, February 18). https://adilet.zan.kz/rus/docs/Z1500000285.

Liguo Zhang, Yinghan Xi. (2022) Civic Education in Japan: Evolution, Practice and Its Review. International Journal of New Developments in Education. Vol. 4, Issue 16: 16-26. https://doi.org/10.25236/IJNDE.2022.041604

Martini, M., Rollero, C., Rizzo, M., Di Carlo, S., De Piccoli, N., & Fedi, A. (2023). Educating youth to civic engagement for social justice: Evaluation of a secondary school project. Behavioral Sciences, 13(8), 650–651. https://doi.org/10.3390/bs13080650

Sharipova, D., Burkhanov, A., & Alpeissova, A. (2017). The determinants of civic and ethnic nationalisms in Kazakhstan: Evidence from the grass-roots level. Nationalism and Ethnic Politics, 23(2), 203–226. https://research.nu.edu.kz/en/publications/the-determinants-of-civic-and-ethnic-nationalisms-in-kazakhstan-e

Sim, J. B.-Y., & Kho, E. M. (2024). Social Studies and citizenship education in Singapore: Towards a progressive orientation. *Citizenship Teaching and Learning,* 19(2), 133-152. https://scholar.google.com.sg/citations?view_op=view_citation&hl=en&user=CBnkkzwAAAAJ&cstart=20&pagesize=80&citation_for_view=CBnkkzwAAAAJ:lSLTfruPkqcC

State mandatory standard for higher education (2022). Astana, Kazakhstan: [Government of the Republic of Kazakhstan]. https://adilet.zan.kz/rus/docs/V2200028916#z5

State Program for Patriotic Education of Citizens of the Republic of Kazakhstan for 2006–2008. (2006). Astana, Kazakhstan: [Government of the Republic of Kazakhstan]. https://adilet.zan.kz/rus/docs/T060000200_

Toots, A., Oja, M. (2021). Estonia: Civic and Citizenship Education in Turbulent Times. In: Malak-Minkiewicz, B., Torney-Purta, J. (eds) Influences of the IEA Civic and Citizenship Education Studies. Springer, Cham. https://doi.org/10.1007/978-3-030-71102-3_7

Zharkynbekova, S., Shakhputova, Z., Galiyeva, B., & Absadyk, A. (2025). Value Priorities of Student Youth in the Multi-Ethnic Space of Kazakhstan and Their Influence on Intercultural Communications. *Journalism and Media*, *6* (1), 32. https://doi.org/10.3390/journalmedia6010032

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ASSESSING PROFESSIONAL FOREIGN LANGUAGE COMPETENCE AMONG STUDENTS OF LINGUISTIC AND NON-LINGUISTIC SPECIALTIES

Abstract. The article explores the development of professional foreign language competence in students of linguistic and non-linguistic specialties within the convergence of formal and non-formal education. This competence is relevant to training competitive specialists in a globalized and internationalized professional environment.

The study aims to examine the theoretical foundations and applied methods for developing this competence and determine its initial state among students. The tasks include analyzing current research, clarifying the concept of "professional foreign language competence," and assessing students' initial competence levels through a questionnaire. The analysis revealed that societal and educational processes are interconnected. A high-tech society requires convergence as a methodological basis for a new educational paradigm, while educational changes impact social processes. Successful development of professional foreign language competence requires integrating formal and non-formal learning within a convergent educational space. The research findings provide a foundation for developing scientific and methodological solutions for professional foreign language training through the integration of formal and non-formal higher education.

Key words: competence, professional foreign language competence, convergence, foreign language training, formal education, non-formal education, non-formal foreign language education.

Introduction.

Modern education is undergoing profound transformations driven by the development of digital technologies, globalization, and evolving labour market demands. In this context, the integration of formal and non-formal learning becomes particularly important, especially in the field of foreign language acquisition for both linguistic and non-linguistic specialties.

Knowledge of English and other foreign languages grants access to cutting-edge research, patents, and technological advancements, fosters a deeper understanding of technological processes, enhances interaction with technologies, and broadens opportunities for international cooperation and knowledge exchange.

In today’s world, proficiency in foreign languages not only complements professional skills but is also a prerequisite for a successful career, innovative development, and productive intercultural communication. Therefore, the task of improving the quality of training specialists capable of using foreign languages in their professional activities becomes crucial for ensuring the competence and competitiveness of both individuals and society as a whole.

This scientific article is prepared as part of a study on the problem of developing professional foreign language competence, necessitated by several objective contradictions, including the following:

- on the one hand, the modern high-tech society demands that future specialists be capable of effectively conducting professional foreign language communication at a

high level and continuously improving their foreign language competencies throughout their lives in accordance with personal and professional needs;

- on the other hand, there is a lack of scientifically grounded models for teaching professionally oriented foreign languages within the convergence of formal and non-formal higher education, which would effectively develop the necessary competencies.

It is **h**ypothesized that the low level of professional foreign language competence among students of both linguistic and non-linguistic specialties is associated with the insufficient integration of formal and non-formal education methods, and that enhancing this convergence within the educational process will contribute to a significant improvement in language proficiency relevant to professional contexts.

The dimension approach views education as a value from different perspectives: cultural, social, economic and personal. Education as a value facilitates the transmission of cultural heritage and cultural interaction, contributes to the formation of civil society and the reduction of social inequalities, drives economic growth, improves the quality of the labour force and promotes innovation and development, supports personal and professional growth, skills development and self-determination. Education as a system is characterised by taking into account the various components and the interrelationships between them, including the different levels of educational organisations, the different formats of education, and the social, political and economic environment in which it operates. Education is also a holistic pedagogical process, including target, content, activity and result components, providing education, training and development in accordance with social and personal needs. As a separate aspect, the output side of education can be studied and its cognitive, emotional, social and vocational outcomes can be assessed, such as the knowledge, skills and abilities that students acquire; outcomes related to personal development, self-esteem, motivation and emotional stability; social outcomes reflecting students' ability to interact with others, adapt to different environments and participate in community life; vocational outcomes in achieving career goals and success in the world of work; and social outcomes related to the achievement of career goals.

Thus, the purpose of this research paper is to investigate the theoretical foundations and applied methods for developing professional foreign language competence of linguistic and non-linguistic specialties students and determine its initial state among students.

In order to achieve this goal, the following objectives were set:

1) analyse relevant research and sources related to the topic;

2) define the concepts of "competence," "foreign language competence," and "professional foreign language competence";

3) assess students' initial levels of professional foreign language competence through a questionnaire.

The study has shown that processes in society and education are interrelated: The development of post-industrial society requires convergence as the basis of a new pedagogical paradigm, and changes in education affect social development. To improve foreign language training of future specialists, it is necessary to combine formal and informal learning in the environment of convergent education.

Literature review and defining

For a complete presentation of the concept of "professional foreign language competence" we will consider such concepts as "competence" and "foreign language competence" separately. Various authors and researchers have defined the concepts of "competence" and "foreign language competence" differently over the years. Here’s a brief overview:

Hymes (1972) introduced the concept of "communicative competence", emphasizing that knowing a language involves more than grammatical knowledge – it includes the ability to use language appropriately in various social contexts.

Council of Europe (2001) defines foreign language competence based on proficiency levels (A1 to C2) and describes it as the ability to use a foreign language effectively and appropriately in real-life situations. It focuses on communication skills, including listening, speaking, reading, and writing.

Savignon (2002) emphasized communicative competence in foreign language teaching, prioritizing interaction and real-life language use over pure grammatical accuracy.

Doganay, Gaipov, & Sadykbekov (2021) discuss the multifaceted nature of competence, emphasizing its integration of knowledge, skills, capacities, and attitudes. They highlight that competence encompasses various types, including epistemological, professional, communicative, intercultural, and intercultural communicative competence.

Anderson, Baxter, & Culp (2018) outline criteria for foreign language communication skills formation, focusing on:

- Linguistic Competence: The level of foreign language knowledge, including grammar, vocabulary, and pronunciation.
- Cultural Sensitivity: The ability to understand and respect the cultural peculiarities of other speakers.
- Adaptability: The ability to adapt linguistic skills to different situations and audiences.
- Communication Efficiency: The ability to accurately and clearly express one's own opinions and understand others.

These contemporary perspectives underscore the evolving and multifaceted nature of both general and foreign language competence, highlighting the integration of various skills and knowledge areas essential for effective communication, especially in intercultural contexts.

Materials and research methods.

To assess the initial level of professional foreign language competence among students we have composed a questionnaire. The assessment will help determine the subsequent strategies of converging formal and non-formal education to be further implemented in the pedagogical process. The objective of this initiative is to develop the professional foreign language competence of students pursuing linguistic and non-linguistic specialties.

The survey was conducted among students enrolled in linguistic and non-linguistic specialties at Karaganda Buketov University and Astana International University. The survey garnered a total of 119 responses: 58 students comprised the experimental group, while 61 constituted the control group.

Our questionnaire consists of 30 statements, 10 of which are intended to measure each of the three components of professional foreign language competence, with four answer options. The questionnaire was uploaded to Google Forms. Each statement was scored from 1 to 4 points: 1 = completely disagree; 2 = rather disagree; 3 = rather agree; 4 = completely agree. The maximum attainable score was 40 points. The level of professional speech activity (low, medium, and high) was determined in accordance with the range of scores presented in Table 1.

Table 1 – Levels of professional foreign language competence

Scores on a component	*Levels*
10–19	low level
20–29	medium level
30–40	high level

A high level indicates full possession of the corresponding competence, while a low level indicates its absence, imperfection or instability.

Assessment of the level of students' professional foreign language competence includes determination of the effectiveness of pursuit of various types of professional foreign language activities, which are reflected in the curriculum, by the following components:

Motivational. Students' enthusiastic readiness to study a foreign language, to develop professional foreign language competence, reflection and self-assessment skills, skills of planning stages and activities for professional development and improvement of professional foreign language competence, aspiration to satisfy cognitive and communicative needs and increase the level of professional competence;

Praxiological. Specific conscious actions on realization of professional foreign language activity and development of necessary skills, on self-development and self-regulation, on mastering and replenishment of necessary means of nonverbal expression, on development of skills of operative decision-making in situations of professional context;

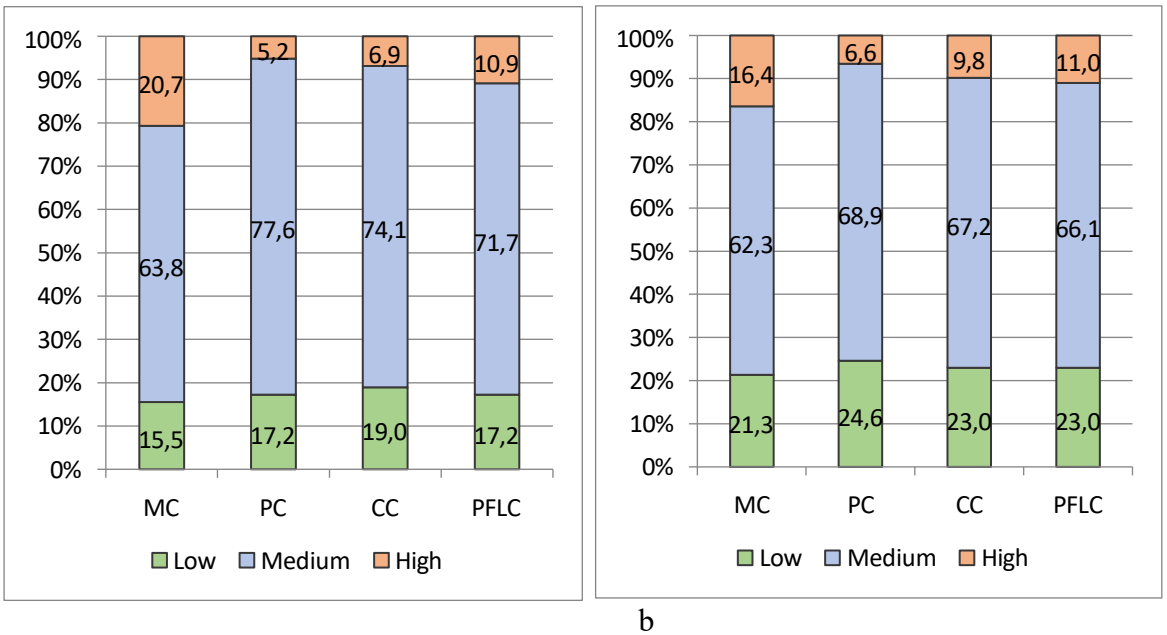
Cognitive. Mental and cognitive activity, acquisition of professionally significant competences necessary for professional foreign language activity, enrichment of professional foreign language terminology, mastering and replenishment of necessary means of verbal expression.

Results and discussion

The results of the questionnaire used to determine the initial level of professional foreign language competence are presented in Figure 1.

Figure 1

Results of diagnosing the level of students' professional foreign language competence by components



a b

a – CG; b – EG; components: MC – motivational component, PC – praxeological component, CC – cognitive component; PFLC – professional foreign language competence

As illustrated in the figure 1, the results of the diagnostic assessment of the level of professional foreign language competence formation revealed that the students in both the

control and experimental groups exhibited comparable levels in terms of their overall professional foreign language competence and its constituent components. It is noteworthy that a moderate proportion of students exhibited a high level of professional foreign language competence, ranging from 5.2% to 20.7% in the control group and from 6.6% to 16.4% in the experimental group, with an average of 10.9% and 11%, respectively. Of the three components of professional foreign language competence, a high level was demonstrated by a greater number of students in motivational component than in praxiological and cognitive components. This finding suggests that while students may possess the motivation to acquire the requisite professional foreign language competencies, they may face deficiencies in terms of knowledge and practical skills.

The proportion of students exhibiting a low level of professional foreign language components ranged from 15.5% to 19%, with an average of 17.2% among students in the control group and from 21.3% to 24.6%, with an average of 23% among students in the experimental group. The proportion of students in the control and experimental groups exhibiting a low level of motivational component is less than of the other two components, with 15.5% and 21.3% of students, respectively. This finding indicates a consistent pattern across categories: the level of knowledge and practical skills in professional foreign language activity is lower than the level of their motivational readiness to master the necessary competences and pursue professional foreign language activity.

Conversely, the predominant proportion of students demonstrated an average level of professional foreign language competence across all components, with an average of 71.7% of students in the control group and 66.1% of the experimental group. These results provide evidence that our hypothesis is confirmed, suggesting that to increase the number of students with a high level of proficiency in the studied competence, there is an urgent need to improve the quality of professional training through the introduction of convergence of formal and non-formal learning.

Implementation of convergence of formal and non-formal learning allows to enhance academic programs in higher (formal) education by complementing them programs and services from additional (non-formal) education. The advantages of convergence of formal and non-formal learning can be manifested in increasing the level of motivational, praxiological and cognitive components of professional foreign language competence, because it gives additional opportunities in accordance with the named components:

- in enhancing student engagement in the educational process by integrating real-life scenarios and individual student preferences, thereby expanding the range of educational trajectories and teaching methods available;
- in fostering critical, analytical, and creative thinking through independent research and experimental activities;
- in cultivating practical skills through the resolution of practical problems and execution of professionally-oriented projects.

Conclusion

In accordance with the purpose and objectives of the present study, we have conducted a comprehensive analysis of current scholarly literature and relevant sources pertaining to the development of professional foreign language competence. This involved the examination of theoretical frameworks and pedagogical models, as well as the clarification and operationalization of key concepts such as “competence,” “foreign language competence,” and, more specifically, “professional foreign language competence.” The term "competence" has been interpreted within the context of this research as a dynamic integration of knowledge, skills, attitudes, and behaviors that enable effective performance in a professional context. “Foreign language competence,” in turn, encompasses the ability to communicate effectively

and appropriately in a foreign language across various communicative situations, while "professional foreign language competence" refers to the use of foreign language skills specifically in professional and occupational settings, with an emphasis on terminological accuracy, communicative strategies, and situational appropriateness.

To empirically assess the initial level of professional foreign language competence among university students, we conducted a diagnostic study using a structured questionnaire. The assessment encompassed cognitive, operational, and motivational components of competence, allowing for a multidimensional understanding of students' preparedness for professional communication in a foreign language. The empirical data obtained revealed that formal education alone does not suffice to ensure the development of high-level professional foreign language competence. The findings indicated that only a moderate proportion of respondents achieved high scores in the overall assessment: specifically, 10.9% of students in the control group and 11% in the experimental group demonstrated a high level of professional foreign language competence.

A more detailed analysis of the individual components of competence revealed that the motivational component yielded comparatively higher scores. This suggests that while students display a strong desire and positive attitude toward acquiring professional foreign language skills, their actual performance in terms of linguistic knowledge and applied communicative skills remains limited. Such discrepancies point to potential gaps in curriculum design, teaching methodology, and opportunities for practical language application.

These findings underscore the necessity of rethinking current educational strategies and embracing a more holistic approach to foreign language instruction. In particular, they highlight the importance of integrating non-formal educational practices such as project-based learning, language immersion, internships, workshops, and extracurricular language programs, into the formal educational framework. Non-formal education, characterized by its flexibility, learner-centered approach, and focus on real-world application, provides a valuable supplement to traditional academic instruction and can significantly enhance students' professional readiness.

Therefore, our subsequent research efforts will focus on the theoretical development and empirical validation of a pedagogical model that facilitates the convergence of formal and non-formal education. This model is aimed at fostering the systematic development of professional foreign language competence among students in both linguistic and non-linguistic specialties. By bridging the gap between classroom instruction and real-world language use, such a model holds the potential to more effectively prepare students for the communicative demands of the modern professional environment.

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Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

Author contributions

Gulim Karimova: Conceptualization, Methodology, Data curation, Writing-Original draft preparation. Gulnaz Tleuzhanova: Reviewing and Editing. Anna Palina: Data curation, Writing-Original draft, Writing-Reviewing, and Editing.

References

Anderson, R., Baxter, G., & Culp, P. (2018). *Developing Effective Communication Skills in Foreign Language Education*.

Council of Europe. (2001). *Common European Framework of Reference for Languages: Learning, Teaching, Assessment*. Cambridge University Press.

Doganay, Y., Gaipov, D. & Sadykbekov, K. (2021). The Concept of Competence in Foreign Language Teaching forIntercultural Communication. *Eurasian Journal of Higher Education, 2(2), 39-46.*

Gaipov, D. & Sadykbekov, K. (2021). The Concept of Competence in Foreign Language Teaching for Intercultural Communication. *Eurasian Journal of Higher Education*, 2, 39-46.

Hymes, D. (1972). On Communicative Competence. In J.B. Pride & J. Holmes (Eds.), *Sociolinguistics* (pp. 269-293). Penguin.

Mikhailov, A. A., & Vorobyev, O. V. (2013). On the essence of the concept of project competence of future technology teachers. Polythematic network electronic scientific journal of Kuban State Agrarian University, 89, 1426-1435.

Nasikhanova, A. Z., & Davydova, L. N. (2013). To the question of the essence of the concept of "foreign language competence. Humanities Studies, 2(46), 29-38.

Savignon, S. J. (Ed.). (2002). *Interpreting Communicative Language Teaching: Contexts and Concerns in Teacher Education*. Yale University Press.

Sergeeva, N. N., & Bushmanova, Y. A. (2011). Professional-oriented foreign language communicative competence of a student of a technical university. Kazan Science, 8, 241-242.

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METHODOLOGICAL FEATURES OF WORKING WITH STUDENTS WITH SPECIAL EDUCATIONAL NEEDS IN TEACHING MATHEMATICS IN GENERAL SECONDARY SCHOOLS

Abstract. Inclusive education requires a dynamic and flexible approach to meet the diverse needs of students with special educational needs (SEN). In Kazakhstan, inclusive education is supported by several legal frameworks, such as the Law on Education, the State Program for the Development of Education (2020–2025), and the National Plan to Ensure the Rights of Persons with Disabilities until 2025. This study explores the methodological features of teaching mathematics to students with SEN in general secondary schools. The research focuses on the development and implementation of teaching strategies tailored to students' specific diagnoses. An experimental program was piloted in three schools in the Karaganda region, involving 87 students (including 19 with SEN) and 14 mathematics teachers. The study applied differentiated instruction, ICT-based teaching methods, and game-based learning approaches. The results demonstrated a 25% increase in academic performance among SEN students and a significant improvement in classroom engagement and motivation. The study highlights effective methodological strategies and provides recommendations for integrating SEN students into mainstream mathematics education.

Keywords: inclusive education, special educational needs, mathematics teaching, ICT tools, individualized education plans, pedagogical methods.

Introduction

Achieving the required outcomes of the state educational standards with students who have special educational needs is a complex process. Therefore, students with special educational needs require the development of individually oriented universal learning activities, which include regulatory, cognitive, and communicative components. These components involve: fostering a positive attitude, sustained motivation towards learning activities, and familiarization with general norms and behavioral rules; understanding and retaining learning goals and objectives, the ability to plan one's actions, implementing self-monitoring and self-assessment, making necessary adjustments, working according to rules and models, and accurately following verbal instructions; the ability to use symbolic and sign tools, and to complete intellectual and personal tasks; organizing and maintaining cooperation with adults and peers.

Using speech tools to resolve various communicative challenges, completing sufficient tasks, constructing statements, and mastering the dialogic form of speech (Abdiganieva, 2020).Example: Consideration of Students with Visual Impairments. When organizing socialization and correction-development processes for students with visual impairments, it is essential to take into account the environment designed specifically for them, including the main problematic structure arising from students' orientation and their interaction with the surrounding environment and creating conditions that ensure a comprehensive approach to correction tools through medical and psycho-pedagogical collaboration, so that the tasks of socialization, compensatory correction, and restorative treatment are interconnected.

The primary objectives for socialization and correction during the pedagogical work phase with students who have visual impairments include activating visual functions and

improving visual acuity by using various mosaics (floor, table, etc.), dominoes, lotto, beads especially for younger children (without overloading those with near vision impairments or with caution); training the retina through exercises with large, brightly colored objects; developing differentiation of primary colors and shades; strengthening the eye muscles, developing oculomotor and tracking functions, and expanding the visual field using tools such as laser pointers; developing stable visual fixation (localization); restoring spatial localization; developing binocular vision; developing stereoscopic vision.

Teaching students with visual impairments requires creating a conducive environment for socialization and visual development. This involves work on decorating reception walls in various ways, selecting visual trainers and didactic materials, and fostering sensory perception (Beyimbetov, 2017).

Visual Training Tools in Wall Decoration for Students with Visual Impairments

When decorating walls, the placement of visual training tools such as diagrams, various thematic paths, and labyrinths can be used as an effective method. This approach helps to exercise the eye muscles, stimulate visual functions, and promote the development of localization, fixation, spatial arrangement, and binocular vision.

An engaging visual method involves the use of glowing wire trainers (used during physical breaks or visual gymnastics). These elements harmonize uniformly with the interior when designed according to thematic or seasonal principles. Objects can be crafted using two-sided colored cardboard appliqué techniques and suspended from the ceiling with threads.

Unfortunately, educational resources specifically designed for students with visual impairments are limited in practice. As a result, teachers often have to rely on teaching aids intended for students with normal vision. Therefore, it is crucial for educators to pay attention to the following parameters when selecting materials:use of colorful images; clear and distinct contours of images; absence of additional unnecessary elements; models used should resemble real objects in shape and color pattern.

Among the researchers dedicated to working with students who require special education are Edi Supriyadi and M.E. Abdiganieva (Birzhanova, 2023; Dzheksenbeva, 2020).

Research Methods

The methodological framework of this study was designed to ensure a systematic and evidence-based approach to improving mathematics instruction for students with SEN.

The educational environment is a set of factors formed by the way of life within the school: the school's material resources, the organization of the learning process, nutrition, medical care, and the psychological climate.

To change the mode of work, it is recommended to use dynamic breaks during lessons, the duration of which can vary from 2 to 5 minutes depending on the students' fatigue levels. Exercises for physical breaks should include various elements of breathing and finger gymnastics, as well as eye exercises. When performing exercises during class, it is advisable to use methods that do not distract from the lesson's objectives. For example, in mathematics lessons, simultaneous oral counting combined with eye relaxation or the use of motor-auditory analyzers can be implemented. On average, a student can focus on one activity for about 10 minutes, after which attention and interest decline. For students with delayed mental development, this indicator is even lower. This factor should be taken into account by incorporating at least four different activities within one lesson. In a mathematics class, these activities may include: control work, solving examples and equations, tasks on the notebook and blackboard, mental counting, drawing, reading, listening, frontal questioning, oral recitation of rules and theorems, sequential questioning, and others. At the same time, too

frequent changes in activities are ineffective; it is recommended not to use more than six types of activities per lesson (Edi Supriyadi, 2022).

For students requiring special education, the use of ICT (information and communication technology) tools is also possible. For instance, e-learning and ICT-based teaching technologies are critically important tools for implementing inclusive education. To ensure accessibility and quality of education, the use of ICT is vital as it enables high-quality remote interaction among participants within the educational process.

Some analysis of the mathematics teaching process is presented in Table 1.

Table 1.
Analysis Table

No.	Situation	Description
1	In case of visual impairments	The learning process allows information to be received through hearing or tactile channels by applying special modes. To adapt the presented information, system software that enables increasing font size and graphic image dimensions (screen magnifiers) is used, as well as specialized programs that allow adjusting the necessary brightness and contrast of images.
2	Hearing impairment	On one hand, it complicates or completely obstructs a person's ability to perceive auditory information, and on the other, it limits their ability to control their own speech. One approach to developing and improving communication skills through assistive technologies is feedback based on visual sensation. Another approach involves using alternatives to oral communication, such as subtitles. Modern ICT allows teachers to create audiovisual materials with subtitles.

Using ICT as a Didactic Tool in Inclusive Education

The use of ICT as a didactic tool contributes to a shift in attitudes toward the learning process and stimulates the development of new strategies for education and assessment, thereby maximizing students' intellectual and creative potential. Additionally, ICT serves as a means of distance learning to meet the educational needs of students who are unable to attend regular classes in educational institutions.

Alongside the use of available hardware and software, learners achieve positive educational outcomes when utilizing electronic tools directly developed by teachers and those accessible through Internet resources and websites, taking into account the specific educational needs of students (IKPRAO. , 2025).

When developing methodological materials for inclusive education, the following support can assist teachers (see Table 2):

Table 2
Methodological tool

№.	Name	Description
1	Special Child	Electronic library resources (http://www.webcenter.ru/~scdl)
2	Special Childhood	Materials from the book section
3	Website for Parents of Special Needs Children	Information and methodological portal materials (http://edu-open.ru)
4	Adapted Multimedia Modules of the Information and Educational Resources Center	http://fcior.edu.ru
5	Adapted Multimedia Modules of the “Interaction” Center	http://inclusion.vzaimodeystvie.ru/library

Selection of Teaching Approaches and Methods in Inclusive Education

When discussing the selection of teaching approaches and methods in inclusive education, it becomes evident that this is one of the most complex issues within teaching methodology.

A collaborative approach to teaching mathematics is a form of organizing lessons where each student alternates between the roles of learner and instructor. Every participant works for everyone, and everyone works for each participant. One of the methodologies for collaborative learning is A.G. Rivin’s method. This approach involves students independently exploring new material without direct explanation from the teacher. The teacher selects several topics, taking into account that learners should be able to study these topics in any order. Depending on the students' abilities, the number of topics should be limited; the teacher can simplify or complicate the text and divide it into paragraphs. In this case, the text should be optimal for inclusive education and accessible in content.

Each paragraph should contain a complete idea, and the prepared material can be studied either in one lesson or over several consecutive lessons on different days. Each student studies one topic and works according to a specific algorithm. At the initial stage, the learner receives the full text on a specific topic and reads it thoroughly to form a general understanding of the subject matter. Afterwards, the student prepares notes. For visually impaired children, printed templates can be provided (see Table 3).

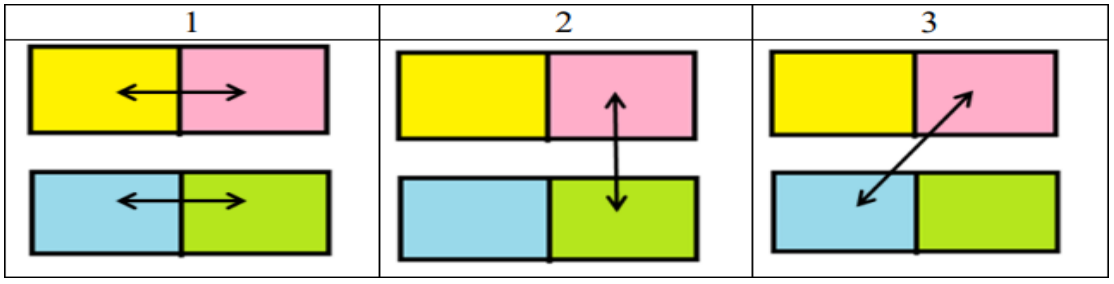
Table 3
Example of Special Worksheets

Date ____			
Topic Title____			
№	"Main idea of the paragraph"	"Key concepts of the paragraph"	Who did you work with?

When selecting teaching methods and approaches in inclusive education, one of the most complex issues arises. Each student is encouraged to find a partner, and learners may be given the freedom to choose their partners. At the initial stage, the teacher should develop an organizational-activity scheme to structure the work, which is then either displayed on the board or distributed in printed form at the workstations.

For example, when four different texts are reviewed in a lesson, an interaction model is employed where students can collaborate in pairs according to the given diagram (see Figure 1). This approach facilitates peer cooperation, promotes active engagement, and helps students navigate the learning material effectively within the inclusive classroom environment.

Figure 1.
Organizational-Activity Diagram



Thus, two students sit side by side, each having their own topic. First, they study the topic of the first student. The first student reads the first paragraph of their text while the second listens attentively. Then, this part of the text is discussed jointly: questions are asked, the meaning and main idea are highlighted, and key concepts are reviewed. Next, the second student writes the conclusions drawn from this paragraph into the first student's notebook and records their surname in the last column. Afterwards, the second student reads the first paragraph of their own topic, with the first student providingassistance. The partners then switch roles. In this way, both partners study the second part of the text and become familiar with two parts of their partner's material.

Alongside ICT tools, game-based technologies also hold significant potential for organizing the learning process in inclusive classrooms. However, the specific nature of the class demands a well-thought-out approach when selecting didactic games. Game technology can be used as a segment of a lesson (introduction, explanation, reinforcement, practice, assessment) to activate and motivate students in mastering concepts and topics. Some examples of didactic games suitable for these purposes are presented in Table 5:

Table 5
Types of Didactic Games

No.	Name	Description
1	Find the Mistake	Focuses on the student identifying the error made
2	Odd One Out	The student removes the extra item from five pictures and explains the logic behind the action
3	Lotto	Content may include concepts and definitions, formulas and their names, images and descriptions
4	What's Missing?	A whole is shown with missing parts on the card; the student identifies the missing part and justifies their answer

The variety of games allows for accommodating the individual characteristics of students with special educational needs (SEN). For example, for visually impaired students, the games mentioned above should include images with strong contrast against the background to

facilitate perception. Additionally, collective group games can be designed to be short in duration to maintain engagement and focus (see Table 6).

This tailored approach ensures that the learning process is inclusive, accessible, and effective for all learners, taking into account their unique sensory and cognitive requirements.

Table 6

Types of Games Applicable in Mathematics Lessons

№	Name	Description
1	Mosaic Game	Students must assemble a detailed picture. All parts of the picture are held by the teacher and distributed to groups based on correct task completion.
2	"Hands" Exercise Game	Primarily aimed at developing communication skills. Students are asked to draw as many palms of all group members as possible on a sheet of paper, writing terms, definitions, or formulas related to the studied topic on each drawing.

These games can be applied across all subjects in the natural science and mathematics fields, and students with special educational needs become full participants depending on the nature of the game situation.

Different types of pedagogical support are equally important in the process of knowledge acquisition (see Table 7):

Table 7

Types of pedagogical support

№	Description
1	Non-coercive teaching (based on interest, success, and confidence);
2	Lessons as a system of rehabilitation, whereby each student begins to feel themselves, act rationally, set goals, and achieve them;
3	Content adaptation by simplifying learning material and removing excessive complexity;
4	Simultaneous engagement of hearing, vision, motor skills, memory, and logical thinking in the process of material perception;
5	Use of anticipated action foundations (reference signals);
6	Additional exercises;
7	Optimal pacing for complete assimilation, etc.

Tasks for students with special educational needs should be communicated by the teacher both orally and in writing. The instructions must be short and clear, consisting of a single verb, and the teacher should be present near the student when giving the task. To ensure the child understands the task, it is important to ask them to repeat the instructions and explain their meaning.

Incorporating corrective and developmental exercises during lessons enhances students' mental processes and fosters the development of cognitive functions, thereby laying the foundation for successful learning activities. The use of these exercises also helps to alleviate emotional tension, create conditions for achievement, and support behavioral correction. Consequently, it enables children to feel more independent and confident in themselves (NAO Kazakhstan. , 2025).

Recommendations for Mathematics Teachers

Correctional and Developmental Tasks:

1. Given the numbers 12, 0, 15, 1, 8, 5, 2, 3, 44, divide them according to the following criteria:
2. – Single-digit numbers _____
3. – Two-digit numbers _____
4. – Natural numbers in ascending order _____
5. In each of the following four sets of words, underline the word that does not belong:
6. Segment, line, ray, triangle, figure, square.
7. Centimeter, millimeter, decimeter, length, meter, kilometer.
8. Ton, centner, mass, gram, pood.
9. In Table 8, identify the common properties of the concepts "segment," "ray," and "line," and list as many differences as possible. This task is aimed at developing comparison skills.

Table 8

Task Appendix

General properties	Differences		
	Segment	Ray	Line

Drawing Task Card (with Game Elements). Using the letter values indicated in the table below, find the value of the expression A − B − C. Write the obtained values in the "Result" row, and color each part of the picture according to the corresponding result in the table. For example, in the first column of the table, the student should get the result 13 (seeTable 10).

Table10

Creative Assignment in Mathematics

Letter Values					
a b c	7,7 2,2 3,94	4,7 1,9 6,03	14,3 3,2 40,76	1,3 8,7 3,7	9,1 2,9 7,15
Result	1				
Color in the picture					

In the picture, the areas marked with these numbers should be colored red. Thus, if there is a student requiring special education needs in the class, individual assignments can be organized using the methods described in this section.

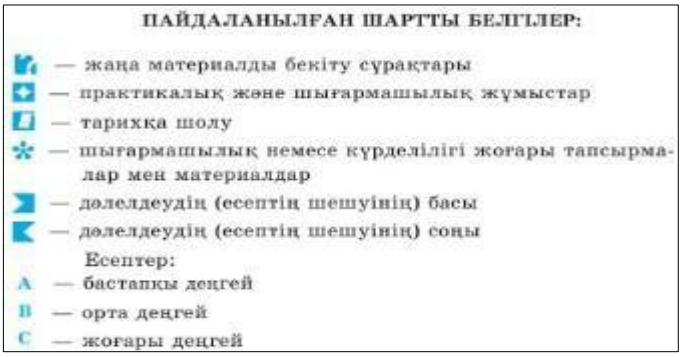
There are websites dedicated to analyzing regulatory documents, reviewing textbooks, and compiling specialized materials for working with students with special educational needs (Nurmukasheva, 2018; SATR. , 2025; Sorokoumova, 2023; Special Education Portal. , 2025). Additionally, information dissemination platforms are also operational.

The network of special education institutions in the Karaganda region comprises 29 organizations, categorized by various directions and functions, which are fully detailed on the official website.

Several textbooks are used when teaching mathematics to students with special educational needs. The primary one is the general school textbook.

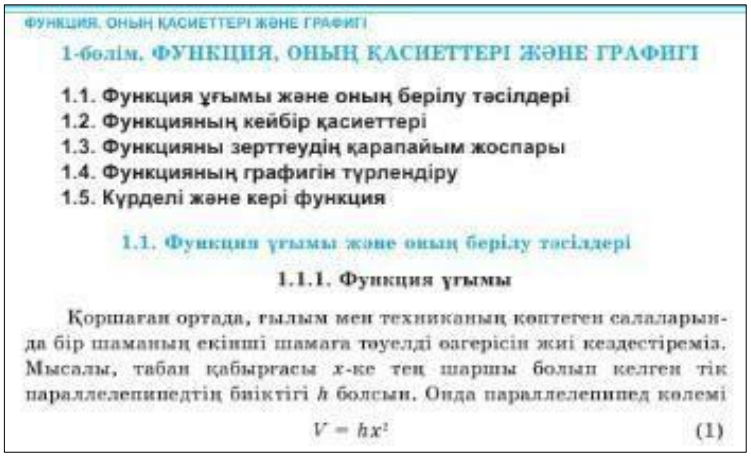
As an example, an analysis is conducted on the 10th-grade textbook "Algebra and the Basics of Analysis." According to the textbook's coding system, tasks are divided into different levels (see Figure 15).

Figure 15.
Legend of Symbols



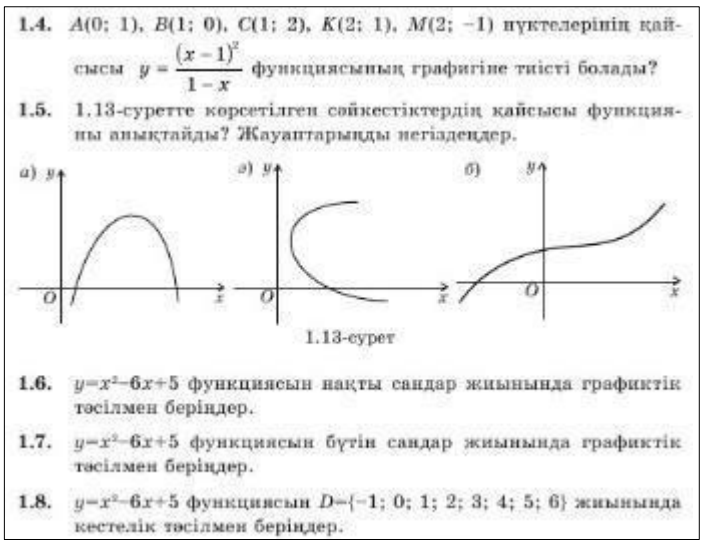
The first topic in the textbook is "Function, its Properties, and Graph" (see Figure 16):

Figure 16.
Textbook Topic



Problems for this topic are divided into levels: Level A includes problems 1.1–1.10, Level B includes problems 1.11–1.21, and Level C includes problems 1.22–1.26. Judging by the number of tasks, the textbook content is designed for students with average to above-average academic performance. Level A tasks are aimed at developing fundamental understanding of the topic and helping students acquire the simplest essential skills. For students requiring special education, alternative learning objectives are set, and these students primarily work with Level A tasks. Based on the topic discussed above, a selection of Level A tasks can be made specifically for students with special educational needs (see Figure 17).

Figure 17.
Content of Level A Tasks



1.4. $A(0;\ 1)$, $B(1;\ 0)$, $C(1;\ 2)$, $K(2;\ 1)$, $M(2;\ -1)$ нүктелерінің қайсысы $y=\dfrac{(x-1)^2}{1-x}$ функциясының графигіне тиісті болады?

1.5. 1.13-суретте көрсетілген сәйкестіктердің қайсысы функцияны анықтайды? Жауаптарыңды негіздеңдер.

а) б) в)

1.13-сурет

1.6. $y=x^2-6x+5$ функциясын нақты сандар жиынында графиктік тәсілмен беріңдер.

1.7. $y=x^2-6x+5$ функциясын бүтін сандар жиынында графиктік тәсілмен беріңдер.

1.8. $y=x^2-6x+5$ функциясын $D=\{-1;\ 0;\ 1;\ 2;\ 3;\ 4;\ 5;\ 6\}$ жиынында кестелік тәсілмен беріңдер.

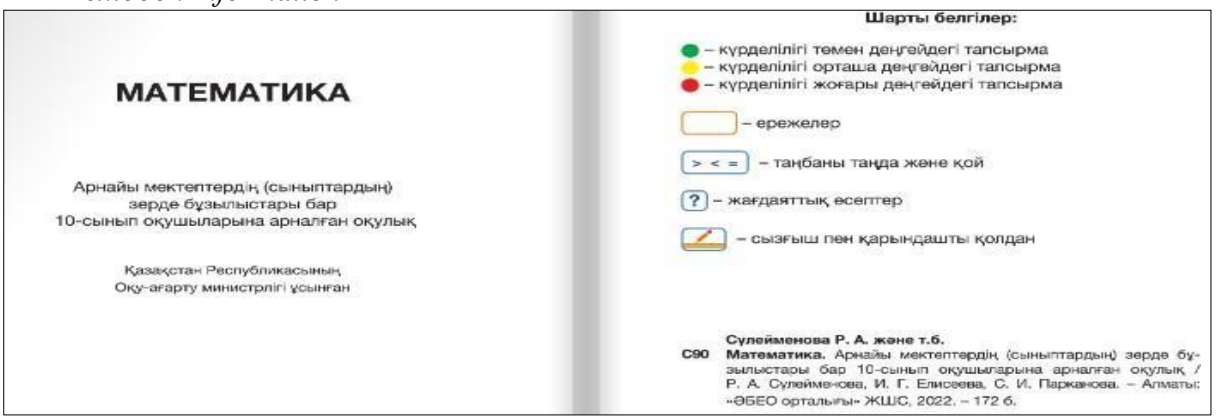
For this topic, students are required to master the simplest operations using definitions. Textbooks and instructional-methodological kits designed for special education are recommended based on students' specific diagnoses. Currently, mainstream schools offer educational materials tailored to students with special educational needs across several directions. An analysis is conducted of textbooks intended for students with intellectual disabilities (see Figure 18).

Figure 18.
Textbook Cover

Сүлейменова Р. А. және т.б.
Математика.Арнайы мектептердің (сыныптардың) зерде бұзылыстары бар 10-сынып оқушыларына арналған оқулық / Р. А. Сүлейменова, И. Г. Елисеева, С. И. Парканова. – Алматы: «ӘБЕО орталығы» ЖШС, 2022. – 172 б.

The inside cover of the textbook includes the legend of symbols, a description of the textbook, and information about the authors (see Figure 19).

Figure 19.
Textbook Information



The content of the textbook is compared with the standard textbook for general secondary education students, "Algebra and the Basics of Analysis." The first topic of the Grade 10 textbook designed for students with intellectual disabilities begins with the topic shown in the following figure (see Figure 20).

Figure 20.
Textbook Material

1-ДЕН 1 000 000-ҒА ДЕЙІНГІ САНДАРДЫҢ НУМЕРАЦИЯСЫ

12. Төмендегі сандарды цифрмен жаз.
Жеті жүз сексен мың он;
бес жүз он үш мың бес;
үш жүз жиырма екі мың алпыс үш;
тоқсан тоғыз мың үш жүз бес;
жүз мың жиырма сегіз;
жеті жүз жеті мың сегіз жүз отыз жеті.

13. Дәптерге кесте сыз. Төмендегі сандарды кестеге жаз:
1) 9, 612, 786 456, 491 803, 6 347, 34, 100 000, 632, 81;
2) 5 401, 704 501, 3, 88 000, 29, 1 000 000, 491 321, 999, 5.

Біртаңбалы									
Екітаңбалы									
Үштаңбалы									
Төрттаңбалы									
Бестаңбалы									
Алтытаңбалы									
Жетітаңбалы									

Әр санды оқы.

6

The next topic in the textbook is "Lines, Curves, Broken Lines, and Segments" (see Figure 21).

Figure 21.
Textbook Material

ГЕОМЕТРИЯЛЫҚ МАТЕРИАЛ

Түзу, қисық, сынық сызықтар мен кесінді

19. Еске түсір!

Сызық — бұл бірінің артынан бірі біркелкі орналасқан, көп нүктелерден құралған геометриялық фигура.

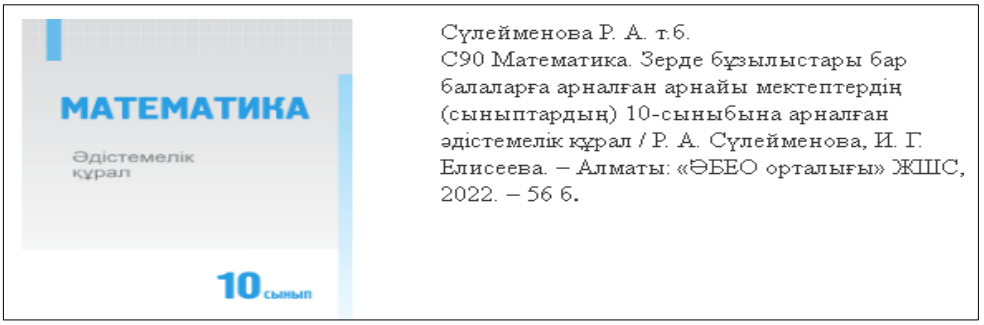
Геометриялық сызықтардың үш түрі болады.

Сызықтар түрі	Мысал
Түзу	
Қисық	
Сынық	

By examining these two topics, it becomes evident that for students with the aforementioned diagnoses, the subjects "Algebra and the Basics of Analysis" and "Geometry" are taught as a single integrated subject. Additionally, there is a significant difference in the scope of topics and materials covered.

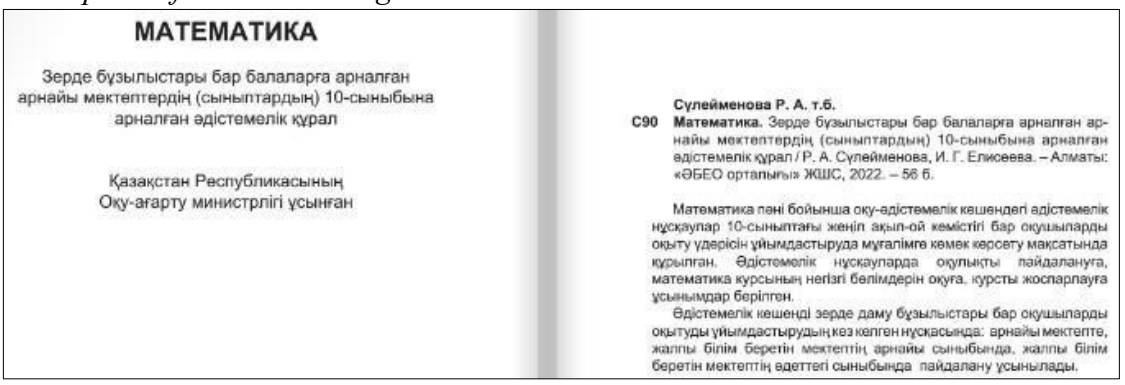
For such students, a methodological guide is provided alongside the textbook (see Figure 22).

Figure 22.
Methodological Guide



The methodological guide was also analyzed for this diagnosis and for the same 10th-grade students (see Figure 23).

Figure 23.
Description of the Methodological Guide



The content of the methodological guide includes the topic, learning objectives, and number of hours. The full version of the special textbook and methodological guide is available on the dedicated website. Under the class objectives for the lesson topic, it is required to specify individual goals for students with special educational needs (SEN). It is also important to note that individualized education plans (IEPs) and differentiated tasks designed for such students should not exceed Level A in difficulty. While working with general education students, attention must also be given to students with SEN. Assessment criteria are similarly documented when developing individual learning plans. During classroom activities, various types of work are naturally carried out (see Table 17).

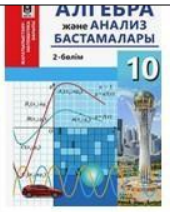
Table17

Sample Assignment

Тапсырма 1. Алматы облысындағы кездейсоқ алынған 25 ауылдағы халық санын зерттеу мынандай нәтиже береді:

2680	2805	2700	2050	2760
2930	2430	2990	2795	2170
2945	2430	2990	2795	2170
2095	2786	2545	2869	2890
2590	2712	2120	2986	2775

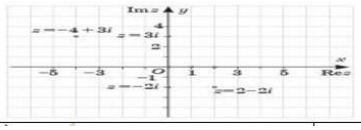
a) жиіліктің аралық кестесін жазыңыз (2150 адамнан бастап, аралық ұзындығын 150 адам етіп алыңыз);
b) гистограммасын тұрғызыңыз.



If such tasks prove too difficult for students with special educational needs (SEN), they are given simpler tasks involving reading the provided information and performing basic operations according to their level. Since one of the key goals in working with SEN students is their social integration, it is essential to involve them in group work as well. Therefore, as a subject teacher, group work was organized during the lesson (see Figure 30):

Figure 30.

Group Work Assignment

ТОППЕН ЖҰМЫС	Мұғалім мысал көрсетеді, топтарға тапсырма береді * Ескерту - ЕББҚ бар оқушыны қоса алғанда (есту қабілетінде бұзылыстары бар) 4. Координаталық жазықтықта: 1) $z = -4 + 3i$; 2) $z = 2 - 2i$; 3) $z = 3i$; 4) $z = -2i$ сандарын белгілейік (52-сурет). 	Үш топқа да бірдей тапсырма 16.8. Координаталық жазықтықта келетін нүктелерді 1) $z = -1 - 3i$; 3) $z = -\sqrt{5} + i\sqrt{3}$; 	Елші әдісі арқылы тапсырмаларды топ басшы қарап шығады. Бағалау «үш шапалақ» арқылы бағалайды 	Оқулық Оқу құралдары; Слайд; Интернет ресурстары

The content of paired work organized with SEN students in the class covered by the Individual Education Plan (IEP) is shown in the following figure (Figure 31):

Figure 31.

Content of Paired Work

ЖҰПТЕН ЖҰМЫС	* **Ескерту - ЕББҚ бар оқушыны қоса алғанда** (жеңіл бұзылыстары бар) **3. Комплекс санның модулін анықтаңдар:** **1)** $4-3i$; **2)** $-3+2i$; **3)** $0,2+0,1i$; **4)** $\frac{1}{3}-\frac{4}{5}i$; **5. Комплекс санның модулін табыңдар:** **1)** $(2-i)(i+1)$; **2)** $\frac{2i-1}{1+i}$; **3)** $(2-3i)^3$;	$Z = a + bj$ $r = a + bj = \sqrt{a^2 + b^2}$ $r = \sqrt{a^2 + b^2}$ – *комплекс санның модулі* Анықтама: комплекс санның модулі нақты және жорамал бөліктердің коэффициенттерінің квадраттарының қосындысының квадрат түбірінің арифметикалық мәні деп аталады және r белгіленеді	-Комплекс санның нақты бөлігін білдеді; - Мадақтау Жарайсың!, Керемет! Жақсы! Талпын! 	Оқулық Оқу құралдары; Слайд; Интернет ресурсары

Thus, an example of working with students with special educational needs (SEN) in grades 10-11 has been analyzed. Additionally, a survey was conducted among teachers and parents of general education institutions to identify issues related to working with students who have special educational needs.

As part of the research focused on the practical application and methodological analysis of the topic, a roundtable discussion was conducted across five educational school-centers in Karaganda. The event brought together teachers working with students with special educational needs (SEN) and 3rd- and 4th-year university students. The roundtable was held under the theme "Methodological Features of Working with Students with Special Educational Needs in the Teaching of Mathematics." During the session, senior students shared the challenges encountered during their teaching practice and received professional guidance and recommendations from experienced educators.

In the 2024–2025 academic year in collaboration with the Faculty of Professional Development at E.A. Buketov University, a specialized training course"Using Interactive Educational Platforms in the Learning Process" was organized. This course was dedicated to examining and implementing interactive platforms designed to improve teaching effectiveness and enhance student learning outcomes.

During the research process, particular emphasis was placed on ensuring alignment with the learning objectives of secondary school mathematics and strict adherence to the principles of inclusivity. The methodology was evaluated in terms of its structural coherence, systematic implementation, accessibility and simplicity of instructional materials, and the integration of innovative elements. The effectiveness and efficiency of the approaches were continuously assessed at various stages of implementation.

The evaluation of the methodology was based on the following criteria: development of mathematical thinking skills among students with special educational needs (SEN); availability of practical outcomes supported by empirical evidence; analysis of the level and quality of differentiation; provision of tasks appropriate to students' individual readiness levels; use of supportive tools, such as concrete models, visual aids, and technological resources; application of methods enabling students to assess their own learning progress; well-defined and systematic feedback mechanisms; availability of specialized equipment or viable alternative resources; integration of modern pedagogical technologies, including ICT, gamification elements, and multimedia; utilization of objective methods for evaluating student performance; inclusion of self-assessment and peer-assessment practices; opportunities for reflection by both teachers and students.

The practical implementation of these methodologies confirmed their relevance, effectiveness, and necessity in inclusive mathematics education.

In general secondary schools, instruction for students with special educational needs is carried out primarily using standard textbooks, supplemented, when necessary, by specialized educational resources. However, to ensure full comprehension and mastery of the material, it is essential for mathematics teachers to carefully select and adapt teaching methods and strategies to meet the diverse needs and abilities of learners.

Conclusion

The assessment of student progress is closely connected to the jointly defined goals of teachers, parents and specialists. When aims are realistic and structured within targeted educational domains, assessment becomes an effective tool for adaptive teaching rather than a formality. Successful progress tracking for students with special educational needs requires clear task-setting, use of resources and specialist support, continuous monitoring, and transparent communication with families and school administration.

Effective assessment should be based on individualized education plans that translate broad curricular aims into measurable objectives. It needs to combine formative and summative measures, draw on multiple sources of evidence such as teacher observation, ICT-based data and self-assessment, and ensure documentation is accessible to parents and professionals.

The study confirmed the importance of activity-based methods, ICT tools and adapted curricula. Alternating structured tasks and collaborative formats increased engagement, while digital resources improved accessibility and broadened teaching options. Practical classroom work showed that combining these approaches enhances both academic results and participation of students with special educational needs.

Limitations include the modest sample and the focus on mathematics. Future research should expand to other subjects, evaluate long-term outcomes and integrate indicators of social inclusion and student well-being. Overall, the methodological strategies outlined here demonstrate strong potential to raise the quality of inclusive education, provided that evaluation, professional training and collaboration among stakeholders are consistently maintained.

Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

Author contributions

Seitimbetova Aigerim: Conceptualization, Methodology, Resources and Editing. Kossybayeva Umitzhan: Writing - Original draft preparation, Supervision, Writing-Reviewing, Investigation, Project administration. Kauymbek Indira: Formal analysis, Visualization, Inestigation.

References

Adilet Legal Information System. (n.d.). *Law of the Republic of Kazakhstan on Education*. Retrieved September 16, 2025, from http://www.adilet.kz

Adilet Legal Information System. (n.d.). *State Program for the Development of Education in the Republic of Kazakhstan for 2020-2025*. Retrieved September 16, 2025, from http://www.adilet.kz

UBA. (n.d.). *State Compulsory Education Standards of the Republic of Kazakhstan (Primary, Basic Secondary, General Secondary Education)*. Retrieved September 16, 2025, from http://www.uba.kz

Adilet Legal Information System. (n.d.). *Law of the Republic of Kazakhstan on Social and Medical-Pedagogical Support for Children with Disabilities*. Retrieved September 16, 2025, from http://www.adilet.kz

Adilet Legal Information System. (n.d.). *Law on the Rights of the Child in the Republic of Kazakhstan*. Retrieved September 16, 2025, from http://www.adilet.kz

Adilet Legal Information System. (n.d.). *National Plan for Ensuring the Rights of Persons with Disabilities until 2025 in the Republic of Kazakhstan*. Retrieved September 16, 2025, from http://www.adilet.kz

Abdiganieva, M. E. (2020). Implementation of inclusive education in Kazakhstan. In *Science, education, innovation: Approval of research results: Materials of the International Scientific-Practical Conference* (pp. 534–539). Scientific Publishing Center "World of Science".

Beyimbetov, Q. Zh., & Akhmetova, B. K. (2017). The role of didactic games in enhancing student engagement in mathematics lessons. *Education Bulletin*, (2), 3–8.

Birzhanova, A. A. (2023). Effective organization of mathematics lessons in inclusive education conditions. *Internauka*, 13(6[283]), 31–53.

Dzheksenbeva, K. O. (2020). Methodological organization of teaching students with special needs in general education institutions. *Scientific-Practical Research*, 5(5[28]), 14–17.

Edi Supriyadi, Sari, I. P., Fauzi, A. L., Mahmudin, & Dahlan, J. A. (2022). Bibliometric analysis: Inclusive mathematics education research. In *Proceedings of ICEHOS 2022*. Atlantis Press. https://doi.org/10.2991/978-2-38476-088-6_18

IKPRAO. (n.d.). *Official website*. Retrieved September 16, 2025, from http://www.ikprao.ru

NAO Kazakhstan. (n.d.). *Official website*. Retrieved September 16, 2025, from http://www.nao.kz

Nurmukasheva, S. K. (2018). Inclusive education and teaching methods for children with special educational needs. In *Integration of the scientific community to the global challenges of our time: Materials of the III International Scientific-Practical Conference* (Vol. III, pp. 320–327). Regional Academy of Management Public Fund.

SATR. (n.d.). *Official website*. Retrieved September 16, 2025, from http://www.satr.kz

Sorokoumova, S. N. (2023). Organization of inclusive education in the context of education modernization.

Special Education Portal. (n.d.). *Official website*. Retrieved September 16, 2025, from http://special-edu.kz

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PARTICIPATION OF KAZAKHSTANI UNIVERSITIES IN GLOBAL RANKINGS: ANALYSIS OF DYNAMICS, PROBLEMS, AND PROSPECTS

Abstract. Global university rankings are increasingly used as tools for assessing university effectiveness and shaping educational policies. This article presents a comprehensive analysis of the participation of Kazakhstani universities in the international rankings QS, THE, and ARWU. The study reveals both positive dynamics and persistent institutional barriers for Kazakhstani universities.

The research methodology includes quantitative and qualitative analysis of university positions, as well as comparative analysis. The findings show that the main problems with the global positions of Kazakhstani universities are related to insufficient scientific productivity, limited internationalization, and a disconnect between public policy and institutional practice. Recommendations are provided for the development of the research ecosystem and the transformation of academic management mechanisms.

Keywords: university rankings, Kazakhstan, higher education, internationalization, academic reputation.

Introduction

Over the past two decades, global university rankings have become powerful tools for institutional competitiveness and higher education policy. Rankings such as the QS World University Rankings, Times Higher Education (THE), and the Academic Ranking of World Universities (ARWU) have become influential indicators of academic reputation, research potential, internationalization, and the attractiveness of universities for students, investors, employers, international partners, and national governments (Hazelkorn, 2015; Marginson, 2014).

In this context, a university's ranking position is no longer considered an additional reputational asset but is becoming an essential component of strategic planning, mission formulation, and resource allocation. Countries with developing education systems, including Kazakhstan, are increasingly participating in the global competition for academic recognition and striving to integrate into the international education space. Since the 2010s, Kazakhstan has institutionalized efforts to increase university competitiveness through participation in global rankings, reflected in regulations, state programs, and public funding (MoES RK, 2020).

For example, the State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020-2025 explicitly states the goal of placing Kazakhstani higher education institutions among the top 500 in global rankings. Al-Farabi Kazakh National University, Nazarbayev University, and L.N. Gumilyov Eurasian National University are supported through targeted funding, research clusters, and the recruitment of foreign faculty.

Despite this, the participation of Kazakhstani universities in global rankings remains limited in both scope and quality. Many institutions fail to meet ranking criteria in several areas: scientific productivity, internationalization of faculty, involvement in global collaboration, citations, and academic reputation. Internal institutional barriers, fragmented internationalization strategies, limited research output in English, and staff turnover further exacerbate the issue.

Therefore, analyzing the participation of Kazakhstani higher education institutions in global rankings is an important research objective. On the one hand, it enables an objective assessment of the higher education system in the international context. On the other hand, it identifies strategic growth areas, institutional challenges, and potential reform directions. This article aims to systematize empirical data, analyze the dynamics of Kazakhstani universities' participation in global rankings from 2020 to 2025, compare the experience with other countries, and offer recommendations for improving Kazakhstan's position in the global academic arena.

Literature Review

The participation of universities in global rankings has been the focus of academic debate for over a decade. Researchers emphasize several key aspects of how rankings influence educational policy and university behavior.

First, rankings institutionalize hierarchies in the global academic space, strengthen the dominance of English-speaking institutions, and place pressure on developing countries' higher education systems (Marginson, 2007; Hazelkorn, 2015). In this regard, rankings serve not only as assessment tools but also as mechanisms of global inequality (Shin et al., 2011; Stack, 2021).

Second, rankings influence internal resource distribution in universities: priority is given to academic publications (especially in English), citation rates, and visibility in the international academic space. This shapes institutional strategies - from curriculum design to international collaboration (Rauhvargers, 2013; Salmi, 2009).

Third, rankings shape external perceptions of universities among key stakeholders - students, parents, partners, donors, and government agencies. They have become crucial elements in marketing and positioning in the global educational market (Usher & Savino, 2006; Altbach, 2013).

In the post-Soviet region, including Kazakhstan, rankings are often used as a tool to validate educational reforms. Ranking results are integrated into national university evaluation systems, impacting funding, accreditation, and leadership appointments (Kushnir et al., 2021; MES, 2023).

However, the literature also contains significant criticism of rankings. Scholars highlight methodological flaws, cultural biases (e.g., prioritization of English-language sources), and the misalignment between ranking metrics and national educational goals (Deem et al., 2008; Stack, 2021). These issues are particularly acute for countries with underdeveloped research infrastructures, limited academic autonomy, and low international visibility.

For Kazakhstan, this underscores the need for a balanced and strategic approach to ranking participation, viewing it as a tool for quality improvement, not a goal in itself.

Methodology

The study is based on the following approaches:

1. Secondary analysis of open data from the global rankings of QS, THE, and ARWU.
2. Analysis of bibliometric indicators of Scopus and Web of Science: publication activity, citation index, and share of publications in high-ranking journals.
3. Comparative analysis with universities from Uzbekistan, Malaysia, the Czech Republic, and Russia.

The following research questions serve as a guide for the study:

- How do Kazakhstani universities compare to their regional and international peers in terms of global rankings?
- Which governmental initiatives and institutional practices propel these ranks upward?

- What structural barriers stand in the way of Kazakhstan's higher education system's long-term progress?

The study's primary objective is to monitor Kazakhstan's advancement in global rankings in relation to the broader framework of domestic reforms in higher education.

The study seeks to achieve the following specific objectives:

1. To aggregate and organize quantitative data on Kazakhstani university representation in QS, THE, and ARWU rankings;

2. To assess publication activity and citation impact using bibliometric analysis;

3. To identify regional trends by contrasting Kazakhstan with a few reference nations;

4. To investigate institutional tactics and structural limitations influencing ranking results.

Methodologically, the analysis is predicated on comparative policy viewpoints (Marginson, 2014; Hazelkorn, 2015) and bibliometric methodologies (Moed, 2005; Glänzel, 2003). These frameworks make it possible to integrate ranking dynamics with systemic developments and to emphasize both structural and institutional features.

Results and Discussion

Analysis of the participation of Kazakhstani universities in global academic rankings (QS, Times Higher Education, Web of Science, Scopus) shows positive changes that reflect certain institutional changes in the country's higher education system. At the same time, as Hazelkorn (2015) and Marginson (2014) note, the growth of ranking positions does not necessarily coincide with sustainable academic development: the influence of external indicators may lead to selective strategic decisions aimed at satisfying the ranking criteria, rather than fundamental changes.

Dynamics of participation and position of Kazakhstani universities

Analysis of quantitative data shows that the number of Kazakhstani universities included in the QS and THE rankings is gradually increasing, but this representation remains very low compared to international and even regional counterparts.

The analysis should be interpreted in light of Kazakhstan's Concept for the Development of Higher Education and Science (2023–2029), which places a strong emphasis on institutional autonomy, international competitiveness, and integration into the global academic environment.

Table 1.

Number of Kazakhstani universities in international rankings

Rankings	**2020**	**2023**	**2025**
QS World University Rankings	8	10	11
Times Higher Education (THE)	1	2	2
ARWU	0	0	0

Sources: compiled by the authors based on the analysis of data from QS, THE, Scopus university reports

QS (2025) reports that 11 Kazakhstani universities were listed in 2025, up from just one in 2015. The results show a similar trend, declining over the same period of time from one to two universities. As reported in OECD (2021) and Altbach (2013), this increase is ascribed to strong academic reporting, increased publishing activity, and internationalization initiatives.

Table 2.
Kazakhstani universities in global rankings (QS and THE, 2025)

University	QS 2025	THE 2025	Number of publications (Scopus, 2024)	Share of foreign teachers (%)
Nazarbayev University	138	301–350	5,420	43%
Al-Farabi Kazakh National University	223	601–800	3,610	19%
Satpayev University	441–490	801–1000	3,020	13%
L.N. Gumilev Eurasian National University	492	-	1,420	10%
Kazakh Agrotechnical University	601–650	-	1,120	8%
Kazakh-British Technical University (KBTU)	631–680	-	1,030	12%
Karaganda University named after Buketov	701–750	-	790	7%
Abai Kazakh National Pedagogical University	751–800	-	660	6%
Almaty Technological University (ATU)	801–1000	-	570	5%
Kazakh University of Humanities and Law (KazGUU)	901–1000	-	460	3%
Sh. Ualikhanov Kokshetau University	1001–1200	-	340	2%

Sources: compiled by the authors based on QS (2025), THE (2025), Scopus (2024), and university reports

Kazakhstan is starting to solidify its top-tier participation, as seen by the ascent of Al-Farabi KazNU to QS 223 and Nazarbayev University to QS 138. The majority of universities, however, continue to be in the lower tiers (651–1000+), suggesting that resources are heavily concentrated in a limited number of establishments.

Thus, there is an effect of "ranking concentration", in which strategic resources are concentrated in a narrow group of universities, while other institutions remain outside the global academic arena. However, as Dim et al. (2008) argue, representation in the rankings does not in itself indicate comprehensive academic improvement, but can be an indicator of active participation in the global educational space.

Regional and international context

Kazakhstan has maintained its advantage in the Central Asian region, but it is significantly lower than that of the countries of Southeast Asia. For example, in the QS ranking (2024), the Czech Republic has 14 universities. This can be partly explained by systematic state support and academic autonomy, as documented in the OECD (2021) and Rauchvargers (2013) studies.

Table 3.
Regional position of Kazakhstan in the global university rankings

Country	QS (2025)	THE (2025)	ARWU (2025)
Kazakhstan	11	2	0
Uzbekistan	6	2	0
Malaysia	24	15	5
Russia	32	21	11
Czech Republic	13	9	2

Sources: compiled by the authors based on the analysis of QS, THE, ARWU data (2025)

Kazakhstan's situation highlights the drawbacks of a rankings-based approach to international integration, going beyond the numbers. Although QS representation is higher in Kazakhstan than in Uzbekistan, the difference with Malaysia highlights the structural advantages of nations that have made steady investments in regional hubs, research ecosystems, and English-medium education. As a result, unless structural reforms guarantee sustainability, Kazakhstan runs the risk of staying in a "middle position," above its regional rivals but below its global leaders.

Rankings as a factor in changing university strategy

A number of Kazakhstani higher education institutions are reconsidering their strategic orientations in favor of indicators measured by global rankings: international mobility, academic reputation, and citations.

In line with the world-class university model, Nazarbayev University has focused its strategy on creating research-intensive centers with close international engagement.

Although citation quality is still inconsistent, Al-Farabi Kazakh National University (KazNU) has implemented an aggressive publication policy and increased partnerships with Chinese and Russian schools to boost Scopus production.

As a sectoral adaptation rather than a simple reputational one, Satpayev University has placed a high priority on engineering-focused collaborations with business and global research networks.

This demonstrates how rankings serve as a selective force behind institutional modernization, while different universities employ different approaches: some adopt worldwide models, while others modify ranking logics to play to their unique advantages.

According to Hazelkorn (2015) and Salmi (2009), colleges are run like corporations and are governed by the "competitiveness" concept. This is consistent with global trends. In particular, Nazarbayev University is focused on the model of a world-class university, which is reflected in its intensive support for research centers and international collaborations. However, Altbach (2013) warns that excessive imitation of global models can neutralize the local missions of universities and exacerbate educational inequalities.

Constraints and structural barriers

Several interconnected structural hurdles continue to limit Kazakhstan's sustainable academic development despite noticeable quantitative growth. One of the main challenges is financial: chronic underfunding and restricted access to competitive research funds create unequal institutional capacities, particularly in regional universities. Another issue concerns academic autonomy. Although the 2023–2029 Concept stresses the importance of greater independence, centralized governance procedures still constrain universities' ability to implement autonomous strategies. International integration also remains limited: even though

the number of foreign professors has increased, collaboration is mostly project-based rather than systemic, and participation in global research networks is fragmented. Language barriers add to these difficulties. The transition to English-medium instruction enhances international visibility but generates internal challenges, such as a shortage of qualified teachers and a decline in the quality of social sciences and humanities education. In addition, a bibliometric imbalance persists: the quantity of Kazakhstani publications grows more quickly than their citation impact, which means national research is not receiving sufficient recognition in global academic communities. Taken together, these factors show that without systemic reforms, improvements motivated by rankings will remain fragile.

Conclusions

The results of the analysis show that the participation of Kazakhstani universities in global university rankings is limited in scope, unstable in dynamics, and vulnerable to external and internal institutional factors. While the number of universities represented in the QS and THE rankings is gradually increasing, qualitative indicators such as citation counts, academic reputation, internationalization, and the stability of the research environment remain low.

For instance, in QS 2025, Kazakhstan has eleven universities while Uzbekistan has just six, demonstrating the relative strength of the area. Nonetheless, Malaysia's 24 QS and 15 THE universities, which are supported by steady funding and internationalization efforts, highlight the differences between Central and Southeast Asia. This illustrates how Kazakhstan's dependence on partial reforms rather than radical change is the root cause of its fragility.

Of particular concern is the phenomenon of “rating rationality,” in which universities’ strategic priorities are replaced by a focus on quantitative indicators, to the detriment of their core academic mission. This creates a risk of institutional degradation: universities strive to enter the rankings, but not to achieve real scientific and educational breakthroughs.

Taking into account the identified trends, the following strategic directions are proposed:

1) Development of a national system for supporting research productivity, focusing on the quality, not the quantity, of publications;

2) Implementation of a sustainable internationalization policy, including programs to attract foreign teachers and students, expanding academic mobility, and supporting English-language programs;

3) Formation of reputation strategies aimed at strengthening the academic image of Kazakhstani universities through international cooperation, participation in global scientific consortia, and publications in high-ranking journals;

4) Revision of the KPI system of universities to align the rating requirements with the long-term objectives of developing academic freedom, autonomy, and the quality of education.

Thus, Kazakhstani universities should consider international rankings not as a goal in themselves, but as an indicator of the maturity of the national academic ecosystem. Only through institutional integrity, strategic stability, and academic credibility can Kazakhstani higher education achieve long-term success and real recognition on the global stage.

Limitations and Future Research. There are various restrictions on this study. First of all, it mostly uses secondary data from bibliometric databases and international rankings, which might not adequately represent the qualitative aspects of institutional development. Second, the comparison with a few chosen nations (Malaysia, the Czech Republic, Russia, and Uzbekistan) is representative but not all-inclusive. Third, the rapid change of ranking algorithms (e.g., QS 2023–2025 updates) complicates longitudinal consistency.

Future studies should use mixed methods that incorporate interviews with university leaders, broaden the comparative analysis to include other Central and Southeast Asian systems (such as Vietnam, Thailand, and Indonesia), and investigate the long-term impacts of rankings on academic identity, equity, and governance.

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Author Contributions

Baurzhan Bokayev: Conceptualization, Methodology, Resources and Editing. Zulfiya Torebekova: Writing - Original draft preparation, Supervision, Writing-Reviewing, Investigation, Project administration. Nurbek Aizharykov: Formal analysis, Visualization, Inestigation.

References

Altbach, P. G. (2013). The international imperative in higher education. Sense Publishers.

Concept for the Development of Higher Education and Science in Kazakhstan (2023–2029). (2023). Ministry of Science and Higher Education of the Republic of Kazakhstan.

Deem, R., Mok, K. H., & Lucas, L. (2008). Transforming higher education in whose image? Exploring the concept of the 'world-class' university. Globalisation, Societies and Education, 6(2), 121–136. https://doi.org/10.1080/14767720802034538

Hazelkorn, E. (2011). Impact of global rankings on higher education research and reform. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000213752

Hazelkorn, E. (2015). Rankings and the reshaping of higher education: The battle for world-class excellence (2nd ed.). Palgrave Macmillan.

Kushnir, H., Omarov, A., & Alzhanova, A. (2021). Higher education transformation in Kazakhstan: From Soviet legacy to global competitiveness. Central Asian Affairs, 8(1), 55–78.

Marginson, S. (2007). Global university rankings: Impacts on higher education. Journal of Higher Education Policy and Management, 29(2), 131–142.

Marginson, S. (2014). University rankings and social science. European Journal of Education, 49(1), 45–59. https://doi.org/10.1111/ejed.12060

Ministry of Education and Science of the Republic of Kazakhstan. (2020). State program for the development of education and science of the Republic of Kazakhstan for 2020–2025. Retrieved from https://www.gov.kz

Ministry of Science and Higher Education of the Republic of Kazakhstan. (2023). Annual report on academic research and internationalization. MoSHE.

OECD. (2021). Education at a glance 2021: Kazakhstan country note. Organisation for Economic Co-operation and Development. Retrieved July 2024 from https://www.oecd.org/education/education-at-a-glance

QS Quacquarelli Symonds. (2024). QS World University Rankings 2024. Retrieved July 2024 from https://www.topuniversities.com

QS Quacquarelli Symonds. (2025). *QS World University Rankings 2025*. Retrieved from https://www.topuniversities.com

Rauhvargers, A. (2013). Global university rankings and their impact: Report II. European University Association.

Salmi, J. (2009). The challenge of establishing world-class universities. The World Bank.

Scopus Database. (2023). Publication analysis by country. Elsevier. Retrieved July 2024 from https://www.scopus.com

Scopus Database. (2024). Publication analysis by country. Elsevier.

Shin, J. C., Toutkoushian, R. K., & Teichler, U. (Eds.). (2011). University rankings: Theoretical basis, methodology and impacts on global higher education. Springer.

Stack, M. (2021). Global university rankings and the politics of knowledge. University of Toronto Press.

Times Higher Education. (2024). THE World University Rankings 2024. Retrieved July 2024 from https://www.timeshighereducation.com

Times Higher Education. (2025). *World University Rankings 2025*. Retrieved from https://www.timeshighereducation.com

Usher, A., & Savino, M. (2006). A global survey of university ranking and league tables. Higher Education Strategy Associates.

Web of Science Core Collection. (2024). Country reports. Clarivate Analytics.

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THE EXPERIENCE OF OLYMPIC EDUCATION FOR UNIVERSITY STUDENTS

Abstract. The article explores new approaches to professional training in sports education, focusing on integrating physical education and sports specialists into the global system. It highlightsthe promotion of the ideals and values of Olympic teaching in response to the growing interest in the international athletic movement and the Games in the context of modern global society.

The study is based on research materials evaluating the professional literacy level of specialists in physical education regarding the global sporting event, including its history, current state, and the impact of new knowledge on the professional preparation of future specialists. This study employed a mixed-methods design, combining a survey of 225 students with an experimental intervention involving an “Olympic Education” course. Findings showed that students in the experimental group significantly improved their Olympic literacy compared to the control group, confirming the effectiveness of the intervention.

The main aim of the article is to cultivate and enhance the culture of Olympism among youth by introducing them to the ideals and values of competitive sports through educational programs. Additionally, the article presents the experience of implementing Olympism concepts at the M. Utemisov West Kazakhstan University. Recommendations for improving students' literacy in sports-related knowledge at higher educational institutions are also provided.

Keywords: olympic education, physical education and sports specialists, Olympic Games, olympism, students, olympic movement.

Introduction

The pinnacle of sports – the Olympic Games – is a grand competition watched by the entire world, where thousands of athletes from all corners of the globe strive to conquer this height. Over the 30 years of Kazakhstan’s independence, we have witnessed significant achievements by our athletes. At the Olympic Games and global competitions, our national flag has waved numerous times, our anthem has been played, and our spirit has soared higher.

The relevance of introducing Olympic education stems from the contradiction between the high level of sports development achieved at the Olympic Games over the past several decades and the low level of implementation of Olympic ideals and values among youth in the educational process. The current youth's theoretical knowledge of the Olympic Games, the development history of the modern Olympic movement, and the value of Olympism in the Republic of Kazakhstan is insufficient. Therefore, studying the issue of implementing Olympic education in Kazakhstan requires a comprehensive approach. The achievements of Olympic athletes hold great social, educational, and moral significance.

The Olympic movement has long been recognized as a global platform that transcends sports, influencing social and cultural development. Scholars have examined the educational impact of Olympism and emphasized the importance of integrating its values into the educational curriculum (Bakhtiyarova, S., Ali, Z., Nurbagi, S.., Baitlessova, N.., & Yergaliyev,

A., 2021). The Olympic Charter outlines the primary objectives of Olympic education, which include fostering a spirit of friendship, fair play, and mutual respect (Olympic Charter, 2020).

The relevance of Olympic education in Kazakhstan stems from the growing recognition of the need to instill Olympic values among youth. Research findings highlight the significant role of Olympic education in fostering students' understanding of both the historical evolution and contemporary dynamics of the Olympic movement, thus enhancing their overall professional competence (Bulatova, Maria & Platonov, Vladimir, 2018, Theodorakis, Y., Georgiadis, K., & Hassandra, M., 2024). Moreover, the inclusion of Olympic education within the curriculum of higher education institutions has been shown to positively influence students' motivation toward participating in physical activities and competitive sports (Hakman, Anna & Galan, Yaroslav & Koshura, Andrew & Beshlei, Olga., 2021).

Currently, the effective widespread application of Olympic education is only possible when there are highly qualified professionals in the pedagogical field who possess the necessary knowledge, skills, and expertise to introduce individuals to the ideals and values of the Olympics, an area where Kazakhstan is still lacking. In this regard, it is essential to find effective ways to implement Olympic education and enhance literacy in this field for future physical education and sports specialists in Kazakhstan's higher educational institutions.

The issues of Olympic education have drawn the attention of many domestic and foreign scholars and practitioners (Bakhtiyarova, S., Kuderiyev, Z., Murzakhmetov, Y. [et al.], 2020). These topics are discussed at international sports congresses, scientific conferences, seminars, and research works. In Kazakhstan, the Kazakh Academy of Sports and Tourism regularly hosts International Scientific Congresses on "Olympic Sports and Sports for All," which are attended by scientists from many countries.

In historical data on Olympic education, the general sports movement, and Kazakhstan's role within it are presented. The author highlighted the need to revive scientific research on Olympic education and culture in Kazakhstan, specifically in the historical Olympic theme (Doskaraev, B.M., 2019).

V. Stolyarov (Stolyarov, V., 2019) drawing on extensive professional experience, developed and implemented his own conceptual framework for Olympic education. In his work, he critically analyzed the fundamental problems and common misconceptions observed in the theoretical and practical dimensions of pedagogical activity within Olympic education. He identified three core directions where significant misinterpretations tend to occur:

Olympic education is frequently interpreted too broadly, often being equated with any pedagogical initiative related to physical education and sports. This includes programs aimed at health promotion, physical development, fitness enhancement, and teaching sports techniques.

Another issue arises from a limited perspective on pedagogical efforts, where Olympic education is confined to familiarizing youth with the competitive aspects of sport. This narrow focus reduces Olympic education to the transmission of factual knowledge about the Olympic movement and Olympism, without deeper engagement.

A prevailing emphasis is placed on transferring knowledge about the historical background and current state of the sports movement. Although such information is valuable, Olympic education must also convey the core mission and values of Olympism, the philosophical ideas of Pierre de Coubertin, their relevance in modern contexts, and the strategies needed to sustain and promote these ideals. This also involves fostering an understanding of the humanistic essence of international sport and combating its negative manifestations.

Soldatenkov et al. (Soldatenkov, F.N., Abramov, R.V., Krestyannikov, A.S., & Chugaevskiy, E.V., 2019) studied the potential of using Olympic education as a tool for promoting physical fitness and a healthy lifestyle. They explored various forms of working

with children, such as activities in the form of Olympic expert's observations. After a series of events based on Olympic education tools, the results demonstrated a positive impact on children's enthusiasm for a healthy lifestyle.

Ovchinnikov et al. (Ovchinnikov, A.Y., & Efremenkov, K.N., 2015) conducted a comprehensive study on the use of multimedia technologies in Olympic education for students at higher educational institutions in the field of physical education. The author developed an advanced model of Olympic education for preparing physical education undergraduates, incorporating multimedia technologies. The research confirmed that this model could be applied in the educational process of higher professional institutions across various fields of study.

In recent times, German researchers have been actively engaged in exploring various dimensions of Olympic education, focusing on its conceptual foundations, thematic scope, and the diverse approaches used in its pedagogical application. According to Rychtecky (Rychtecky, A., 2017), there is a noticeable rise in attention toward the practical outcomes of Olympic education in Germany, supported by in-depth evaluations conducted by the country's leading specialists.

Fioranzi et al. (Fioranzi, A, Florio, G., 2014) outlined two distinct approaches to the advancement of Olympic education in general education schools in New Zealand. The first approach involves presenting the history and current state of the Olympic Games in conjunction with content that may not correspond to factual information, numerical data, or the academic goals outlined in school curricula. The second approach views Olympic ideals and values as integral to shaping students' life principles through physical education and sport.

While Kazakhstani scholars have emphasized historical and cultural aspects of Olympism, international literature increasingly addresses technological innovations and cross-cultural pedagogical models. This contrast reveals the need for Kazakhstan to integrate global best practices into local educational strategies.

General provisions

A healthy lifestyle is the main element of modern man's culture. In our modern world, such tasks of physical education of young people as strengthening and preserving health, forming healthy lifestyle skills are relevant. The effectiveness of solving these tasks directly depends on the degree of development of each person's personal attitude to their health. Understanding and awareness of the phenomena of health and a healthy lifestyle form the foundation on which human behavior should be built. A healthy lifestyle of a student is determined by the value orientations, worldview, moral and social experience. Self-confidence, well-being, strong-willed stability - all these are signs of a student's psychological health.

Materials and Methods

Research Design

This study employed a mixed-methods approach, integrating both qualitative and quantitative research methodologies to assess the implementation of Olympic education in university settings. The research was structured in two main phases: (1) a survey-based assessment of students' knowledge of Olympic education and (2) an experimental intervention involving the introduction of an Olympic education course.

Participants

The study involved 225 third-year students enrolled in Physical Education and Sports programs across three higher education institutions in Kazakhstan: K. Zhubanov Aktobe Regional University (ARU) (n = 73); Kh. Dosmukhamedov Atyrau University (AU) (n = 75); M. Utemisov West Kazakhstan University (WKU) (n = 77). Participants were selected based

on their enrollment in physical education programs, ensuring that the study targeted future specialists in the field.

Data Collection Methods

A structured questionnaire was developed to assess students' knowledge of Olympic history, values, and Kazakhstan's role in the Olympic movement. The survey included multiple-choice and open-ended questions covering three thematic blocks: Ancient Olympic Games, the modern Olympic movement, Kazakhstan's participation in the Olympics. Data were collected through an online survey platform and in-person sessions at participating universities.

Experimental Study

Two groups were formed at M. Utemisov West Kazakhstan University: Experimental Group (n = 30): Received an intensive Olympic education intervention. Control Group (n = 30): Followed the standard university curriculum without additional Olympic education components.

The intervention consisted of: 15-hour theoretical course on Olympic values and history; 15 hours of interactive learning, including quizzes and role-playing games; 15 hours of guided independent work, such as Olympic crosswords and research assignments; 45 hours of self-study, including literature review and group discussions.

Informed consent was obtained from all participants before data collection. The study adhered to university guidelines on research ethics, ensuring participant confidentiality and voluntary participation. Data were anonymized and securely stored to prevent unauthorized access. The study was conducted in three universities, which may limit the generalizability of findings to other regions.

The intervention was limited to one semester; long-term impacts of Olympic education require further study.

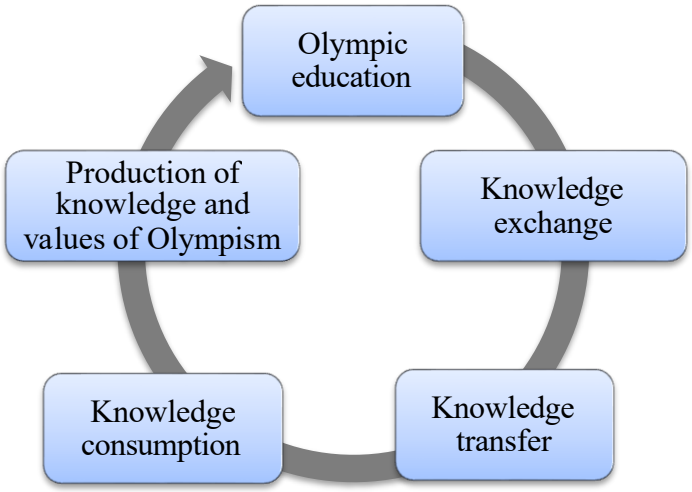
This methodological approach ensured a comprehensive assessment of Olympic education literacy among future sports professionals while testing an innovative educational intervention to enhance their knowledge and engagement with Olympic values.

The necessity of enhancing and renewing Olympic education within pedagogical practice is affirmed by the primary guiding document of the global sports movement—the Olympic Charter—as well as by the strategic objectives outlined by both International and National Olympic Committees. These sources underline the importance of supporting young people in Kazakhstan by facilitating access to sports education related to the Olympic Games, fostering the fundamental principles of Olympism, and integrating these values into the content of physical education programs in schools and higher education institutions.

Olympic education, as a systemic component, is realized through a pedagogical process that is humanistically structured. This process is designed to create meaningful opportunities for the youth and general population to internalize knowledge about Olympic values and ideals. The focus is on guiding individuals toward transforming their personal behavior into positive motivational drivers that promote and sustain a humanistic way of life.

The process of implementing Olympic education, as shown in Figure 1, can be represented in the form of the following stages.

Figure 1.
Stages of the implementation of Olympic education



In this regard, the need to educate children and adolescents through Olympic education tools and methods has become especially relevant due to the intensification of issues related to the humanization of life on Earth in the 21st century.

Olympic education is closely connected to stages such as knowledge exchange, knowledge transfer, knowledge consumption, and the dissemination of knowledge and Olympic values.

As a result, Olympic education has increasingly become the subject of active scientific research, as the necessity of developing the Olympic movement for the humanization of society has been recognized internationally. This highlights the need to seek new, unconventional educational sources that promote universal moral and spiritual values.

Research results

To prove the hypothesis that the presence of Olympic knowledge in physical education and sports specialists directly affects their ability to implement Olympic literacy in pedagogical practice, we conducted a survey aimed at determining the level of literacy called "The Formation Level of the Olympic Knowledge System" among students majoring in Physical education and sports.

A total of 225 students from the 3rd year of physical education and sports programs participated in the survey. Among them, 73 students were from the K. Zhubanov Aktobe Regional University (ARU), 75 students from the Kh. Dosmukhamedov Atyrau University (AU), and 77 students from M. Utemisov West Kazakhstan University (WKU).

Table 1 presents the results of correct responses in determining the formation of Olympic knowledge literacy among students majoring in Physical education and sports.

Table 1.
Formation of the literacy of Olympic education of students of the specialty Physical Culture and sports, %

№	Questions	Name of higher education institutions		
		WKU, n=77	AU, n=75	ARU, n=73
1	Show the first Olympic champion of independent Kazakhstan	62,9	62,67	65,8
2	Mark in what sports Zh. Ushkempirov, Sh. Serikov became champions of the Olympic Games	95,7	86,67	86,3
3	Mark from what year Kazakhstan began to participate in the Summer Olympics as an independent state	46,6	46,67	57,7
4	Specify in which Olympic Games B. Sattarkhanov, E. Ibraimov, and O. Shishigina became champions	85,2	74, 6	86,3
5	Mark the first boxing champion of independent Kazakhstan to win the Val Barker Cup	45,2	62, 6	63
6	Show the first athlete of Kazakhstan to win a gold medal in swimming	87,8	96	91,8

Based on the analysis of the survey results, the need for specialized education in the field of Olympic education was identified. This is because only 70% of the students were able to correctly answer even the easiest questions, which they should have known. The total number of incorrect answers was 30%. In this regard, it can be concluded that future physical education and sports specialists do not possess sufficient knowledge in the issues of the Olympic movement and the meaning of sports and the Olympics. The reasons for this result can primarily be attributed to the insufficient information provided about the history and current state of the Olympic movement in the subjects taught at higher educational institutions specializing in physical education and sports.

Findings from the survey conducted among students specializing in physical education and sports, along with coaches from various disciplines, physical education instructors, and sports administrators, indicate that although young people show growing enthusiasm toward sports and the Olympic Games, their understanding of the ideals, values, and traditions of Olympism remains limited. This highlights the pressing need and relevance of implementing Olympic education to strengthen the Olympic movement and contribute to the broader advancement of society..

During the experiment, two groups were formed from third-year students of the Physical Education and Sports department of M. Utemisov West Kazakhstan University: a control group (30 students) and an experimental group (30 students).

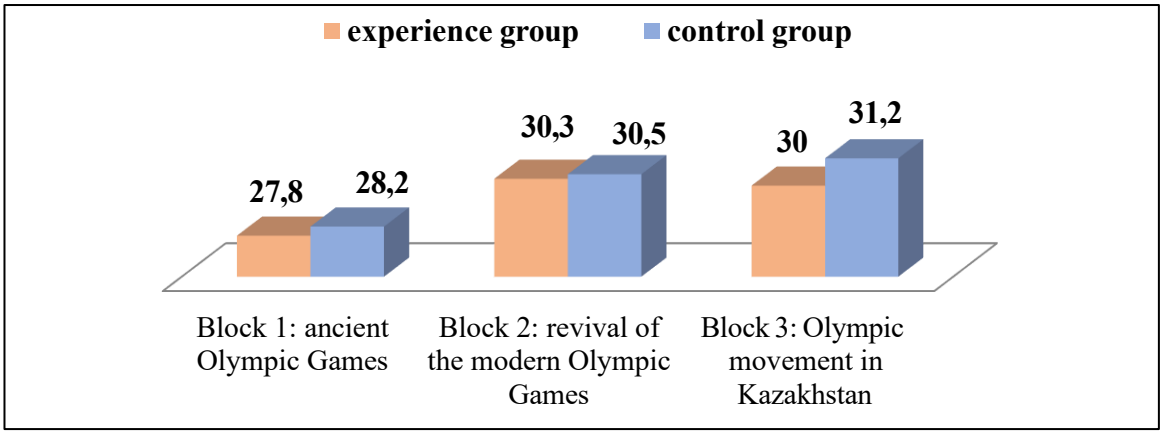
To prove the statement that a high level of Olympic education in physical education and sports specialists is a prerequisite for developing their Olympic literacy, we conducted an "Olympic Literacy" test for physical education and sports majors.

Prior to initiating the experiment, a diagnostic tool titled the "Olympic Literacy" test was created and administered to evaluate students' understanding of the Olympic movement. The test was structured into three thematic sections: the first section addressed topics concerning the Ancient Olympic Games, the second explored the restoration of the Modern Olympic Games, and the third examined the progression of the Olympic movement in Kazakhstan. Each section comprised 30 questions, making a total of 90 questions, all aimed at assessing the students' level of Olympic literacy.

Figure 2 shows the comparative results of physical education and sports major students' "Olympic Literacy" test before the experiment.

Figure 2.

Comparative pre-test results of students' Olympic literacy (points represent correct responses in three thematic blocks of the literacy test).



In this regard, the results of the test aimed at determining the Olympic education literacy of physical education and sports major students indicate that the formation of their Olympic literacy requires a formative experiment.

In light of this, we will elaborate on the content and methodology of the elective course we developed, which is aimed at forming Olympic education literacy in physical education and sports specialists.

The experimental group studied according to the author's methodology, which we designed to improve Olympic education, while the control group followed the generally accepted methodology in higher education institutions. The content of the author's methodology included: a 15-hour theoretical course covering the theoretical base of Olympic education; 15 hours of intellectual games such as "Olympic Cell," "Olympic Primer," and "Olympic Lessons;" 15 hours of independent work under the guidance of the instructor (IWS), during which Olympic crosswords were solved and Olympic quizzes were held; 45 hours of student's independent work (SIW), where tasks on Olympic terminology were checked, round tables and role-playing games were organized.

Discussion

The primary objective of the "Olympic Education" course is to provide students with a solid foundation of knowledge about Olympism, the Olympic movement, and the Olympic Games, enabling them to integrate these concepts into their future professional teaching practices. As future educators, students will work toward developing a level of understanding that supports the enhancement of public perception regarding Olympism and the Olympic movement, while also facilitating the spread of its humanistic values within society. This educational approach aims to cultivate virtuous character traits among young people, inspire a commitment to balanced physical development, and promote both physical fitness and spiritual growth.

The objectives of the course are as follows:

- To establish solid and deep knowledge among students about the Olympic Games, the Olympic movement, their history, the goals, objectives, ideals, and values of Olympism, general humanism, and the humanistic potential of sport.

- To equip students with the knowledge that will help foster children's and youth's interest in sports and physical activities, their enthusiasm for the Olympic Games and the Olympic movement, and their aspiration to implement humanistic values through sport in their future professional practices.

As outlined in the course syllabus for "Olympic Education," we structured the content into 3 modules. The first module is titled "The Origin of the Olympic Games in Ancient Greece," the second module is "The Revival of the Modern Olympic Games and the Olympic Movement in Kazakhstan," and the third module is "Spreading Olympic Education to Children and Youth (Preschool, School, and Higher Education)."

Based on this, during seminar classes, we developed the intellectual game "Olympic Cell" as a teaching method. Well-organized intellectual games help create a conducive emotional atmosphere for learning and establish psychological connections between all participants. In the game setting, students' intellectual efforts are engaged. The types of group work help students develop communication skills and also foster teamwork, mutual understanding, and the ability to recognize the value of each team member, which are skills that require time to cultivate.

In the "Olympic Cell" intellectual game, the student begins by selecting one of the cells displayed on the game slide with the "Olympic Topics" and a point value. The questions are designed so that each corresponds to a specific topic of the game. Five topics are offered for the game. The point values range from 10 to 50. The higher the point value, the more difficult the question.

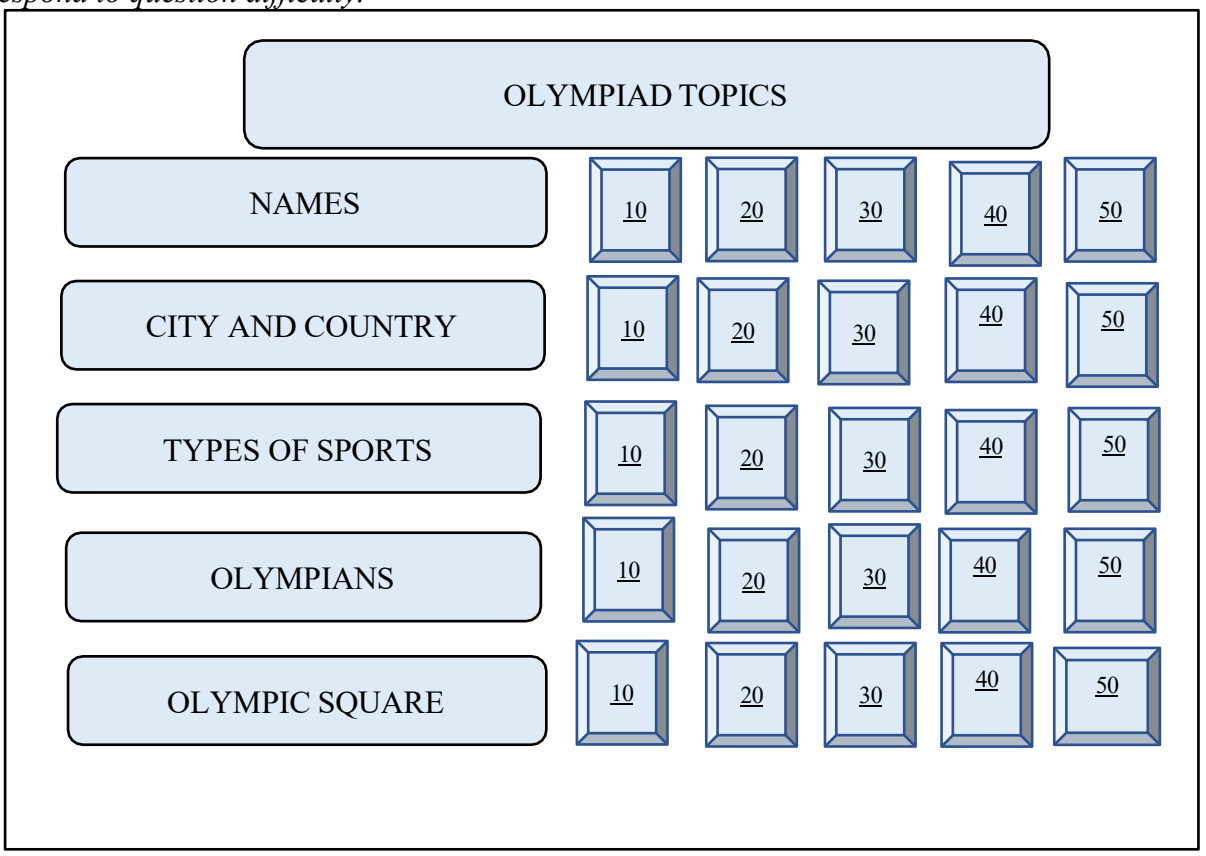
The game continues until all the questions have been played. The game is organized in the following ways:

a) Head-to-head game (between students)

b) Team game (students are divided into two teams). If one team gives an incorrect answer, the other team gets the opportunity to respond. The team with the most points is considered the winner.

Figure 3.

Example screenshot of the interactive game "Olympic Cell," showing how point values correspond to question difficulty.

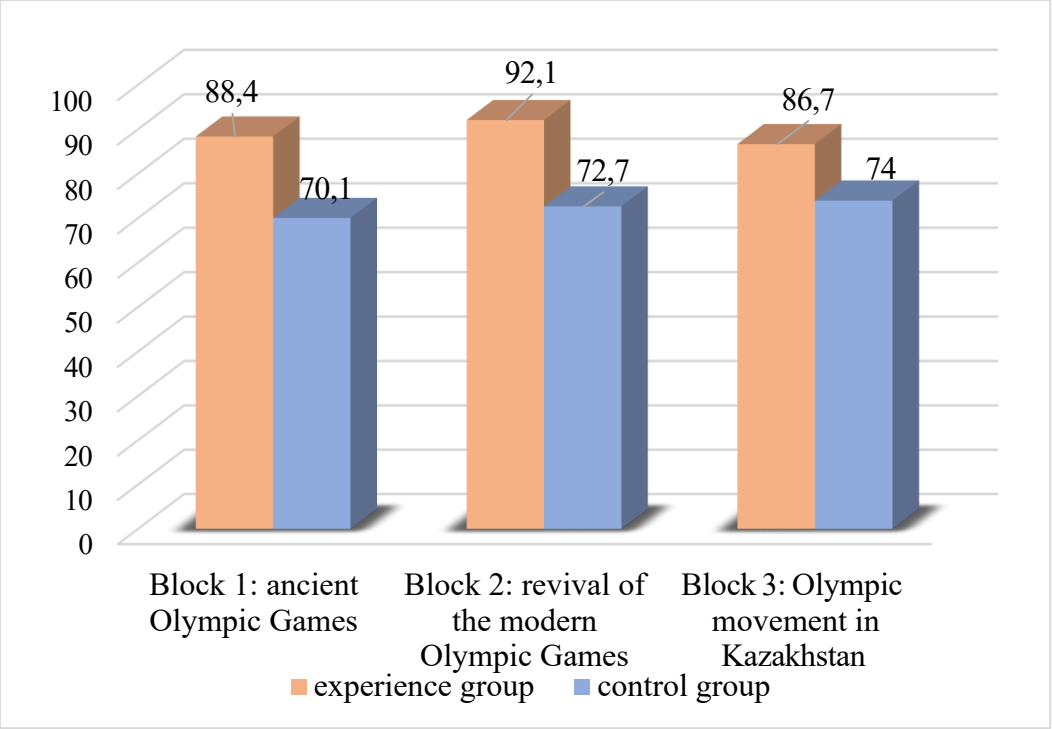


Thus, in order to equip students with the necessary competencies, we implemented a number of active and interactive methods, along with business games conducted during practical classes.

This is illustrated in Figure 4, which demonstrates how the methodology for improving Olympic education influences the enhancement of Olympic knowledge in training specialists in physical education and sports. This is achieved by including the elective course "Olympic Education" in the curriculum.

Figure 4.

Post-test comparison of control vs. experimental groups; points indicate mean scores out of 90 questions.



Our intervention aligns with findings from Germany, where structured Olympic education programs enhanced students' understanding of Olympism (Rychtecky, 2017), and from New Zealand, where values-based approaches improved student engagement (Fioranzi & Florio, 2014). This suggests that the Kazakhstani case adds valuable evidence from Central Asia to the global discussion on Olympic literacy in higher education.

Summarizing the results of the "Olympic Literacy" test, it can be concluded that mastering the elective course "Olympic Education" significantly improved the knowledge volume and quality in the experimental group compared to the control group. This provides solid grounds to affirm its positive impact on the level of literacy and knowledge in the field of the Olympic movement.

Conclusions

Currently, it can be stated that organizing a unified, multi-level system of Olympic literacy in the training of physical education and sports specialists is a justified approach. Thus, the development of Olympic literacy is structurally feasible and has the potential to encompass

all educational institutions in Kazakhstan. Furthermore, the use of Olympic education tools provides a tangible opportunity to educate and nurture the younger generation in the spirit of true Olympic values — respect, friendship, and the pursuit of excellence.

At present, it is possible to create a unified system of Olympic education for future physical education and sports specialists by enhancing Olympic education and continuing its practical implementation at the preschool, general, and higher education levels. Thus, if a practice based on the three main stages of education is established in our country, it should be emphasized that this will lead to an increase in the Olympic literacy of the younger generation and the formation of a unified system of Olympic education.

To enhance the Olympic literacy of future physical education and sports specialists, we have proposed the following recommendations:

1. The subject "Olympic Education", which serves as a key component in providing a fundamental understanding of Olympism, should be included in the curriculum of the "Physical Education and Sports" educational program as part of the basic or specialized disciplines cycle.
2. Active and interactive teaching methods should be employed within the framework of the "Olympic Education" course. These include Olympic literacy testing, Olympic crossword puzzles, Olympic quizzes, Olympic dictionaries, Olympic lessons, masterclasses with specialists in the field of the Olympic movement, as well as role-playing and intellectual games (e.g., "Olympic Alphabet," "Olympic Cell"). These methods contribute to the successful development of a systematic knowledge base for students specializing in physical education and sports.
3. To enhance the Olympic literacy of future physical education and sports specialists, it is essential to provide electronic textbooks on the topic of the Olympic Games, sports-related films, audio materials, and computer-based tools. Additionally, it is necessary to intensify scientific research and project work on issues related to Olympic education. A dedicated section on Olympic topics should also be included in the "Theory and Methods of Physical Education" scientific-theoretical journal.

Currently, the implementation of a comprehensive, multi-tiered Olympic education system in the preparation of future professionals in physical education and sports is seen as a well-founded and effective strategy. From a structural perspective, establishing such a system is both achievable and capable of being integrated across all levels of educational institutions in Kazakhstan. In addition, incorporating Olympic education methodologies offers a tangible means to instill core Olympic principles such as respect, friendship, and striving for excellence into the upbringing of younger generations.

Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

Author Contributions

Bakhtiyarova Sayagul: Conceptualization, Methodology; Kenzhin Zhaxat: Data curation, Writing- Original draft preparation; Kassenov Khanat: Visualization, Investigation; Khanat Kassenov: Supervision; Khazhgaliyeva Gulnar: Validation; Turginbayeva Aitolkyn: Writing- Reviewing and Editing.

References

Bakhtiyarova, S., Ali, Z., Nurbagi, S.., Baitlessova, N.., & Yergaliyev, A. (2021). The role of discipline "Olympic Education" in training specialists of "Physical Culture and Sport" in

Kazakhstan. Cypriot Journal of Educational Sciences, 16(6), 3196–3212. https://doi.org/10.18844/cjes.v16i6.6536.

Bulatova, Maria & Platonov, Vladimir. (2018). Olympism and the Olympic education: history, modernity, future. Science in Olympic Sport. 4-27. 10.32652/olympic2018.4_1.

Theodorakis, Y., Georgiadis, K., & Hassandra, M. (2024). Evolution of the Olympic Movement: Adapting to Contemporary Global Challenges. Social Sciences, 13(7), 326. https://doi.org/10.3390/socsci13070326.

Hakman, Anna & Galan, Yaroslav & Koshura, Andrew & Beshlei, Olga. (2021). INTRODUCING OLYMPIC EDUCATION AS A MEANS OF INCREASING MOTIVATION AND ENGAGEMENT OF 5- 14 YEARS OLD CHILDREN IN PHYSICAL EDUCATION AND SPORT. Scientific journal of National Pedagogical Dragomanov University Series 14 Theory and methodology of arts education. 132. 9-12. 10.31392/NPU-nc.series.

Bakhtiyarova, S., Kuderiyev, Z., Murzakhmetov, Y. [et al.].(2020). Olympic education as one of the priority areas of physical education and sports specialists. Journal of Physical Education and Sport.– Vol. 20, № 1, P. 273-279..

Doskaraev, B.M. (2019). Essays on the history of Olympic education and sports in Kazakhstan: A textbook. / B.M. Doskaraev, E.K. Seysenbekov, E.T. Altynbek. – Almaty: KazAST 400 p.

Stolyarov, V. (2019). The concept of Olympic education (many years of experience in development and implementation in practice) / V. Stolyarov. // Science in Olympic Sports. – No. S3. – Pp. 112-117.

Soldatenkov, F.N., Abramov, R.V., Krestyannikov, A.S., & Chugaevskiy, E.V. (2019). The paradigm of Olympic education in the context of competitive activity as a factor in increasing motivation for physical culture and a healthy lifestyle // Vestnik of Surgut State Pedagogical University. – No. 3(60). – P. 227-232.

Ovchinnikov, A.Y., & Efremenkov, K.N. (2015). Multimedia technologies in Olympic education for students of higher educational institutions of physical culture. Scientific notes of the University. P.F. Lesgaft, No. 11(129), pp. 208-211.

Rychtecky, A. (2017). Czech Republic: teaching Olympic education and education through sport. In: Naul R, Binder D, Rychtecky A, Culpan I, editors. Olympic education: an international review. New York: Taylor & Francis. P. 47-60.

Fioranzi, A, Florio, G. (2014). Analysis of the Olympic ideals applied to the World of business 2010 winners. In: Chatziefstathiou D, Muller N, editors. Olympism, Olympic education and learning legacies. Newcastle upon Tyne: Cambridge scholars Publishing; P. 260-267.

Olympic Charter (July 17, 2020). https://olympteka.ru/olymp/ioc/document.html.

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DEFINING THE LINGUISTIC MEANS OF SCIENTIFIC AND TECHNICAL COMMUNICATION IN THE TRAINING OF ENGINEERS

Abstract. Changes in the higher education system predetermine the need for scientific understanding of the process of scientific and professional activities formation, which play a key role in the development of knowledge, innovation and solving complex problems in the field of science and technology. The article examines the problem of scientific training of engineers, which lies in the need to substantiate and develop technology for the formation of scientific and professional competence of technical university students in the process of teaching the scientific language, that is, teaching scientific communication in engineering. The authors presented research of scientific and linguistic system of technical personnel training through a theoretical review of foreign experience in order to determine key linguistic means of scientific and technical communication and a questionnaire survey to assess the applicability of linguistic means of scientific discourse in the training of engineering and technical personnel.

The research has been carried out within the framework of the project funded by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan “Enhancing Scientific and Professional Language Learning for Engineering Students in Kazakhstan through Digital Technologies” (Grant No. AP19678460).

Keywords: linguistic means; scientific communication; training of engineers; theoretical review; questionnaire survey; data analysis.

Introduction

The role of language in scientific training cannot be overestimated. In an era of rapid information exchange and knowledge globalization, scientific language acquisition is no longer limited to mere linguistic knowledge. It is a dynamic tool for successful transmission of scientific ideas, an instrument of innovation and a catalyst for the development of cross-cultural communication in finding solutions to multifaceted global problems. Scientists have long recognized the need for precise terminology and clear expression to communicate complex ideas. As science has developed, the role of language has evolved, extending far beyond the traditional boundaries of journal articles and scientific conferences to embrace the vast digital sphere in which data is shared and international collaboration occurs.

The purpose of this research on the intensification of scientific training of technical specialists is to identify the role of language in the scientific training of future engineers and to determine linguistic means in the process of scientific and technical communication.

The conducted content analysis of the concepts “ linguistic means” and “scientific and technical communication” made it possible to determine their significance and relevance, and to consider foreign practice of using linguistic means in the process of scientific communication. According to Hyland (2011), language becomes a form of presentation of interpretations in the scientific genre, which requires adherence to certain patterns regarding the linguistic means. Language influences thinking because it offers cognitive means for developing mental shortcuts. Scientific texts are designed to convince readers of the knowledge underlying a research article or dissertation. To achieve these different goals, scientists tend to use the same repertoire of linguistic means over and over again (Hyland, 2011).

Researchers emphasize that linguistic means of formalizing scientific (professional) speech are designed to ensure accurate perception, recording and transmission of information exchanged between specialist communicators, since the linguistic component occupies an important place in the system of scientific communication. Written recording and transmission of scientific (special) information requires some work on the linguistic forms of its expression. The pattern of use of linguistic means in scientific texts is determined by a number of factors; the main ones being objectivity, accuracy, information content, and logic (Mikhaylenko, 2014, p. 78).

Currently, scientific communication is:

- a set of processes for transmitting and receiving scientific information in society, forming the main mechanism for the existence and development of science;
- means of popularizing the results of scientific activity and activating the processes of new knowledge exchange (Gladkova, 2009, p. 162);
- exchange of information between people involved in science professionally (Mikhaylenko, 2014, p. 80).

The means of scientific communication include all kinds of forms of exchange and dissemination of scientific information. Traditional (or classical) means of scientific communication are usually divided into formal, semi-formal and informal. Formal and semi-formal communications are documentary sources of information. These include, first of all, formal documents officially published in scientific publications: journal articles, collections of scientific papers, conference proceedings, monographs. Semi-formal documents are manuscripts, preprints, scientific reports, text messages, etc. (Gladkova, 2009, p. 162).

Successful scientific communication today largely depends on the level of information culture of scientists, researchers, teachers and students and on their ability to use the latest information and communication technologies (Talishinski, 2021, p. 113). Digital technologies significantly accelerate the development of society, enhance the role and importance of information and knowledge, transform knowledge into a direct creative force; expand and enrich information exchange channels; make the transition from book communication to multimedia and form modern models of scientific interaction.

According to linguists, a number of linguistic means contribute to the fulfillment of this requirement in scientific texts. Written documents of scientific nature are complex linguistic forms, the main purpose of which is to convey information to the reader (Mehler & Romary, 2012).

Methodology

To conduct the research, a combination of the following methods was used: 1) comparative analysis of foreign and domestic sources on linguistic means of scientific communication of technical specialists; 2) content analysis of the concept of “linguistic means” and “scientific communication”; 3) quantitative and qualitative methods of collecting information; 4) questionnaire survey for teachers and linguists of technical university to identify linguistic means of scientific and technical communication; 5) systematic analysis of the obtained data.

Analysis of the research problem

Scientific and technical communication is distinguished by its inherent characteristics, which can serve as an obstacle to understanding scientific and technical texts.

Technical documentation conveys information that readers must interpret unambiguously. Among the most important points to pay attention to in the field of scientific and technical communication is the clarity of documents of scientific nature (Mehler & Romary, 2012). The specialized terminology and jargon inherent in scientific and technical

communication can create barriers to effective communication. Also, cultural and linguistic diversity can complicate the process of translation and interdisciplinary discourse. Communicating complex concepts requires a delicate balance between accuracy and accessibility.

In technical and natural sciences, an unambiguous definition of terms is possible, which is associated with the designation of specifically observable, objectively existing processes and phenomena of the surrounding world. In fields such as engineering, medicine, and computer science, precise language is essential to convey important information. The definitions of such terms can be changed and clarified regarding the linguistic form of expression, however their content must remain unchanged, since this is what ensures the unambiguity of the term, its accuracy and information content (Mikhaylenko, 2014, p. 81).

Herbert (1999) divides terms into two categories: highly specialized terms, which usually have a very specialized meaning; “semi-scientific or semi-technical words having a range of meanings and often used idiomatically (for example, work, plant, load, feed, force).” Godman and Payne distinguish between two types of terms: technical terms and non-technical terms. Technical terms are those terms whose concepts are the same across all sciences, regardless of the language used. In each case, the properties of the characteristic can be enumerated to uniquely define the object. Non-technical terms are divided into general language terms (e.g. coordinators, subordinators, determiners, quantifiers) (Pearson, 1998).

Scientific and technical terminology, which, as Gredina (2010) writes, is the most mobile layer of vocabulary, subject to constant and active enrichment and change due to the scientific unification of the terminology of a particular field of knowledge.This is due to the fact that terminology develops taking into account new technologies and concepts, serves as a bridge for the transfer and expansion of knowledge from one generation of experts to another; accordingly, when new terms are introduced or existing ones are developed, the latest achievements and ideas in a certain scientific direction are reflected. In engineering, problem solving often involves identifying and analyzing specific components or processes in technical fields, creating new terms to describe new inventions and discoveries. Moreover, in interdisciplinary research, terminology acts as a common language that transcends the boundaries of individual fields. For example, this is especially valuable in fields such as bioinformatics, where biologists and computer scientists need to understand each other's work.

In scientific articles, accurate terminology is critical for peer review because terminological clarity ensures that reviewers can accurately evaluate methods and results. Reviewers rely on terminology to evaluate the validity and accuracy of research papers. Technical documents such as manuals, textbooks, instructions, guidelines rely heavily on terminology. For example, in the automotive industry, technical guidelines use standardized terminology to describe vehicle components, maintenance procedures, and repair instructions.

It should be noted that technical terminology may vary depending on language and culture. Accurate translation of technical terms can be challenging because not all concepts have direct meanings in other languages. This can create problems in international collaboration and dissemination of research.

Louis Anke (2013), in his study on the classification of different styles of terms definitions, gives high importance to definitions, which play an important role in the information age. The need to structure the information available on the Internet is obvious, since the volume of information is growing every day. Understanding the meaning of words can be achieved through the existence of glossaries or special dictionaries.

Therefore, as the first linguistic means of scientific and technical communication, we highlight terminology, which plays a fundamental role in technical fields by providing a standardized and precise language for defining concepts, processes and phenomena. This precise use of specific terms and definitions is critical to effective communication, knowledge

dissemination, and problem solving in technical fields.. Standardized terminology ensures that all technical experts understand and use the same language, which is especially important in interdisciplinary research and collaboration, where experts from different scientific fields need to communicate effectively, facilitating the exchange of information. Using specific terms and definitions makes communication easier, more effective, and allows to accurately diagnose the problem, develop the solution, and document the results.

Importantly, abbreviations and acronyms are concise and effective tools for representing complex concepts and various terminologies. In technical fields where accuracy is of utmost importance, abbreviations and acronyms help maintain clarity and consistency, establishing a standardized language for describing specific concepts or objects, reducing the risk of misinterpretation.

Technical documents and reports often contain repeated terms and phrases. Abbreviations and acronyms reduce redundancy and improve the readability of documents by highlighting key information. Students who are not familiar with specific acronyms and abbreviations used in technical fields may find the documents difficult to understand, which can limit the accessibility of research and information. When translating technical documentation into other languages, abbreviations and acronyms can be difficult to translate, as some of them may not have direct equivalents in other languages. Moreover, problems such as ambiguity and overuse must be effectively solved to maintain the readability and accessibility of scientific text.

Consequently, we have highlighted abbreviations and acronyms as a separate significant linguistic means of scientific and technical communication.

The next key linguistic means of scientific and technical communication are technical drawings and diagram**s** – tools used for academic and research purposes to visually represent complex concepts, projects, and research results. These graphical elements serve as an important means of conveying information, enhancing understanding, and promoting effective communication within and between different fields of science.

One of the fundamental roles of technical drawings and diagrams for academic and research purposes is to enhance the clarity of information presentation. These visuals help simplify complex concepts and structures, making them more accessible to a wider audience due to the ability to convey ideas, which greatly improves understanding. Technical drawings and diagrams serve as tools to facilitate understanding of a scientific field.

Taffesse and Cassa (2005) note that a drawing, a graphic representation of an object, is the result of the creative thought of an engineer or technician. When one person draws a rough provision card towards another, this is graphic communication. Drawings, photographs, slides, transparencies, and sketches are all forms of graphic communication. Any medium that uses a graphic image to convey a message, instructions, or idea is involved in graphic communication.

One of the most widely used forms of graphic communication is drawing. Technically, it can be defined as “a graphic representation of an idea, concept, or entity that actually or potentially exists in life.”

According to Taffassa and Kassa (2005), there are two main types of drawings: artistic drawings and technical drawings. A technical drawing is a means of clearly and concisely conveying all the information needed to bring an idea or concept into reality. Therefore, a technical drawing often contains more than just a graphic representation of the subject. It also contains dimensions, notes and specifications.

In research activities, technical drawings and diagrams play a crucial role in making abstract or theoretical concepts tangible. In mathematics, graphs and geometric diagrams are used to explain abstract mathematical concepts.

According to NASA’s Manual of Engineering Drawing Standards, technical drawings and diagrams must adhere to standardized conventions and rules. For example, technical

drawings comply with American Society of Mechanical Engineers (ASME) standards or International Organization for Standardization (ISO) standards. This compliance ensures consistency, accuracy and uniformity in the presentation of information (Scientific and Operational Requirements for TOMS Data, 1986).

Technical drawings and diagrams serve as vital links between diverse disciplines. Researchers from different backgrounds can use visuals as common reference points to understand and collaborate on complex projects. For example, in bioinformatics, diagrams depicting genetic sequences and protein structures facilitate collaboration between biologists and computer scientists. Such interdisciplinary collaboration is essential for the development of knowledge in new areas that require experience from different fields.

Technical drawings and diagrams are effective communication tools in academic and research contexts. During presentations, scientific articles, and research reports, these visuals complement textual content by breaking down complex details into easy-to-understand formats.

As part of international research collaborations, technical drawings and diagrams overcome language barriers. These visuals provide a universal communication tool that allows researchers with different linguistic backgrounds to collaborate effectively. This is especially important in today's globalized academic environment. This promotes inclusivity and allows researchers from different cultures to contribute to global knowledge.

Efficient presentation of numerical results, supplemented by well-designed graphs and tables is fundamental to scientific research. Numerical data provides the basis for scientific results. A clear and well-organized numerical presentation increases the interpretability of research results, allowing other researchers to understand, learn from, and build on the work. When numerical results are properly visualized, they help identify trends, patterns, and relationships that may not be immediately obvious from raw numbers alone. In this case, the numerical representation helps researchers identify correlations and draw valid conclusions.

Data collection and analysis provide the basis for decision making, verification, safety assessment, and performance assessment in scientific and technical research. According to generally accepted concepts of scientific discourse, the presentation, discussion and analysis of experimental data requires statistical calculations, in which mathematical or symbolic logic is used in scientific communication.Mathematical logic is based primarily on methods for constructing logical calculi based on a strict symbolic language, axiomatization and formalization.

Therefore, the following linguistic means has the significance of engineering data, which can be complex and multifaceted. Effective communication of engineering results is essential for collaboration and knowledge transfer. Numerical data provides the basis for documentation and reporting, allowing engineers to communicate their findings clearly and concisely, making them easier to analyze and interpret.

Citation of sources is an undeniable aspect of scientific research and contributes to greater openness of scientific publications, which has become our next linguistic means of scientific and technical communication.

Thomas Annesley (2011) interprets that proper citation allows researchers to show how their work builds on existing knowledge, providing context and credibility to their own findings. It also encourages further research and development of ideas. In a technical environment, the fundamental principles are verification of results and reproducibility of experiments. Proper citation provides necessary references for other researchers to verify the accuracy and validity of the work, replicate experiments, and develop existing knowledge.

According to Teresa Brochet (2009), standard citation styles such as APA and MLA were originally developed for other disciplines, they have also been adapted for use in technical texts.

Citation of sources serves as a mechanism for ensuring the quality of technical publications. Reviewers evaluate the accuracy and appropriateness of citations as part of the review process, ensuring the integrity of the research. As technical research becomes increasingly global, proper citation practice facilitate international collaboration. Researchers from different regions can more effectively understand and contribute to each other's work. For engineering researchers, proper citation of sources is a sign of professionalism. Citation of sources using standard technical citation styles is fundamental to scientific and professional communication and supports intellectual integrity. Researchers and teachers have a shared responsibility for prioritizing and promoting proper citation practice to ensure that the technical community continues to engage in ethical scientific and professional discourse.

Formal style of text in engineering science is one of the key components with the help of which researchers and scientists communicate their findings, methodologies and ideas. In the field of engineering, which covers disciplines such as physics, chemistry, computer science, and biology, the use of formal sentence structures and language is of paramount importance. Formal writing style provides a structure that enhances clarity and ensures that the intended message is accurately conveyed to a diverse audience of scholars and researchers.

Robert Goldbort (2006) notes that technical research often involves experiments and studies that need to be replicated for verification. Formal writing style provides the level of detail necessary for others to accurately reproduce the work, promoting the principles of the scientific method. Ambiguity is reduced by formal language. Each sentence has a clear interpretation, minimizing the risk of misunderstanding.

In engineering research, formal writing style is not just a stylistic choice; it is a means of ensuring clear and precise communication. This allows complex ideas to be conveyed accurately and objectively. Through structured organization of sentences and paragraphs, precise terminology, avoidance of ambiguity, and elimination of personal biases, formal writing style serves as a means of sharing knowledge, promoting the development of engineering.

An equally important component in the presentation and organization of research results is text structuring, which serves as a critical tool for increasing clarity, facilitating navigation and effectively communicating complex information. Structuring the text into sections and subsections provides a clear and organized structure. Often, complex technical documents can be lengthy. Structured text with headings and numbering helps readers navigate content efficiently, allowing them to quickly find the information they need. Structuring the text ensures a logical flow of ideas. This helps authors present their work in a systematic manner, making it easier for readers to follow the narrative.

Structured text emphasizes key concepts and provides pointers to help readers understand the content. This helps highlight important information and maintain interaction. For example: a bold “Key Findings” heading signals the start of significant results. Subheadings such as “Discussion” and “Conclusion” guide readers through the analysis and summary of the research.

Technical content reports rely heavily on structured text to systematically document experiments, observations, and project results. Ranked engineering journals follow a structured format with sections for abstracts, introductions, methods, conclusions, discussions, and references. This promotes consistency and readability. Logical organization that allows for efficient scanning and highlights key points ensures that technical documents are accessible and understandable to a diverse audience of researchers, students, and experts.

Thus, logical text structuring is a key linguistic means of scientific and technical communication, since the construction of logical sequences of ideas and arguments of a scientific text is necessary for a convincing presentation of scientific conclusions. As Levitt et al. (2018) notice logical structure is the basis of a persuasive scientific argument. It ensures

that scientific findings are presented clearly, coherently and effectively. In addition, it is worth remembering that a logical structure not only serves to convey conclusions, but also deepens one's own understanding of research, making it a fundamental component of scientific research and communication.

In scientific research and communication, constructing logical arguments and coherently organizing ideas is paramount to effectively presenting results. A logically structured research paper enhances the credibility of scientific results by demonstrating that conclusions are based on a systematic and rigorous approach, thereby increasing their credibility.

The use of specific expressions and vocabulary characteristic of the scientific style is a key requirement. This specialized language serves several important functions, including conveying precision, objectivity, and a systematic approach to research and analysis. Academic expressions integrate the research process and its results, demonstrating a commitment to systematic research and analysis, for example: “According to our research, the hypothesis was confirmed.”

For example, a phrase such as “According to research”: used to attribute conclusions or statements to previously conducted research. Example: “According to nanotechnology research, the properties of nanoscale materials are significantly different from bulk materials.”

In summary, it is necessary to emphasize the importance of using academic expressions and scientific vocabulary as an integral part of effective communication, accuracy, and maintaining a scientific tone. These expressions serve to emphasize the rigor of the research, objectivity, and systematic analysis. They are widely used in research papers, technical reports, scientific journals and educational materials, providing clear and authoritative presentation of information. The strategic use of these expressions not only enhances the credibility of technical discourse, but also promotes a culture of rigorous research and documentation within the scientific community.

In the field of engineering, maintaining high precision of grammar and punctuation is an important element to ensure clear and precise communication.

In technical sciences, where complex ideas and data are presented, precision in grammar and punctuation is critical to ensure that the message is conveyed clearly and comprehensively. Ambiguity or errors may interfere with understanding. Engineering research papers require precision in grammar and punctuation to accurately present methodologies, results, and conclusions. Ambiguities in language may lead to misinterpretation.

Maintaining high precision in the use of grammatical rules and punctuation to prevent ambiguity and misunderstanding in technical sciences is non-negotiable. Scholars and researchers must adhere to the highest standards of precision in grammar and punctuation to ensure their work is accessible, credible, and effective. Researchers Bajaj et al. (2023) write about the purity of scientific text in terms of precision grammar.

Thus, the analysis of scientific literature made it possible to identify nine key linguistic means of scientific and technical communication: terminology, abbreviations and acronyms, technical drawings and diagrams, engineering data (numbers, formulas, etc.), citation, formal style of communication, logical text structuring, academic expressions and vocabulary, precision grammar and punctuation.

Results and discussion

Linguistic means play an important role in scientific and technical communication. They are the main tool for transmitting scientific and technical knowledge, as well as a way of expressing and structuring thoughts and ideas in oral and written scientific communication. Correct use of linguistic means establishes a clear and understandable connection between the author and the reader, facilitating the process of transmitting scientific and technical information. In order to evaluate linguistic means of scientific and technical communication

used in practice (terminology, style, grammar, etc.) among teachers and linguists of a technical university, as well as to study the motives and reasons that influence the choice of certain linguistic means, the survey "Choice of linguistic means in scientific and technical communication" was conducted.

The survey assumes a rigidly fixed order, content and form of responses with the registration of respondents alone with themselves. This survey is classified according to the content and design of the questions asked. The survey questions have the following classification: -by content: a) the main questions formulated to obtain the necessary information about the subject of the study; b) control tests, the functional purpose of which is to verify the veracity of answers to basic questions, to clarify the information received. -by design: a) closed - the survey contains several possible answers. To answer a closed question, the respondent must mark the selected answer option (circle the corresponding number or simply emphasize the answer option); b) semi-closed - if answers are not provided as much as possible; d) Yes-No questions.

The assessment survey consists of five parts: 1. Social-demographical questions, which allow the classification of respondents in accordance with the specified characteristics; 2. General opinion on the quality of education; 3. Evaluation of written communication; 4. Evaluation of oral communication; 5. Additional comments and suggestions.

Part 1. 267 people took part in the survey, of which: 41.8% are senior teachers; 31.3% are teachers; 22.4% are associate professors; 3% are professors and 1.5% are heads of departments. Teachers from different educational organizations of Kazakhstan and abroad took part in the survey: Pan-European University (Bratislava, Slovakia), K.I. Satpayev Kazakh National Research Technical University, Abylkas Saginov Karaganda Technical University, Polytechnic College of the Kazakhmys Corporation, International Educational Corporation, Abai Kazakh National Pedagogical University, Buketov Karaganda University. Of the 267 respondents, 27.8% of respondents are Russian Language teachers, 47.8% are Foreign Language teachers, 24.4% of respondents are Kazakh Language teachers.

As a result of the survey on teaching experience, the following results were obtained: 58.2% of respondents have teaching experience of 20 years or more; 26.8% have 10 to 20 years of teaching experience; 9% have 5 to 10 years of teaching experience; 6% have up to 5 years of teaching experience.

Part 2. For the first part, "General opinion about the quality of training," respondents were asked to answer 10 questions. The diagrams below highlight the responses.

Figure 1

"What role do linguistic means play in scientific and technical communication?"

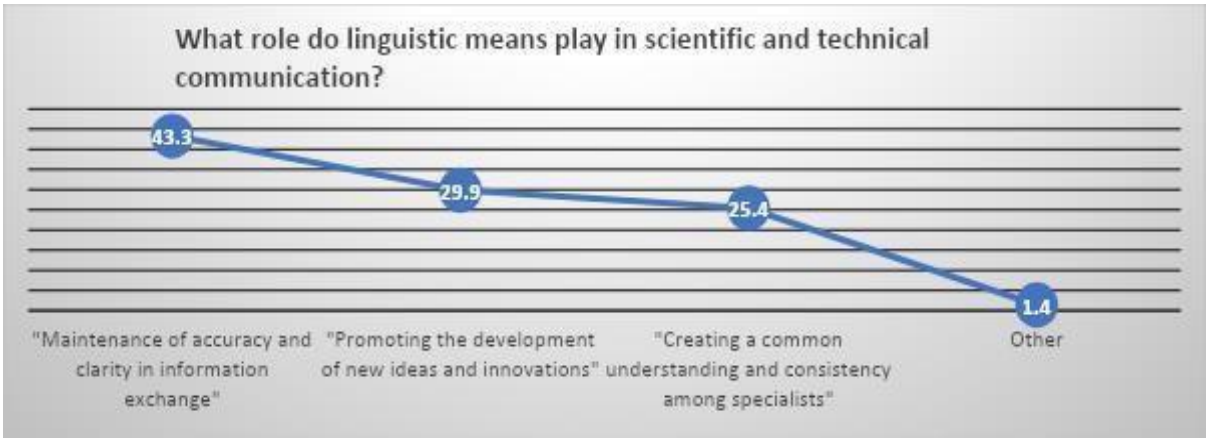
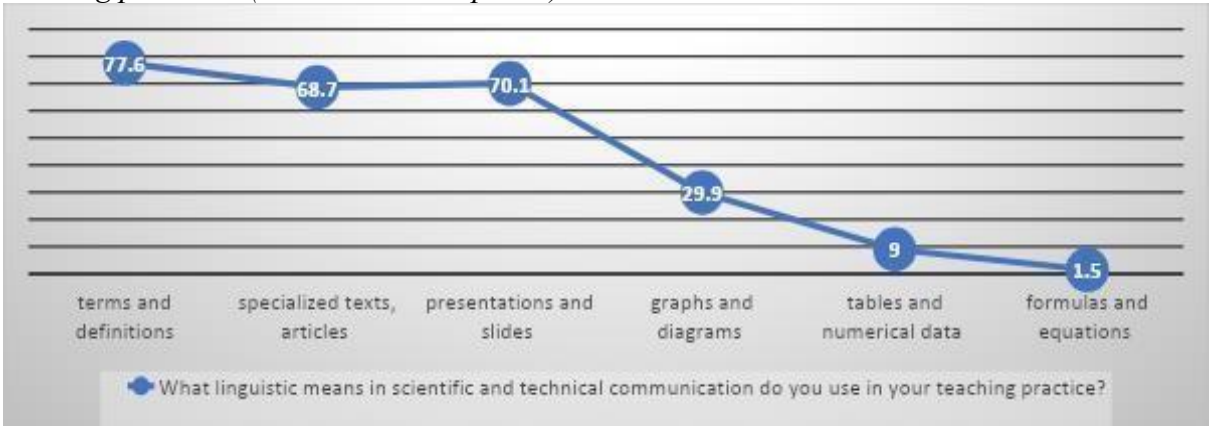


Figure 2

"What linguistic means in scientific and technical communication do you use in your teaching practice? (choose several options)"



Regarding the question "What methods and approaches do you use to help students understand and use linguistic means in scientific and technical communication? (choose several options)" respondents most often indicated the following answers: practical exercises and assignments - 80.6%, group classes and discussions - 70.1%, explanations and demonstrations - 62.7%, use of online resources and training programs - 46.3%. Much less frequently, respondents chose the answer "use of real examples and projects" – 25.4%, a possible reason for its low popularity may be the lack of available resources or materials for this approach. Additionally, some teachers may feel that using real examples and projects requires more time and effort to prepare and organize classes.

For the question "Do you consider it necessary to develop specialized educational materials or courses on linguistic means in scientific and technical communication?" the vast majority responded positively (98.5%).

Regarding the question "What modern technologies and online resources do you use or recommend to support linguistic means teaching in scientific and technical communication? (choose several options)" the following answers were received: electronic textbooks and resources – 89.6%, online courses and platforms – 52.2%, specialized programs and applications – 41.8%, virtual laboratories are used by only 3% of respondents. The reason for the low percentage of use of virtual laboratories may be the need for physical presence and access to specialized equipment to conduct experiments. Perhaps respondents prefer more traditional teaching methods and think that virtual labs cannot fully replace real-life experience. Additionally, virtual laboratories are not yet as widespread or accessible for use in scientific and technical communication.

For the question "Are you ready to participate in professional training or seminars to develop skills in linguistic means teaching in scientific and technical communication?" the majority of respondents answered that they are ready (89.6%) and only 10.4% of respondents answered negatively.

Figure 3

"Choose one or more challenges that you see in linguistic means teaching in scientific and technical communication"

For the question "On a scale from 1 to 5, rate the quality of linguistic means teaching in scientific and technical written communication (1 - very bad, 5 - excellent)" The reason for low grades may be ineffective teaching of linguistic means in scientific and technical written communication, lack of qualifications of teachers, lack of suitable educational materials, unsatisfactory level of student preparation.

Figure 4

On a scale from 1 to 5, rate the quality of linguistic means teaching in scientific and technical written communication (1 - very bad, 5 - excellent)"

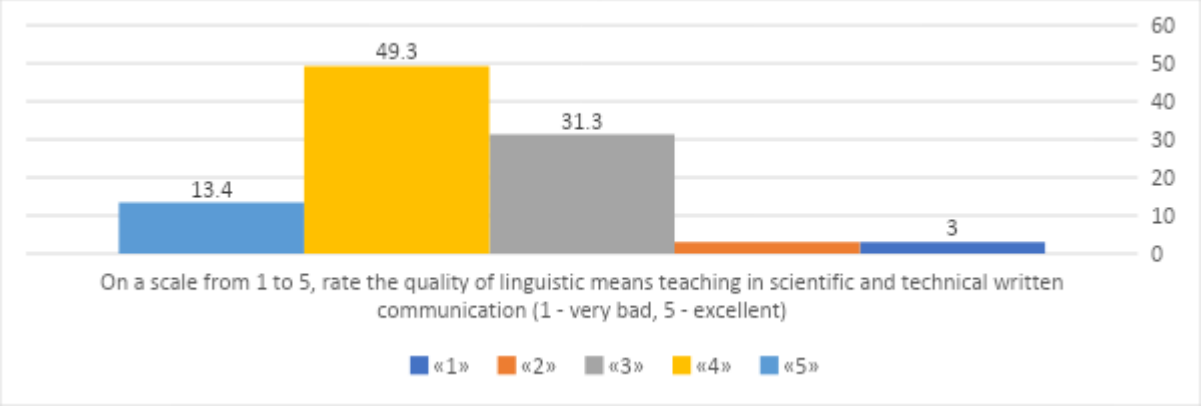
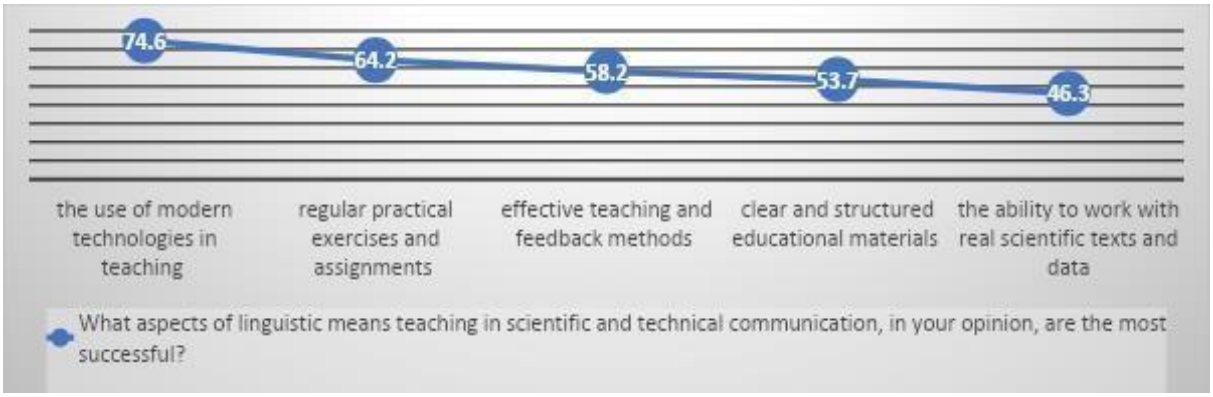


Figure 5

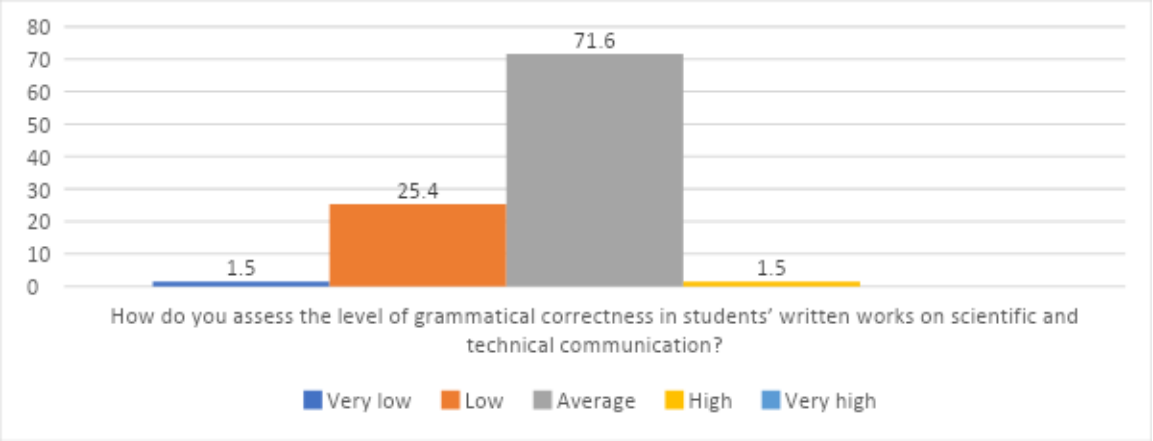
"*What aspects of linguistic means teaching in scientific and technical communication, in your opinion, are the most successful? (choose several options)"*



*Part 3***.** In the next section of questions, respondents were asked to assess written communication. Regarding the question "How do you assess the level of grammatical correctness in students' written works on scientific and technical communication?" the overwhelming majority of respondents (71.6%) think that the level of grammatical correctness in students' written works on scientific and technical communication is average. Lack of practice in written communication may be the reason for low level of grammatical correctness.

Figure 6

"How do you assess the level of grammatical correctness in students' written works on scientific and technical communication?"



For the question "Assess the level of clarity and consistency in the expression of ideas in students' written works", (diagram 5)the reasons for the low level of clarity and consistency in the expression of ideas in students' written works may be insufficient knowledge of the subject and the inability to structure and express their thoughts, as well as a lack of written expression skills. Most students do not have enough practice in writing essays, scientific articles and other types of written work.

Figure 7

"Assess the level of clarity and consistency in the expression of ideas in students' written work"

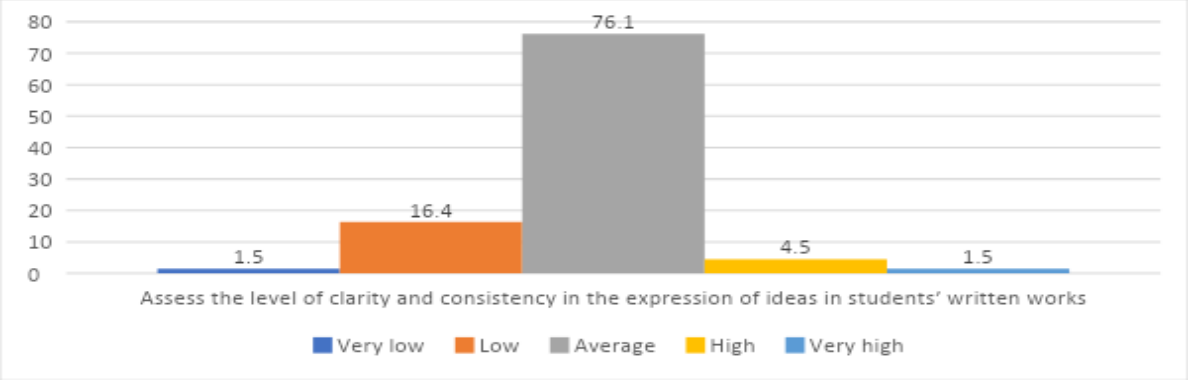
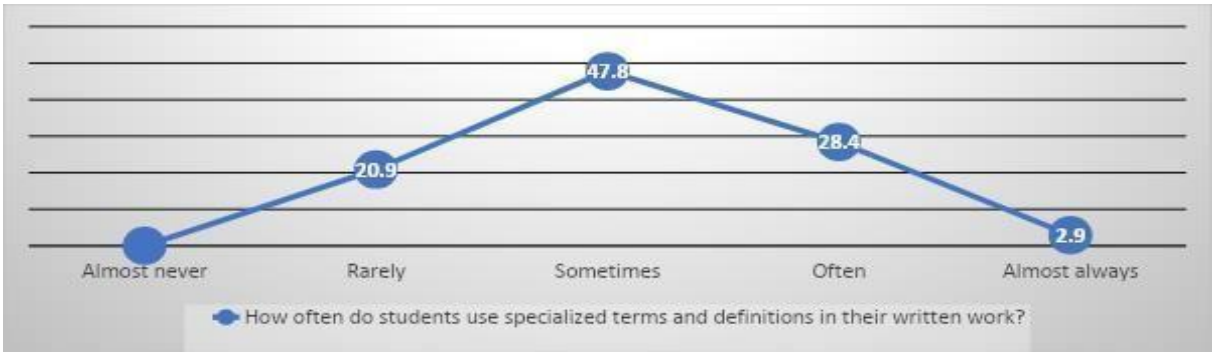


Figure 8

"How often do students use specialized terms and definitions in their written work?"



From the received answers, we can conclude that there is a low percentage of using terms in students' written work, which is most likely explained by the fact that students do not know the conceptual and scientific apparatus on the topic of written work and do not always understand the importance and significance of terminology in educational and scientific communication.

Figure 9

"What aspects of written communication, in your opinion, require more attention in teaching?" (choose several options)

Part 3. In the third section of questions, respondents were asked to assess oral communication. Regarding the question "How do you assess students' level of oral clarity and articulation in oral communication on scientific and technical subject?" 86.6% of respondents assess the level of students' oral clarity and articulation in oral communication on scientific and technical subject as average; 7.5% of respondents noted a high level of students' oral clarity and articulation in oral communication on scientific and technical subject, and only 6% of respondents chose the answers "low" and "very low" (4.5% and 1.5%, respectively). Insufficient level of qualitative oral expression among students is characterized by insufficient practice of oral speech in the language, passive vocabulary, including terminological vocabulary on specialisation, as well as insufficient level of motivation in reading scientific and specialised literature in the process of learning.

For the question "Assess the ability of students to express ideas in oral communication" the vast majority of respondents (79.1%) assessed the ability of students to express ideas in oral communication as average, 10.4% of respondents noted low ability of students to express ideas in oral communication, 9% of respondents noted high ability of students express ideas in oral communication and only 1.5% noted a very low ability of students to express ideas in oral communication. Expressing ideas in language, including scientific language, requires high level of proficiency in scientific style, which is characterized by the accuracy of transmitted information and accessibility of presentation, which is a difficult process for students. The average level in the questionnaire survey indicates the need to teach the scientific style of oral speech to technical students.

For the question "How often do students use specialized terms and definitions in their oral communication?" The low numbers of students using terms in oral communication indicates the importance of developing the improvement of professional scientific language.

Figure 10

"How often do students use specialized terms and definitions in their oral communication?"

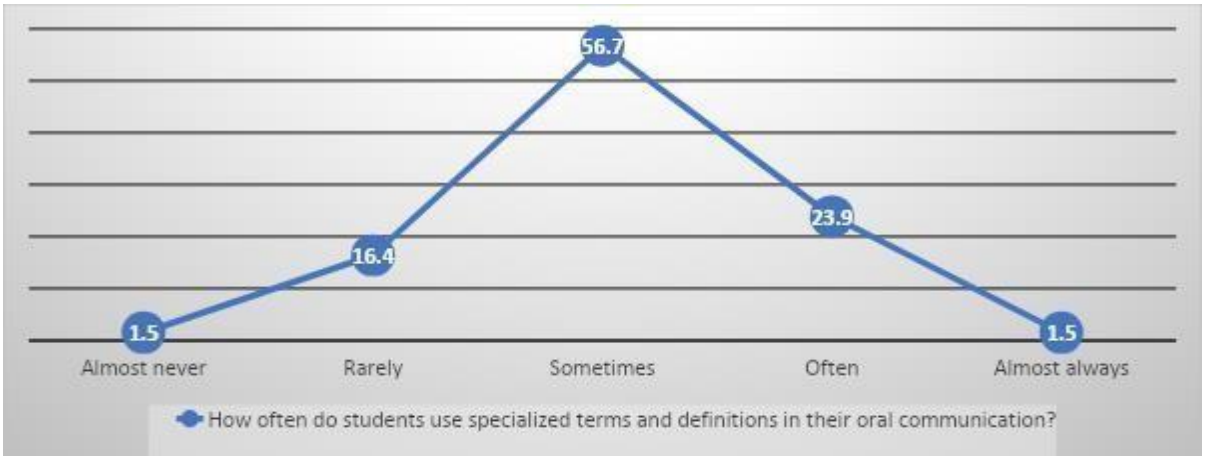
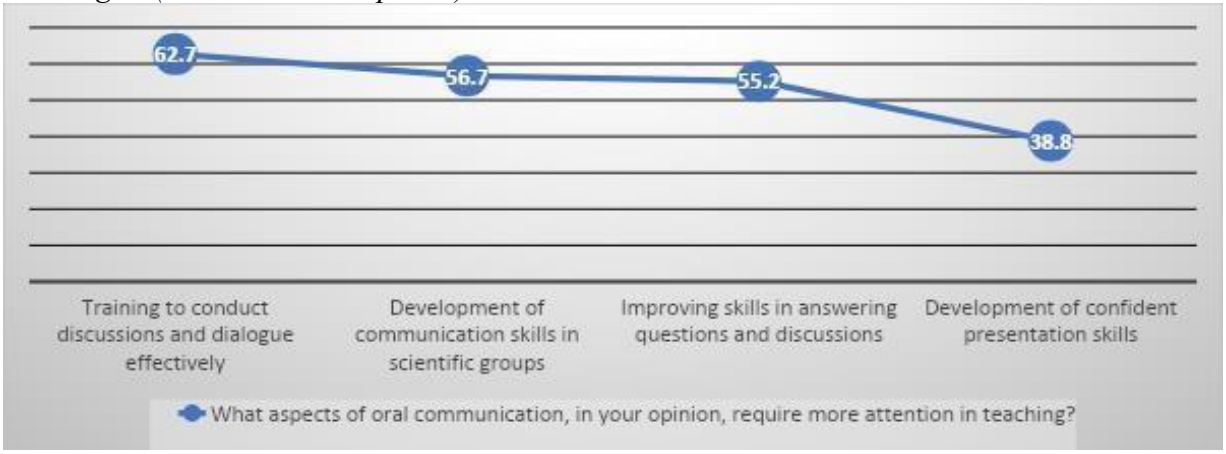


Figure 11

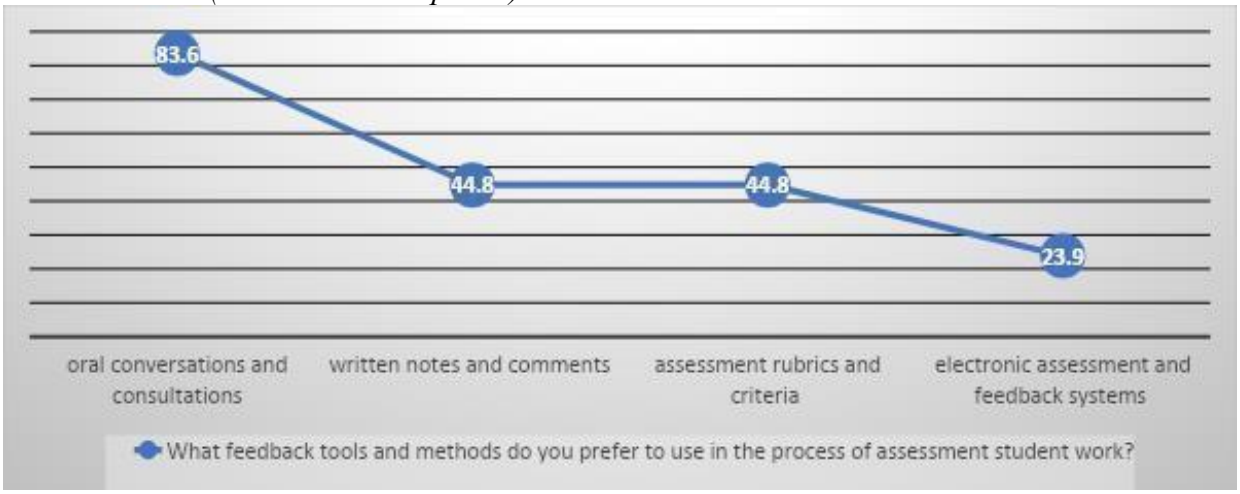
"What aspects of oral communication, in your opinion, require more attention in teaching?" (choose several options)



Part 4 "Feedback and support." For the questions "How often do you provide feedback to students on their written work?" and "How often do you provide feedback to students on their oral communication (for example, after presentations)?" the pattern of answers is almost identical. More than half of respondents (55.2%) responded that they often provide feedback to students on their written work and 52.2% - on oral communication, 37.3% almost always provide feedback to students on their written work and 46.3% - on oral communication, 6% of respondents responded that they sometimes provide feedback to students on their written work and 1.5% responded that they rarely provide feedback to students on their written and oral work.

Figure 12

"What feedback tools and methods do you prefer to use in the process of assessment student work?" (choose several options)



On the question "What changes or improvements in the system of feedback and student support would you suggest to improve the quality of linguistic means teaching in scientific and technical communication?" the majority of respondents agree with the importance and significance of the formation of language skills in scientific and technical discourse and accordingly suggest the development of a special training program on the level system of language teaching with an increase in the amount of hours for written and oral scientific communication.

In response to the final open ended part of the survey, asking for additional comments and suggestions, respondents made proposals to improve the system of teaching scientific communication, namely, to develop a unified electronic assessment and feedback system at the university; to form a group of students where they can discuss and interact within the framework of projects and learning activities; to improve methods of teaching specialized vocabulary and terms; to conduct scientific and technical seminars or webinars with foreign scientists; to introduce a feedback system in accordance with linguistic means of scientific and technical communication, including detailed records of scores and comments on each of the criteria; and to create interactive online resources that will help students practice and develop their language skills in scientific and technical communication.

In the context of the development of written scientific speech, there is an interest in optimizing the learning process through automated worksheets for written work, which will contribute to a deeper understanding of the student The development of skills in working with scientific literature remains open to the introduction of innovative methods in language teaching, and more practice in conducting open discussions and a mentoring system is also needed.

Respondents also noted the problem of teaching pronunciation, which is important in the process of any oral communication, and especially in scientific communication, which requires accuracy and clarity in the presentation of ideas. In this regard, the idea of regular assessment and organization of adequate feedback on work with the pronunciation of scientific and technical terminology and specialized vocabulary with the possibility of recording one's speech has been suggested.

And finally, for the development of oral scientific communication, a proposal was made to create discussion clubs by linguists together with production masters for discussing production situations and solutions to production problems. Such a tandem teaching method or the so-called co-teaching method with close communication with engineering and technical personnel will contribute to the intensification of the scientific language teaching process in technical fields.

Conclusion

The survey on the choice of linguistic means in scientific and technical communication in the training of engineers made it possible to assess what linguistic means of scientific communication are used by teachers and scientists, and to determine the degree of their use in written and oral speech in the training of engineers, as well as to establish preferences and motives of scientists and specialists in choosing linguistic means in the process of writing scientific and technical documentation.

According to the survey results, a generally average or insufficient level of proficiency in scientific communication can be traced, since according to teachers, students have difficulty in understanding specialized terms and definitions and have certain difficulties in expressing their ideas of a scientific and professional character in oral and written speech. The high need of students can be seen in improving scientific writing, namely the development of structuring scientific text and training in data analysis and interpretation.

To develop students' motivation for scientific activity, it is necessary to apply a variety of methods and approaches, including digital technologies with tracking the progress of students' academic performance, wide access to educational, professional and scientific resources, as well as a developed electronic feedback system to provide continuous qualitative assessment of students' knowledge.

These results will be used to develop recommendations for improving scientific and technical communication and providing more effective transfer of scientific information in the

training of engineers through the use of multi-factor SWOT analysis of questionnaire data and a theoretical review on the project research topic.

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Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

Author Contributions

Damira Jantassova: Data curation, Writing - Original draft preparation, Software, Supervision, Writing - Reviewing and Editing, Investigation, Project administration.

Zhuldyz Tentekbayeva: Conceptualization, Methodology, Resources.

Daniyel Damiyev: Validation, Formal analysis, Visualization.

References

Almazova, N. I., SHul'gina, E. M., Sidorenko, T. V., Serova, T. S., Salekhova, L. L., Baranova, T. A., Vdovina, E. K., Gal'skova, N. D., Krylov, E. G., Minakova, L. YU., Obdalova, O. A., & Rybushkina, S. V. (2018). Integrirovannoe obuchenie inostrannym yazykam i professional'nym disciplinam. Opyt rossijskih vuzov. Elib.spbstu.ru. https://elib.spbstu.ru/dl/2/id18-83.pdf/info

Anke, L. E. (2013). Classifying Different Definitional Styles for Different Users. Procedia - Social and Behavioral Sciences, 95, 267–275. https://doi.org/10.1016/j.sbspro.2013.10.647

Annesley, T. M. (2011). Giving Credit: Citations and References. Clinical Chemistry, 57(1), 14–17. https://doi.org/10.1373/clinchem.2010.158048

APA PsycNet. (n.d.). Psycnet.apa.org. https://psycnet.apa.org/fulltext/2018-00750-002.html

Bajaj, N., Rajwadi, M., Constance, T. G., Wall, J., Moniri, M., Laird, T., Woodruff, C., Laird, J., Glackin, C., & Cannings, N. (2023). Deception detection in conversations using the proximity of linguistic markers. Knowledge-Based Systems, 267, 110422. https://doi.org/10.1016/j.knosys.2023.110422

Beltukova, N.P. (2012). Formirovanie professional'no-orientirovannoj inoyazychnoj kommunikativnoj kompetencii u ekonomistov-bakalavrov. Uchrediteli: Nacional'nyj issledovatel'skij Tomskij gosudarstvennyj universitet https://elibrary.ru/ozlzyp

Bowden, P. R. (1999). Jennifer Pearson. Terms in Context. John Benjamins Publishing Co., Amsterdam. 1998. ISBN 90 272 2269 X (Eur.)/1 55619 342 (US). Natural Language Engineering, 5(4), 395–402. https://doi.org/10.1017/S135132490021231X

Brosche, T. A. M. (2009). Successful Online Learning: Managing the Online Learning Environment Efficiently and Effectively: Managing the Online Learning Environment Efficiently and Effectively. In Google Books. Jones & Bartlett Publishers. http://surl.li/qjkod

Dunaeva, A. S., & Vetchinova, M. N. (2014). Kul'turologicheskaya ideya koncepcii kommunikativnogo inoyazychnogo obrazovaniya. Yazyk i kul'tura, 3 (27)), 138-145.

Fuertes-Olivera, P., & Nielsen, S. (2011). The Dynamics of Terms in Accounting: What the construction of the accounting dictionaries reveals about metaphorical terms in culture-bound subject fields. Terminology, 17, 157-180. https://doi.org/10.1075/term.17.1.09fue

Gladkova, Z. V. (2009). Vidy kommunikacij v sovremennoj nauke. Nauchnyj vestnik Moskovskogo gosudarstvennogo tekhnicheskogo universiteta grazhdanskoj aviacii, (142), 161-163.

Goldbort, R. (2006). Writing for Science. In Google Books. Yale University Press. https://books.google.kz/books?hl=en&lr=&id=HuM1Dm9ejVoC&oi=fnd&pg=PR1&dq=27.%09Robert+Goldbort

Gredina, I.V. (2010). Koncepty nauchnogo diskursa. https://gtmarket.ru/concepts/scientific-concepts

Hyland, K. (2011). Continuum Companion to Discourse Analysis. In Google Books. Bloomsbury Publishing. https://clck.ru/38jvKW

Isakova, L. D. (2013). Lingvisticheskij aspekt nauchnoj kommunikacii. Kognitivno-diskursivnaya paradigma: teoriya i praktika. Tom 4 (664), Seriya «Yazykovedenie»

Kokenova, Z.K. (2012). Realizaciya pyati kompetencij v uchebnom processe po russkomu yazyku dlya studentov-medikov. Kazahskij nacional'nyj medicinskij universitet im. S. D. Asfendiyarova http://surl.li/qjmkl

Kondyurina, I. M. (2018). Obuchenie inoyazychnoj nauchnoj kommunikacii magistrov v neyazyko- vom vuze / I. M. Kondyurina, E. V. Grishina, V. V. Sheveleva. Sociokul'turnoe prostranstvo Rossii i zarubezh'ya: obshchestvo, obrazovanie, yazyk. Vypusk 7, 107—121 https://elar.rsvpu.ru/bitstream/123456789/30211/1/sprz_2018_7_15.pdf

Krutikhina, T. A., Antonov, E. V., & Ionkina, K. V. (2022). The fuzzy objects recognition in scientific and technical papers by means of natural languages processing technologies. Procedia Computer Science, 213, 656–665. https://doi.org/10.1016/j.procs.2022.11.118

Levitt, H. M., Bamberg, M., Creswell, J. W., Frost, D. M., Josselson, R., & Suárez-Orozco, C. (2018). Journal article reporting standards for qualitative primary, qualitative meta-analytic, and mixed methods research in psychology: The APA Publications and Communications Board task force report. American Psychologist, 73(1), 26–46. https://doi.org/10.1037/amp0000151

Mehler, A., & Romary, L. (2012). Handbook of Technical Communication. In Google Books. Walter de Gruyter. http://surl.li/qjlgs

Mikhaylenko, T. D. (2014). Yazykovye aspekty nauchnoy kommunikatsii. Vestnik Rossiyskoy tamozhennoy akademii, 78–83. https://cyberleninka.ru/article/n/yazykovye-aspekty-nauchnoy-kommunikatsii

Mikhaylova, G. I. (2016). Znachimost' yazykovoj kompetentnosti v kontekste professional'noj kompetencii budushchego specialista. Gramota. No 7(61): in 3 parts. Part 1, 192-195. http://www.gramota.net/materials/2/2016/7-1/58.html

M. Jimmie Killingsworth, & Gilbertson, M. K. (2018). Signs, Genres, and Communities in Technical Communication. In Routledge eBooks. https://doi.org/10.4324/9781315223728

Osiyanova, O.M. (2009). Kul'tura rechevogo obshcheniya prepodavatelya kak resurs povysheniya kachestva podgotovki specialista. Dinamika nauchnyh issledovanij, 6. http://www.rusnauka.com/21_DNIS_2009/Pedagogica/49364.doc.htm

Samoylenko, S. G. (2019). Yazykovaya podgotovka kak sostavlyayushchaya sovremennoj strategii professional'noj podgotovki inzhenernyh kadrov. Vestnik Surgutskogo gosudarstvennogo pedagogicheskogo universiteta, 3(60), 171-176. https://cyberleninka.ru/article/n/yazykovaya-podgotovka-kak-sostavlyayuschaya-sovremennoy-strategii-professionalnoy-podgotovki-inzhenernyh-kadrov

Shirokanova, A. A. (2013) Novaya rol' i formy nauchnoj kommunikacii v informacionnuyu epohu https://elib.bsu.by/bitstream/123456789/91941/1/103-116.pdf

Scientific and Operational Requirements for TOMS Data: Proceedings of a Conference Held at NASA Goddard Space Flight Center, Greenbelt, Maryland, September 10-11, 1986. In Google Books. National Aeronautics and Space Administration, Scientific and Technical Information Division. http://surl.li/qjkjc

Taffesse, W., & Kassa, L. (2005). In collaboration with the Ethiopia Public Health Training Initiative, The Carter Center, the Ethiopia Ministry of Health, and. http://sv.20file.org/up1/1112_0.pdf

Talishinski E.B. (2021). Razvitie nauchnoj kommunikacii v usloviyah informatizacii obshchestva. Tezisy dokladov Devyatoj mezhdunarodnoj nauchno-prakticheskoj konferencii, 113-115 https://elibrary.ru/item.asp?id=47224813

Valeev, A. A., & Kondrat'eva, I. G. (2015). Axiological Approach to the Development of Students' Intercultural Competences by Foreign Language Means. Procedia - Social and Behavioral Sciences, 191, 361–365. https://doi.org/10.1016/j.sbspro.2015.04.377

Xiao, Yuehai. (2011). Academic Discourse: English in a Global Context. Journal of English for Academic Purposes. 10. 198-199. 10.1016/j.jeap.2010.02.009.

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UNDERGRADUATES' PERSPECTIVES ON TEACHING AS A CAREER: EVIDENCE FROM KAZAKHSTAN

Abstract. This study investigates the determinants of choosing teaching as a career in Kazakhstan. Using a quantitative, cross-sectional survey of 625 undergraduate students across 38 higher education institutions, the research explores how school background, academic performance, field of study, participation in teaching-related programs, and scholarship type shape career intentions. Statistical analyses revealed several key patterns. Public school graduates were more likely than peers from selective or private schools to consider teaching. Students who considered teaching did not score significantly lower on the national exam than those who did not. Enrollment in education majors strongly predicted interest in teaching, yet notably, 68% of non-education students also reported considering the profession, highlighting the potential of alternative entry routes. Participation in programs such as Teach for Kazakhstan or teacher clubs was significantly associated with stronger career commitment, while rural quota recipients expressed greater readiness to teach in rural areas compared to peers. The findings suggest that structural experiences and targeted incentives exert greater influence on teaching intentions than academic achievement. The study concludes that policy interventions should prioritize early classroom exposure, bundled financial and professional support, and broadened pathways into teaching to strengthen recruitment and retention in Kazakhstan's education system.

Keywords: University graduates' careers**,** teaching career, university student survey, career choice predictors, teacher supply.

Introduction

Teachers occupy a central role in shaping the prospects of societies, yet the attractiveness of teaching as a career has shifted across time and place. Globally, UNESCO (2017) projected that by 2030, nearly 69 million new teachers will be required to meet international education targets, while OECD (2024) reported that shortages are already intensifying across member states. The issue of teacher recruitment and retention has become a pressing concern in Kazakhstan, too. Analysts note that despite ongoing reforms, systemic weaknesses, ranging from workload pressures to inadequate career attractiveness, continue to undermine the teaching profession in Kazakhstan (Lykova, 2024). President Tokayev has further highlighted the severity of the teacher shortage, revealing that more than 5,000 teaching positions remain unfilled across the country (There is a shortage, 2023). These developments raise important questions about who chooses to pursue teaching, what motivates them, and under what conditions they are likely to commit to the profession.

Previous studies have approached this theme from different angles, including motivations for entering teaching, perceptions of career prospects, and structural or policy factors that shape career intentions. For example, Borgerding (2015) investigated early STEM majors and found that science education summer internships could influence interest in teaching careers. Cabral and Lambirth (2017) examined accelerated education degrees, identifying alternative routes into teaching. Carroll, Parasnis, and Tani (2021) analysed

gendered patterns in the profession, concluding that men and women face different economic incentives and career expectations. Chandran, Padalkar, and Shimray (2025) highlighted the emerging motivations of preservice teacher education students, emphasising personal and social drivers.

The methodological approaches across prior research also vary, ranging from qualitative multi-case studies (Borgerding, 2015) to large-scale surveys (Christensen et al., 2019; Han, Borgonovi, & Guerriero, 2020), longitudinal data analysis (Savage et al., 2021), and systematic reviews (Thompson-Lee, See, & Klassen, 2025). This range of approaches has provided robust evidence on motivations and barriers. For instance, Fray and Gore (2018) conducted a scoping review of empirical studies, revealing recurring patterns such as altruistic motivations and perceptions of job security. Watt et al. (2012) extended this further through an international comparison using the FIT-Choice scale. Although the issue has received scholarly attention on an international level, there is limited exploration of the topic within the specific socio-economic and policy environment of Kazakhstan.

In Kazakhstan, some research has examined aspects of teacher education and professional training, but it remains mostly descriptive in nature. Ospanova (2024), for instance, documented reforms in teacher preparation, noting both achievements and persisting challenges in aligning teacher education with labour market needs. However, empirical evidence directly addressing Kazakhstani students' career intentions and the structural incentives or disincentives shaping these choices remains scarce. Given the country's acute teacher shortage and the government's stated policy goals, this represents an important area for investigation.

The present study aims to address this gap by exploring the determinants of teaching career choice among Kazakhstani students. Specifically, the study addresses the following questions:

1. Does the type of secondary school attended—public, selective, or private/international influence whether students consider teaching as a career?
2. Do students who have considered teaching as a career have higher academic achievement, as measured by UNT scores, compared to those who have not considered teaching?
3. Are students enrolled in teaching-related majors more likely to consider a teaching career than students enrolled in other fields?
4. Does participation in teaching-related programs such as Teach for Kazakhstan, university teacher clubs, or internships strengthen students' commitment to a teaching career?
5. Are students receiving rural or targeted scholarships more likely to express readiness to teach in rural areas compared to other students?

Literature review

Across contexts, research on entry into teaching has been dominated by studies of motivation, altruistic, intrinsic, and extrinsic drivers, often operationalised through the FIT-Choice framework (Fray & Gore, 2018; Watt et al., 2012). Other studies broaden this lens to include structural and sociological influences such as socio-economic background, family expectations, and national policy settings that shape who considers teaching and under what conditions (See et al., 2022). Evidence from specific domains (e.g., STEM) further indicates that policy levers like scholarships and bonuses do not affect recruitment and are more effective for retention (Thompson-Lee et al., 2025).

Demographic sorting into teacher education and the profession is evident in multiple settings. In Germany, higher social/artistic interests and parental influence, especially a parent wanting the child to teach, were strong predictors of entry to the profession (Savage et al., 2021). A more exhaustive international review concludes that socio-economic background is

an important factor influencing career decisions in teaching (See et al., 2022). At the school-leaver stage, willingness data show that students who view themselves as "average" academically are more open to teaching than high achievers, and encouragement from family/others substantially predicts openness to teaching (Christensen et al., 2019). Together, these findings situate teacher recruitment within family resources, socialisation, and perceived academic positioning rather than individual motivation alone (See et al., 2022; Savage et al., 2021; Christensen et al., 2019).

Evidence on academic selectivity is mixed and context-specific. Longitudinal Swedish register data indicate a steady decline in the average academic achievement of new teachers between 1996 and 2016, with greater declines among uncertified and primary-phase entrants and relatively higher grades among prospective science teachers (Alatalo et al., 2024). In Germany, while teacher-education entrants showed somewhat lower achievement and cognitive speed, multivariate analyses yielded only weak evidence of strong "negative selection"(Savage et al., 2021). At earlier pipeline stages, high achievers are less inclined to see teaching as their best option, aligning with findings that self-identified "average" students are more open to the profession (Christensen et al., 2019).

Policy changes to entry routes shape who becomes a teacher. In U.S. data, state adoption of alternative certification was associated with sizable increases in the share of beginning teachers of colour and with growth at both ends of college selectivity, but with no apparent effect on the proportion of men; stricter entry standards within these policies were linked to increases in STEM and special education hires (Redding, 2021). Program-level studies show that accelerated degrees can operate as a "second-chance" route, drawing in candidates for reasons of cost and speed while eliciting mixed views about practice opportunities (Cabral & Lambirth, 2017). In STEM specifically, rigorous reviews report that scholarships and stipends (e.g., Noyce-type programs) generally show weak or null effects on recruitment; there is no firm evidence of the effectiveness of the alternative pathways; retention bonuses targeted to shortage subjects/contexts have somewhat more substantial evidence for reducing attrition (Thompson-Lee et al., 2025). Authentic classroom experiences (e.g., science education internships) can increase interest by centring student learning and relationship-building, though effects vary with the quality of experiences (Borgerding, 2015).

Intentions to teach in rural schools are patterned by origin and region. A large survey of teacher-education students in eastern China showed that urban-origin students were markedly less willing to teach in rural areas compared to their counterparts from rural areas (Wang et al., 2023). Female students were more inclined to teach in their hometown villages (Wang et al., 2023).

Methods

The study utilised a quantitative, cross-sectional survey design to investigate career intentions, motivational orientations, and perceptions of the teaching profession among undergraduate students in Kazakhstan. The instrument consisted of items grouped into four thematic blocks: socio-demographic information, career intentions, motivational orientations, and perceptions of teaching as a profession. The structure of the questionnaire was informed by prior literature on teacher motivation and recruitment (Fray & Gore, 2018; See et al., 2022). Before dissemination, the instrument was piloted with a small group of students to ensure clarity and validity.

The target population consisted of undergraduate students across all fields of study. Invitations were sent via the administrations of 38 higher education institutions in Kazakhstan. Participation was voluntary and anonymous. Students accessed the online survey through a link hosted on SurveyMonkey. Prior to beginning, respondents read an informed consent statement,

and only those who agreed proceeded. The survey was designed to exclude any identifying information such as names, email addresses, or phone numbers.

The survey yielded 1,103 initial responses. Of these, 173 students did not consent and were removed. A further 238 did not complete the survey. Of the 692 who provided complete responses, 67 were excluded during data cleaning. Exclusion criteria included: (1) surveys completed in less than three minutes, (2) patterned responses across items, and (3) duplicate submissions with identical response patterns and timestamps. The final analytic sample comprised 625 valid responses.

Data cleaning was performed using Microsoft Excel, while statistical analysis was conducted in Python.

Results

Demographic Characteristics

A majority of respondents were female, representing 72.96% of the total, while men accounted for 27.04%. This distribution does not fully reflect the gender balance in Kazakhstan's higher education system overall, where the proportion of women is closer to 53% and men 47%. However, given the topic of the survey and the fact that 61% of respondents were studying in education-related fields, the sample remains broadly representative. According to national statistics, as of 2025, women make up 82.1% of the country's teaching workforce, which helps explain their overrepresentation in this study.

Table 1.

Distribution of Respondents by Gender

Gender	n	%
Female	456	72.96
Male	169	27.04
Total	625	100.00

Respondents' places of birth were also recorded. The majority, 477 students (76.32%), reported being born in regional centres, highlighting the predominance of students with origins in large urban settlements. A smaller share, 119 students (19.04%), came from smaller towns and villages under regional administration, while only 29 respondents (4.64%) were born in cities of national significance, namely Astana, Almaty, and Shymkent.

Table 2.

Distribution of Respondents by Place of Birth

Place of Birth	n	%
Regional centers	477	76.32
Towns/villages under regional administration	119	19.04
Cities of national significance (Astana, Almaty, Shymkent)	29	4.64
Total	625	100.00

In terms of financial support, 42.40% of respondents were studying based on a general state grant, while 33.76% were paying tuition fees independently. Other forms of support appeared less frequently, including rural quotas (8%), the *Serpin* program (3.84%), Akimat (municipal) grants (3.68%), university-specific grants (2.72%), and the Kazakhstan Halkyna fund (2.24%). Smaller shares were also covered by other special quotas (3.36%).

Table 3.
Distribution of Respondents by Grant Type

Grant Type	n	%
General state grant	265	42.40
Self-funded (tuition)	211	33.76
Rural quota	50	8.00
Serpin	24	3.84
Akimat grant	23	3.68
Other quotas	21	3.36
University grant	17	2.72
Kazakhstan Halkyna	14	2.24
Total	625	100.00

Finally, distribution by field of study showed that most respondents (61.76%) were enrolled in education programs (classified under 6B01 Pedagogical Sciences), while the remaining 38.24% pursued non-education disciplines.

Table 4.
Distribution of Respondents by Field of Study

Field of Study	n	%
Pedagogical sciences	386	61.76
Other disciplines	239	38.24
Total	625	100.00

In determining the readiness for a teaching career, the survey included two items. First, all participants from teaching and non-teaching majors were asked whether they consider or have considered teaching as a career (Yes/No). Second, to obtain more specific career information, those who answered "Yes" were asked questions about specific plans to become a teacher (No, Undecided, Yes – Career Goal, Yes – Obligation).

Consideration of Teaching by School Background

School background may shape career intentions through exposure to different values, expectations, and role models. Graduates of selective or elite schools may be more likely to pursue high-status professions other than teaching, whereas public-school graduates may view teaching as a more attainable career. The following hypothesis was formulated:

Hypothesis 1. Students' school background influences whether they consider teaching as a career. The results of cross-tabulation are shown in Table 5, where expected values are shown in square brackets [] next to observed values.

Table 5.
School Type vs. Consideration of Teaching

School Type	Did not consider	Considered	Total
Public	93 [102.73]	429 [419.27]	522
Selective (Gymnasium, NIS, BIL)	22 [14.37]	51 [58.63]	73
Private/International	8 [5.90]	22 [24.10]	30
Total	123	502	625

$\chi^2(2, N = 625) = 7.14, p = .028$.

Public school graduates were less likely than expected not to consider teaching (93 observed vs. 102.73 expected) and more likely than expected to consider it (429 observed vs. 419.27 expected). Selective school graduates, however, were more likely than expected not to

consider teaching (22 observed vs. 14.37 expected) and less likely to consider it (51 observed vs. 58.63 expected). A similar pattern is seen for private/international school graduates, where non-consideration was higher than expected (8 vs. 5.90) and consideration was lower (22 vs. 24.10). These deviations confirm a statistically significant association between school type and teaching career consideration.

National Exam Results (UNT) and Career Intentions

Evidence on academic selectivity into teaching is mixed and context-dependent. Longitudinal data show declines in average grades among teacher entrants over time, with subject-specific variation (Alatalo et al., 2024). An exploratory study based on the German National Educational Panel Study has not confirmed academic scores to be predictors of choosing teacher education programs (Savage et al., 2021). The study conducted in the US showed that in the earlier stages of the pipeline, top performers are less likely to view teaching as their preferred career path, consistent with evidence showing that students who consider themselves "average" are more receptive to entering the profession. (Christensen et al., 2019). It is therefore important to examine whether academic performance, measured by Unified National Test (UNT) scores, differs between those who have considered teaching and those who have not.

Hypothesis 2: Students who have considered teaching will have lower academic achievement than those who have not. The results of the t-test are displayed in Table 6.

Table 6.

UNT Scores by Consideration of Teaching

Group	n	M	SD
Considered teaching	421	88.46	20.04
Did not consider	100	84.71	18.95

$t(519) = 1.76$, $p = .080$.

Students who considered teaching scored slightly higher on the UNT than those who did not (88.46 vs. 84.71). However, the difference was not statistically significant.

Consideration of Teaching by Major

International evidence suggests that who enters teaching reflects both individual motives and structural sorting. Reviews find persistent patterns in which entrants to teacher education disproportionately come from particular social backgrounds and are shaped by perceptions of the profession (See et al., 2022; Fray & Gore, 2018; Watt et al., 2012). Country evidence shows that students enrolled in teacher-education programs often differ systemically from peers in non-education majors (e.g., by interests, prior achievement, and parental influence), which helps explain a stronger orientation toward teaching careers within education majors (Savage et al., 2021). Given the importance of obtaining a state grant to sponsor a university and the abundance of grants for teaching, anecdotal evidence in Kazakhstan suggests that students in teaching majors often select this field to pursue their degree. Therefore, the following hypothesis was formulated.

Hypothesis 3: Students in teaching majors will be more likely than students in non-teaching majors to consider a teaching career. The cross-tabulation of primary and career consideration is presented in Table 7.

Table 7.

Major vs. Consideration of Teaching

Major	Did not consider	Considered	Total
Other disciplines	76 [47.04]	163 [191.96]	239
Pedagogical sciences	47 [75.96]	339 [310.04]	386
Total	123	502	625

Note. Expected counts in brackets. $\chi^2(1, N = 625) = 33.49, p < .001$.

Observed frequencies show that fewer non-education students considered teaching than expected (163 observed vs. 191.96 expected), while more non-education students than expected did not consider teaching (76 observed vs. 47.04 expected). Conversely, education majors were more likely to consider teaching (339 observed vs. 310.04 expected) and less likely not to consider it (47 observed vs. 75.96 expected). These results confirm a strong association between primary and career consideration.

Another important result of this test was the fact that 68% of non-teaching major students consider or have considered teaching as a career. This highlights the importance of exploring alternative teaching routes for individuals with non-teaching majors.

Participation in Teaching-Related Programs

Experiential opportunities and role models are known to shape career intentions. Authentic exposure to classroom or education-focused experiences (e.g., internships, realistic job previews, service programs, or campus clubs) tends to strengthen interest and crystallise intentions to teach (Borgerding, 2015; Watt et al., 2012; Klassen, 2023). Alternative or accelerated pathways can broaden access and shape pipeline flow (Cabral & Lambirth, 2017; Redding, 2021). Engagement in initiatives such as Teach for Kazakhstan, university-based teacher clubs, or similar programs may strengthen career commitment, particularly among a large number of non-teaching major students who consider teaching as a possible career path. Hypothesis 4: Students who participate in teaching-related programs or clubs are more likely to demonstrate commitment to a teaching career. The cross-tabulation is presented in Table 8.

Table 8.

Participation in Teaching Programs vs. Career Commitment

Participation	No	Undecided	Yes – Career Goal	Yes – Obligation	Total
No programs	37 [36.42]	93 [78.15]	147 [163.12]	72 [71.32]	349
Programs	11 [11.58]	10 [24.85]	68 [51.88]	22 [22.68]	111
Total	48	103	215	94	460

$\chi^2(3, N = 460) = 18.37, p < .001$.

Among students who did not participate in programs, more than expected remained undecided about a teaching career (93 observed vs. 78.15 expected), and fewer than expected reported teaching as their career goal (147 observed vs. 163.12 expected). In contrast, students with program experience were less likely than expected to be undecided (10 vs. 24.85) and more likely to state teaching as their goal (68 vs. 51.88). These deviations indicate a significant association, confirming that program participation is linked with more substantial career commitment.

Some of these programs that offer an alternative route to teaching are also important to increase teacher supply from non-teaching majors.

Readiness to Teach in Rural Areas by Grant Type

Teaching intentions in rural schools vary by students' backgrounds and location. A large-scale survey of teacher-education students in eastern China found generally strong willingness to work in one's hometown (Wang et al., 2023). In Kazakhstan, alongside General grants, there are targeted grants such as rural quota or Akimat (Mayor's Office) grants. They might have terms obligating them to return to their home regions. Thus, grant type may influence readiness to teach in rural schools.

Hypothesis 5: Students receiving rural or targeted scholarships will express greater readiness to teach in rural areas than other students. The cross-tabulation is shown in Table 9.

Table 9.

Grant Type vs. Readiness to Teach in Rural Areas

Grant Type	No	Unsure	Yes	Total
Akimat grants	3 [3.79]	5 [2.96]	7 [8.25]	15
General	59 [55.66]	52 [43.39]	109 [120.96]	220
Other quotas	7 [3.79]	0 [2.96]	8 [8.25]	15
Self-funded	39 [40.98]	28 [31.95]	95 [89.07]	162
Kazakhstan Halkyna	7 [3.29]	0 [2.56]	6 [7.15]	13
Rural quota	3 [11.13]	8 [8.68]	33 [24.19]	44
Serpin	5 [4.81]	4 [3.75]	10 [10.45]	19
University grant	4 [3.54]	2 [2.76]	8 [7.70]	14
Total	127	99	276	502

$\chi^2(14, N = 502) = 27.97, p = .014$.

Notable deviations were observed among rural quota recipients: more students than expected expressed willingness to teach in rural schools (33 observed vs. 24.19 expected), and fewer than expected indicated no willingness (3 observed vs. 11.13 expected). For general grant holders, fewer than expected expressed willingness (109 vs. 120.96), and more than expected were unsure (52 vs. 43.39). These results indicate an important relationship between grant type and rural readiness, with rural quotas especially effective in encouraging service outside urban areas.

Discussion

This study investigated the factors that attract individuals to teaching careers. The data revealed consistent patterns across analytical approaches where respondent intentions correlate with institutional structures encountered during educational experiences rather than standardized test performances. Notably, the recipients of the targeted rural educational reported significantly higher levels of readiness to serve in rural contexts. Conversely, differences in Unified National Test (UNT) scores between those who expressed interest in teaching and those who did not were minimal. The practical implications of these results seem self-evident: exposure to real teaching opportunities and the provision of well-structured, context-sensitive incentives appear to exert greater influence on career intention than do narrow academic thresholds.

Interpreting the patterns

The relationship between academic major and intention to teach, though anticipated, merits closer examination. It is plausible that two distinct, but intertwined processes are at work. Some students may enter education programs already inclined toward teaching, bringing with them a set of pre-existing values and aspirations. Simultaneously, the experiences provided through coursework and early engagement with schools may gradually cultivate and affirm a sense of teacher identity, as suggested by Lortie (2008). Although the present findings cannot isolate these processes with precision, both converge on a common point of leverage.

Programs that incorporate early immersion in classroom environments often do more than inform career choice. They deepen intention and transform vague interest into concrete commitment. This perspective resonates with research highlighting how authentic practicum experiences foster stronger motivation and a more defined conception of the teaching role (Watt et al., 2012).

Involvement in programs beyond the formal curriculum also reveals a noteworthy, albeit modest, association with increased commitment. The various initiatives considered, that range from outreach efforts to student-led clubs, differ considerably in scope and structure. Nonetheless, the pattern remains consistent. Practical exposure appears to shift teaching from a notional career option to a tangible and meaningful possibility. This is consistent with findings from teacher recruitment literature, which point to the pivotal role of experiential learning in shaping professional trajectories (Klassen, 2023). Through such encounters, students are not merely introduced to the profession but begin to inhabit it.

Furthermore, rural quota awards are linked with a higher reported willingness to serve beyond major cities. It appears that incentives may guide intentions toward schools in areas where shortages are acute. Nonetheless, willingness expressed in a survey is not the same as actual placement, and it may even be further from long-term retention. The literature suggests that without housing, mentoring, and a manageable workload in the first year, many teachers exit early (Sisouphanthong et al., 2020). The results of this study should therefore be interpreted as an initial step. It requires a more developed, sophisticated support system if it is to lead to sustainable staffing.

Graduates of public schools seemingly demonstrate a somewhat stronger tendency to consider teaching than those from selective or private schools. One explanation may be visibility. In public schools, students observe a greater number of ordinary teachers and are less exposed to elite professionals, which makes the occupation appear familiar. The civic role of such schools within communities may also reinforce teaching as an attainable path. Another possibility is the status of teaching across different peer cultures. This is speculative and invites qualitative follow-up, yet it offers a plausible line of inquiry.

Finally, the minimal difference in UNT scores deserves attention. Our results confirm that the association between academic success and choosing a teaching career is not straightforward and varies by context. In line with Savage et al. (2021), we find that academic achievement is not a significant predictor of teaching career. This can be explained by the relative stability of teaching jobs and reflects the impact of reforms in Kazakhstan towards increasing teacher status and salaries.

Implications for policy

Looking more broadly at scholarship programs, existing research suggests that financial incentives alone may be insufficient to address teacher shortages effectively. The most promising interventions appear to integrate funding with comprehensive professional preparation and ongoing support systems. Thompson-Lee et al. (2025) demonstrated that retention-focused measures often outperform recruitment bonuses, while international evidence indicates that experiential learning opportunities strengthen career commitment among prospective teachers (Borgerding, 2015).

This body of evidence implies that scholarships, in theory, could be redesigned as elements within larger developmental frameworks rather than treated simply as financial transfers. Universities, for instance, could offer credit-bearing micro-placements that bring students into classrooms for structured and rigorous periods of classroom observation and practice. It is our contention, based on the emerging results of the current study, that such opportunities would allow even students outside education programs to test their interest and skills in teaching within real-life professional contexts. One practical way forward could be to integrate these placements into partnerships with local schools so that students experience them

during their regular academic year rather than only through summer internships. Likewise, for students who are approaching graduation, there is a case for creating paid para-professional positions that ameliorate the passage from study to full employment. These roles could offer real responsibility in the classroom, while helping to maintain access to mentors and development activities at the same time. The assumption is that commitment to teaching usually grows gradually through experiential immersion, not through abrupt transitions from university to independent teaching.

The issue of staffing in rural areas deserves particular focus. Existing quota systems have demonstrated seemingly unsatisfactory results, and many stakeholders and observers argue that they should be replaced with more comprehensive fellowship schemes. Such initiatives would need to go beyond financial incentives. Comprehensive support structures that include guaranteed accommodation, structured mentoring, reduced administrative responsibilities in the initial year of service, and assistance with relocation expenses are likely to play a crucial role in both recruitment and retention. Moreover, there is growing empirical support for the proposition that candidates with prior exposure to rural contexts, whether through personal background or placement experience, exhibit higher rates of long-term retention. Prioritizing these applicants in selection processes may enhance the stability and sustainability of rural staffing efforts.

It could also be put forward that funding schemes could also be refined so that institutions are rewarded for measurable outcomes rather than simply for student enrollments. Linking university and district support to employment conversion rates and to teacher retention at one- and three-year intervals would create incentives that align more closely with workforce development. The principle is not complicated: programs that combine financial support with meaningful professional experiences are more likely to produce teachers who not only begin the job but also stay with it.

Secondary schools have responsibilities that reach well beyond serving as landing points for graduates of teacher education programs. They are also places where many young people first encounter the idea of teaching as a career. These early impressions often arise through brief, informal interactions rather than planned exposure. However, the data presented in this study suggest a more deliberate approach yields stronger results. Undergraduates who engage in structured, teaching-related activities tend to report a higher level of commitment to the profession.

This pattern has implications for secondary schools. They do not need to depend entirely on universities to develop future teachers for them. Instead, they can take a more proactive role in building early-stage pathways. Several forms of engagement are achievable. Senior students, for example, could participate in supervised assistant teacher programs. In these, they would help design lessons, support classroom delivery, and observe experienced educators at work. After-school tutoring could also be transformed. What often begins as casual peer help may turn into a formalized mentoring system: one supported by reflection sessions and guided feedback from staff. Another promising strategy is job shadowing. This approach offers more than observational learning; it provides a practical window into daily teaching life. It may be especially effective in rural contexts or in subjects where teacher shortages continue to persist. In such contexts, brief visits are rarely sufficient; instead, students need repeated, meaningful contact with the profession. Guidance counsellors would serve as essential facilitators in this process. Their task is not merely to provide information but to frame teaching as a gradual, attainable journey that begins with school-level roles and extends through paraprofessional experience to full qualification. The path must be visible; the steps must be clear; the support must be consistent.

If schools move in this direction, it is likely that there will be additional demands on experienced teachers. Hosting placements, supervising young assistants, or guiding job

shadowing requires time and effort. Institutions should therefore recognize this contribution through small grants, release time, or other supportive measures that acknowledge mentoring as a form of professional development in its own right. The broader aim remains consistent: to make teaching visible and respected within school communities and wider society to create multiple entry points through which young specialists can see themselves as potential future educators.

Implications for teacher education in higher education

Teacher education programs continue to face the challenge of balancing/aligning academic standards, and their curriculum plans with the realities of classrooms in regular schools. Standardised test scores have often been assumed to predict teaching success, yet recent studies consistently challenge this view. Evidence points instead to program design and experiential learning as stronger indicators. If this is the case, universities may need to reconsider how teachers are prepared. One response is to broaden access by offering teaching minors or certificates in other disciplines. When such routes include school-based modules from the outset, they not only capture the interest of students who had not previously considered teaching but also provide authentic exposure to practice.

Selection processes within teacher education warrant closer scrutiny. Admittedly, current academic metrics remain part of the equation. They offer a clear, standardized measure of knowledge. Nevertheless, it should be acknowledged that they fail to account for qualities that matter just as much such as resilience, empathy, communication skills, and ethical judgment among them. To address this shortcoming, programs could incorporate additional assessment methods. For instance, structured interviews, classroom simulations, and situational judgment tests provide more insights. These instruments are not without limitations; nonetheless, they can reveal how candidates respond to real-world teaching challenges. While such tools cannot predict long-term success with certainty, they help form a more holistic picture of a candidate's potential to manage the interpersonal and ethical complexities of the classroom. Equally important is the timing of practicum experience. It is worth asking: why should students wait until their final year to enter classrooms? Early placement serves a dual purpose. It allows students who are poorly suited to the profession to reconsider their path before investing further. At the same time, it affirms and strengthens the commitment of those who show aptitude. In this way, the practicum acts not only as a training ground but also as a selection filter that aligns professional preparation with long-term dedication.

Other matters are more practical in nature. Career changers and students without an education background require flexible entry routes. One-year post-baccalaureate programs offer an effective solution, particularly in high-demand subject areas where the teacher supply remains insufficient. Finally, no meaningful reform is possible without systematic evidence. Programs cannot evolve if they lack data. Universities should therefore implement mechanisms to track graduate placement and retention over time: data should be gathered at one- and three-year intervals and disaggregated by subject area, practicum site, and program pathway. Without this information, judgments about program effectiveness rest on assumption rather than fact; with it, decisions can be anchored in patterns that emerge across cohorts and contexts. Good intentions are not enough. To build a teacher workforce that is skilled, stable, and sustainable, reforms must be guided by evidence—collected, analyzed, and applied with care.

Conclusion

This study examined the conditions under which undergraduates in Kazakhstan move toward a teaching career. Across analyses, intentions align more with the structures that students encounter than with marginal differences in test performance. Education majors are more likely to consider teaching. Participation in teaching-related programs corresponds to a stronger commitment, and recipients of rural quota grants report greater readiness for rural

service. Public school graduates show a slight inclination toward teaching relative to peers from selective or private settings. Differences in UNT scores between those who considered teaching and those who did not are small. Taken together, the pattern points to a practical reading. Experience and incentive design appear to shape career thinking more reliably than academic screening.

Three conclusions follow. First, exposure to teaching as early as possible has a huge impact on students. When students go through in-service practicum and enter real classrooms, even for a short period of time, teaching becomes a serious consideration for their careers rather than an abstraction. Second, incentives work best not in isolation but when bundled with systematic and consistent support. Although, scholarships attract applications, housing, mentoring, and a lighter non-teaching load in the first year are presumably more likely to translate intention into arrival and early retention. Third, the pathway into teacher education should remain available for strong candidates from non-education majors, with selection placing more weight on interpersonal and practice-oriented indicators than on fine distinctions in test scores. These conclusions are in line with the results of the study and offer a tractable agenda for ministries, state schools, and universities.

As far as the policy message emerging from the study is concerned, we strongly recommend developing away from a narrow focus on score thresholds. Move toward packages that combine funding with structured school experience and early induction into teaching. State secondary schools can serve as sites of socialisation through assistant teacher terms, mentoring hubs, and systematic shadowing. Teacher education can front-load practicum, open bridge routes for final year students in other fields, and adopt selection tools that read motivation, communication, and judgment. None of these moves requires a leap of faith: on the contrary, they extend existing practices in a more deliberate, data-aware form.

The study, however, has limitations that are necessary to take into consideration when assessing and contextualizing the conclusions of this investigation. The design is cross-sectional; hence the causal inferences are limited. The sample of the survey is not probability-based, and female respondents appear to be over-represented, which might have, in its turn, affected external validity. Also, outcome measures rely on single items, and the UNT scores are self-reported. This might have introduced measurement error. Additionally, analyses lean on bivariate associations; unobserved confounders may remain. Effect sizes in several tests are small, so practical importance should be read with care. These limitations do not necessarily negate the main conclusions and patterns. Yet, they invite the readers to interpret the findings with caution when considering to extrapolate the results into other contexts.

An important recommendation for future research is a prospective, multi-wave, cohort study that would follow undergraduates from the first expression of interest in teaching through application, appointment, and the first three years of employment. A study of this kind would offer a robust framework for understanding the full trajectory from intention to retention. The process might begin with a baseline survey administered early in the undergraduate program. This instrument would collect data on teaching intention, academic major, exposure to relevant programs, rural background, and psychosocial characteristics. These variables would serve as foundational predictors for later outcomes. Each participant could then be linked to administrative records, including application submissions, hiring decisions, placement details, and employment continuity. Such linkage would require secure data-sharing agreements but is feasible within current institutional and legal structures. Following the initial wave of data collection, participants would be recontacted at critical transition points. These might include the completion of practicum, graduation, the start of induction, and the end of the first and third years in the workforce. At each point, brief but psychometrically stable instruments could be used to measure commitment to teaching and readiness for rural placements. The use of concise multi-item scales would help ensure both data quality and participant retention.

Importantly, this research design allows for more than descriptive insights. With appropriate modeling, it would permit the estimation of conversion rates from expressed intention to actual entry into the profession, and from initial entry to sustained participation. Event-history models could be employed to explore how early experiences, such as participation in para-teaching, exposure to rural schools, or involvement in fellowship programs, influence movement through the pipeline. These relationships could be estimated while accounting for relevant confounders.

Stratified sampling would improve the representativeness of the study. By recruiting participants across universities, academic disciplines, and geographical regions, the study would be better positioned to capture variation in pathways toward hard-to-staff subjects and rural locations. Sampling weights could be applied where necessary to correct for imbalance. In addition, pre-registering outcomes and conducting a priori power analyses would enhance the rigor of statistical inference. Methodologically, panel loss presents a real concern. Yet it can be addressed. A combination of modest incentives, planned missingness designs, and streamlined follow-ups would support participant retention over time. The pairing of self-reported data with verified administrative outcomes would further strengthen the reliability of the findings. In sum, this kind of longitudinal, mixed-methods approach would move the field beyond surface-level correlations. It would offer concrete evidence about which factors truly matter in converting early interest into long-term commitment.

The broader body of evidence points to a pragmatic shift in strategy. If Kazakhstan aims to secure a sustainable and committed teaching workforce, reforms must focus on more than recruitment quotas or test-based admissions. Instead, the system should invest in meaningful opportunities to teach, targeted forms of support that accompany financial incentives, and a selection process that recognizes not only academic achievement but also the dispositions and practical readiness that effective teaching demands.

Conflict of Interest Statement

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Author Contributions

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References

Alatalo, T., Hansson, Å., & Johansson, S. (2024). Teachers' academic achievement: Evidence from Swedish longitudinal register data. *European Journal of Teacher Education, 47*(1), 60–80. https://doi.org/10.1080/02619768.2021.1962281

Borgerding, L. A. (2015). Recruitment of early STEM majors into possible secondary science teaching careers: The role of science education summer internships. *International Journal of Environmental & Science Education, 10*(2), 247–270. https://doi.org/10.12973/ijese.2015.244a

Cabral, A., & Lambirth, A. (2017). Accelerated degrees in education: A new profile, alternative access to teaching or part of a re-tooling process? *Journal of Further and Higher Education, 42*(5), 1–17. https://doi.org/10.1080/0309877X.2017.1311995

Chandran, M., Padalkar, S., & Shimray, R. A. (2025). Motivation to become a teacher: Emerging trends from a study of preservice teacher education. *Contemporary Education Dialogue, 22*(1), 127–153. https://doi.org/10.1177/09731849241300796

Carroll, D., Parasnis, J., & Tani, M. (2021). Why do women become teachers while men don't? *The B.E. Journal of Economic Analysis & Policy, 21*(2), 793–823. https://doi.org/10.1515/bejeap-2020-0236

Christensen, S. S., Davies, R. S., Harris, S. P., Hanks, J., & Bowles, B. (2019). Teacher recruitment: Factors that predict high school students' willingness to become teachers. *Education Sciences, 9*(4), 282. https://doi.org/10.3390/educsci9040282

Fray, L., & Gore, J. (2018). Why people choose teaching: A scoping review of empirical studies, 2007–2016. *Teaching and Teacher Education, 75*, 153–163. https://doi.org/10.1016/j.tate.2018.06.009

Han, S. W., Borgonovi, F., & Guerriero, S. (2020). Why don't more boys want to become teachers? The effect of a gendered profession on students' career expectations. *International Journal of Educational Research, 103*, 101645. https://doi.org/10.1016/j.ijer.2020.101645

Klassen, R. M., Granger, H., & Bardach, L. (2023). Attracting prospective STEM teachers using realistic job previews: A mixed methods study. *European Journal of Teacher Education*, *46*(3), 533-555.

Lortie, D. C. (2008). Schoolteacher. In *Handbook of Research on Teacher Education* (pp. 513-523). Routledge.

Lykova N. (2024, January 18). Kazakhstani education 2024: Problems multiply, but there is light. Tengrinews. https://tengrinews.kz/article/kazaxstanskoe-obrazovanie-2024-problemy-mnozatsia-est-svet-2319/

OECD. (2024). *Education policy outlook 2024: Reshaping teaching into a thriving profession from ABCs to AI.* OECD Publishing. https://doi.org/10.1787/9e5d560b-en

Ospanova, M. (2024). Teacher education and professional training in Kazakhstan. *Szkoła – Zawód – Praca, 27*(1), 25–39. https://doi.org/10.34767/SZP.2024.01.02

Redding, C. (2021). Changing the composition of beginning teachers: The role of state alternative certification policies. *Educational Policy, 35*(7), 1087–1116. https://doi.org/10.1177/08959048211015612

Savage, C., Ayaita, A., Hübner, N., & Biewen, M. (2021). Who chooses teacher education and why? Evidence from Germany. *Educational Researcher, 50*(7), 483–487. https://doi.org/10.3102/0013189X211000758

See, B. H., Munthe, E., Ross, S. A., Hitt, L., & El Soufi, N. (2022). Who becomes a teacher and why? *Review of Education, 10*(3), e3377. https://doi.org/10.1002/rev3.3377

Sisouphanthong, V., Suruga, T., & Kyophilavong, P. (2020). Valuation of incentives to recruit and retain teachers in rural schools: Evidence from a discrete choice experiment in Laos and Cambodia. *Cogent Education, 7*(1), 1724243. https://doi.org/10.1080/2331186X.2020.1724243

There is a shortage (2023, September 1). There is a shortage of 5 thousand teachers – Tokayev declared a serious problem. Kazakhstan Today. https://www.kt.kz/rus/education/ne_hvataet_5_tysyach_pedagogov_-_tokaev_zayavil_o_serieznom_1377956260.html

Thompson-Lee, S., See, B. H., & Klassen, R. M. (2025). A systematic review of STEM teacher recruitment and retention interventions. *International Journal of STEM Education, 12*(33). https://doi.org/10.1186/s40594-025-00550-6

UNESCO. (2017). *Education for sustainable development goals: Learning objectives.* UNESCO Publishing. https://unesdoc.unesco.org/ark:/48223/pf0000247444

Wang, Y., Yang, L., Zhang, X., & Shao, Z. (2023). Students' career intention to teach in rural areas by region and household registration: A study of students at an eastern Chinese local normal university. *Sustainability, 15*(15), 11755. https://doi.org/10.3390/su151511755

Watt, H. M. G., Richardson, P. W., Klusmann, U., Kunter, M., Beyer, B., Trautwein, U., & Baumert, J. (2012). Motivations for choosing teaching as a career: An international comparison using the FIT-Choice scale. *Teaching and Teacher Education, 28*(6), 791–805. https://doi.org/10.1016/j.tate.2012.03.003

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FORMATION OF MULTI-UNIVERSITY SCIENTIFIC AND EDUCATIONAL COMMUNITIES BASED ON SCIENTOMETRIC ANALYSIS

Abstract. The article examines the problem of forming multi-university scientific and educational communities based on scientometric and network analysis methods. A formal model for identifying inter-university collaborations is proposed, which is based on constructing a metric space of scientific publications and further clustering using the Louvain algorithm. The model makes it possible to represent universities and researchers as nodes of a collaboration network, where the edge weights are determined by the number of co-authored publications. The developed approach was applied to data from the open OpenAlex database for the analysis of universities in Kazakhstan. The obtained results revealed the existence of a core of leading institutions (Al-Farabi Kazakh National University, Nazarbayev University, L. N. Gumilyov Eurasian National University, and Astana IT University) that demonstrate the highest intensity of collaboration, while other universities remain at the periphery of the research network. It was also established that national collaborations in Kazakhstan are significantly stronger than international ones, which highlights the need for further internationalization and integration into global scientific networks. The results obtained have both theoretical significance for the development of scientometrics and practical value for shaping science policy and designing strategies to improve the effectiveness of academic collaboration.

Keywords: multi-university scientific communities, scientometric analysis, network clustering, scientific collaboration network, citation network, international collaboration.

Introduction

Improvement of scientific activity, development of innovation, stimulation of fundamental and applied research, and the promotion of the country's scientific potential worldwide are possible through the formation of multi-university scientific and educational communities. At the same time, an important role is played by the development of models and methods for organizing scientific research aimed at establishing procedures to ensure the formation of a rational composition and structure of multi-university scientific and educational communities. The foundation of such formation should be the evaluation of objective performance indicators and the normative principles of integrating the nation's science into the global scientific community.

The modern stage of scientific development is characterized by the globalization of knowledge and intensive scientific cooperation between educational and research institutions. Joint studies conducted across several universities make it possible to address complex scientific problems by combining the expertise and resources of different teams. Moreover, the inclusion of representatives from other universities fosters the creation of interdisciplinary projects. As research has shown, international scientific collaborations usually result in publications with higher scientific impact (measured by citation counts) compared to isolated national works. Multi-university scientific and educational communities are defined as stable

networks of universities that collaborate in research and education on a regular basis. The development of such communities is particularly important for countries striving to strengthen their scientific potential and integrate into the global scientific space. In Kazakhstan, in particular, the effective use of scientific potential and its internationalization have been identified by the government as critical tasks for reinforcing the national scientific system. State programs (such as the "Kazakhstan-2050" strategy and the State Program for the Development of Education and Science 2020-2025) explicitly emphasize the necessity of enhancing the contribution of science to the country's socio-economic development through globalization of science and international collaboration.

Despite the obvious advantages, the formation of inter-university scientific communities faces several challenges. First, many traditional assessments of universities and researchers have not considered their network interactions, focusing only on internal institutional indicators (Kosztyán et al., 2021). However, institutions may underestimate the importance of collaboration development as a factor of success. Second, there are regional imbalances: global scientific interaction has historically been dominated by Western countries, while researchers from some other regions remain less integrated into global networks (Zhang et al., 2025). For post-Soviet states, a decline in mutual connections was observed after the collapse of the USSR, along with a simultaneous reorientation towards cooperation with Western countries. Kazakhstan, as part of the post-Soviet space, also faces the legacy of limited international integration.

Although over the past decade the country has undertaken numerous reforms in higher education and science (joining the Bologna Process, the "Bolashak" program for training young researchers abroad, the establishment of the new Nazarbayev research university, etc.), its contribution to global science remains moderate (Narbaev et al., 2025; Amirbekova et al., 2025). Kazakhstan's share in international publications is growing, but the country's visibility in global scientific networks is still low. Among the reasons are low R&D intensity (less than 0.2% of GDP devoted to science) and structural barriers hindering the development of scientific cooperation (Narbaev et al., 2025).

Another important stage of transformation in Kazakhstan's higher education has been its internationalization. Internationalization has influenced both publication activity and academic mobility. Kazakhstan has established a requirement for researchers to publish in journals indexed by Scopus and Web of Science, while other Central Asian countries, such as Turkmenistan and Tajikistan, did not have such requirements (Hladchenko & Moed, 2021). Access to international mobility through international grant projects and other funding sources has become an important dimension of post-Soviet changes in higher education, providing new opportunities for collaboration with international colleagues (Narbaev et al., 2025; Kuzhabekova et al., 2022). These changes were also enabled by the introduction of project and program management theory and practice in education (Nurtayeva et al., 2024).

In 2016, Kazakhstan ranked 85th among 218 countries in terms of the number of scientific publications and 108th in terms of citation counts (NASK, 2023). On average, Kazakhstani researchers published about 200 articles per year in Scopus-indexed journals, with an average of 4.7 citations per publication (Kuzhabekova & Ruby, 2018). The study (Biloshchytskyi et al., 2025) analyzed the activities of higher education institutions in the Republic of Kazakhstan, examining the principles of forming their information and educational environment and developing a ranking of universities using a proposed method based on data from the national institutional assessment system (IQAA).

Thus, the dissemination of knowledge is increasingly transcending geographical boundaries, significantly transforming models of scientific collaboration worldwide (Lin et al., 2023). The establishment of quality assurance systems in science and education is a key prerequisite for the effective development of higher education in a country (Biloshchytskyi et

al., 2024). The relevance of this study lies in the need to develop formal approaches for building and optimizing multi-university scientific and educational communities, particularly with a focus on developing countries such as Kazakhstan.

The research problem is to formalize the network interaction between universities based on scientometric analysis, to identify existing communities (clusters) of universities, and to propose ways to optimize the structure of such a network in order to enhance the efficiency of scientific collaboration. In other words, it is necessary to answer the question: how can the dynamics of inter-university interaction be formally represented, and what measures can strengthen the integration of universities into the global scientific community? Solving this problem will have both theoretical significance and practical value for science policy (by supporting decision-making in fostering collaborations and reforming the scientific system).

Methods and Materials

Let us consider a set of subjects of scientific activity (universities and individual researchers), which are organized and united according to the criterion of a common focus of research topics and shared scientific interests. Such a space of scientific actors will be referred to as a scientific community. Since this space may include researchers affiliated with different universities as well as multiple universities themselves, such a scientific community is inter-university. The development of such an inter-university scientific community takes place through the publication of joint scientific articles, the establishment of collaborative research projects, and similar activities. The connections between researchers in such a community are defined through a scientific collaboration network or a citation network of scientific publications.

Let W_s is a certain inter-university scientific community, $W_s \subset W$, where W is a common educational and scientific space. Let $A = \{a_1, a_2, \ldots, a_n\}$ is the set of all researchers, n – is the number of researchers. Let $Q = \{q_1, q_2, \ldots, q_m\}$ is the set of scientific publications authored by researchers from set A, m is the number of scientific publications. The task consists in constructing such subject-specific spaces that include researchers working in similar scientific fields. To achieve this, the following steps are proposed: to define a metric space and establish distances between researchers' scientific publications; to perform cluster analysis of the publications and construct clusters of similar scientific works; to assign names to the clusters and establish correspondences between publications and cluster labels; and, finally, to build inter-university scientific communities based on these clusters, which will consist of researchers.

Let $W^s = \{\eta_1, \eta_2, \ldots, \eta_r\}$ is the set of inter-university scientific communities. The membership of a researcher $a \in A$ in an inter-university scientific community $\eta \in W^s$ will be denoted by $\mu(a, \eta) \in [0,1]$. Here, the value 0 indicates that the researcher does not belong to the specified inter-university scientific community, while the value 1 means that all of the researcher's publications correspond to this field and the researcher belongs exclusively to this community, $\sum_{j=1}^{r} \mu(a, \eta_j) = 1$,

$$\mu(a, \eta) : A \times W^s \to [0,1]. \quad (1)$$

As a result of applying the method for identifying inter-university scientific communities, we obtain the distribution of each researcher's membership across different inter-university scientific communities. This is because many researchers, as well as all organizations as subjects of scientific activity, publish within several fields. At the very least, they have some publications that do not belong to their primary field. For example, a given researcher may

publish the majority of their works in the field of scientometrics but also have several publications in the field of environmental monitoring. Importantly, the total membership of a researcher across all fields is equal to one.

Let us define a metric space for establishing the distance between the vertices of the citation graph of scientific publications (Q, g), which consists of the set of scientific publications Q and a certain distance function g, defined for any pair of elements in this set. The distance g is defined as a mapping from the Cartesian square of the set Q onto the set of real numbers, i.e: g: $Q \times Q \to \mathbf{R}$, where **R** the set of real numbers. The distance between publications g is a non-negative real-valued function $g(q_i, q_j) \geq 0$, $i = \overline{1,m}$, $j = \overline{1,m}$, which is defined for $\forall\ q_i, q_j \in Q$. For function $g(q_i, q_j)$, $i \neq j$ the axioms of identity, symmetry, and the triangle inequality hold:

$$g(q_i, q_j) = 0 \Leftrightarrow i = j,$$

$$g(q_i, q_j) = g(q_j, q_i),\ \forall\ q_i, q_j \in Q,$$

$$g(q_i, q_j) \leq g(q_i, q_e) + g(q_e, q_j),\ \forall q_i, q_j, q_e \in Q, \qquad (2)$$

In this case, when $g(q_i, q_i) = 0$, $i = \overline{1,m}$, $j = \overline{1,m}$:

$$g(q_i, q_i) \leq g(q_i, q_j) + g(q_j, q_i) = 2g(q_i, q_j). \qquad (3)$$

Let (Q,C) be a directed graph that represents the relationships between the scientific publications from the set Q and the citations from the set C, Q is the set of vertices of the graph, C is the set of arcs of the graph, i.e., pairs (q_i, q_j), $q_i, q_j \in Q$, which represents the citation of a publication q_j in publication q_i, $i \neq j$. We will represent such a graph in space by a set of points corresponding to the vertices of the graph and arcs connecting them.. Distance $g(q_i, q_j)$ between arbitrary vertices $q_i, q_j \in Q$ can be calculated as the length of the shortest path from vertex q_i to vertex q_j, if it exists. A path between vertices q_i and q_j, is defined as a sequence of vertices $q_i = q_{i_0}, q_{i_1}, q_{i_2}, \ldots, q_{i_k} = q_j$, $i_0 < i_1 < i_2 < \ldots < i_k$, $k \in \mathbf{N}$, each of which, except for the last one, is connected to the next by an arc $c_{y,y+1}$, $y = \overline{0,k-1}$. For example, two vertices q_{i_0}, q_{i_1} are connected by an arc $c_{0,1}$, the vertices q_{i_1}, q_{i_2} are connected by an arc $c_{1,2}$ and so on. The length of a path is the number of arcs in this path. The shortest path is the one with the smallest length. The weights of the arcs are equal to 1, i.e., the weight function of the graph is defined as (Q,C): $f: C \to \{1\}$ and the length of the path from vertex q_i to vertex q_j is defined as follows:

$$r(q_i, q_j) = \sum_{i=0}^{k-1} f(c_{y,y+1}). \qquad (4)$$

If there is no path between vertices q_i and q_j then the length will be considered arbitrarily large, for example $r(q_i, q_j) = m + 1$. The shortest path is found using the Bellman–Ford algorithm with a complexity of $O(QC)$ or Dijkstra's algorithm with a complexity of $O(Q^2)$.

Let a metric space be given (Q,g). It is necessary to partition the set of publications Q into a certain number of subsets that do not intersect with each other. Such subsets of the set Q are called clusters. Let us denote the set of clusters by $Y=\{y_1, y_2, \ldots, y_z\}$, where z is the number of clusters into which the set P is partitioned. To define the set of clusters Y, the following

conditions must be satisfied: each publication necessarily belongs to one of the clusters, i.e. $\bigcup_{i=1}^{z} y_i = P$, each publication belongs to a unique cluster, i.e. $y_i \cap y_j = \varnothing, \ \forall i \neq j$, each cluster combines publications that are sufficiently close (in terms of the distance g).

It should be emphasized that when calculating the distances between publications using the approaches described above, so-called isolated publications may appear. An isolated publication is understood as one for which the distance to any other publication from the set P is equal to infinity. According to the definition of a cluster, no other publication can be assigned to the cluster that contains an isolated publication. As a result, clusters consisting of only a single work are formed. The presence of such clusters complicates further analysis and provides no meaningful information about the scientific domains to which these publications belong. Therefore, before performing the clustering procedure, it is advisable to exclude isolated publications from consideration.

For the clustering of such graphs, it is proposed to use the Louvain method (Blondel, 2008), which is based on the maximization of graph modularity. Modularity is defined as the sum of the differences between the fraction of edges within a given subgraph and the square of the fraction of edges with one endpoint belonging to that subgraph. That is, the modularity of the clustering of the publication graph can be defined as follows:

$$\overline{Q} = \sum_{v=1}^{z} (\beta_v - \alpha_v^2), \qquad (5)$$

where α_v – the fraction of citations where either the citing publication or the cited publication belongs to the cluster y_v, that is

$$\alpha_v = \frac{\left\| \left\{ q_i \in Q \middle| (q_i, q_j) \in C, q_i \in y_v, q_j \in Q \right\} \cup \left\{ q_i \in Q \middle| (q_j, q_i) \in C, q_i \in y_v, q_j \in Q \right\} \right\|}{\mathrm{card}(C)}, \qquad (6)$$

where β_v is the fraction of citations where both the citing publication and the cited publication belong to the cluster y_v, that is

$$\beta_v = \frac{\left\| \left\{ q_i \in Q \middle| (q_i, q_j) \in C, q_i \in y_v, q_j \in y_v \right\} \right\|}{\mathrm{card}(C)}, \qquad (7)$$

where card(C) is the number of edges of the graph (Q,C).

We assume that the initial graph (Q,C) has been clustered, for example using the Louvain method, and an initial partition of the set of publications Q into z clusters has been obtained. As a result of the clustering procedure of scientific publications, a set of clusters Y is formed. The cardinality of the set Y may be quite large, which complicates further analysis. One way to address this problem is to aggregate the constructed clusters by merging those that are close to each other and contain a small number of elements. To achieve this, it is necessary to determine the centroid of each constructed cluster.

The centroid of a cluster

$$y_k = \left\{ q_1^k, q_2^k, \cdots, q_{\mu_k}^k \right\}, \ k = \overline{1, z}, \qquad (8)$$

is defined as the object within the cluster Ω^k, or which the total distance to all other objects in the cluster is minimal:

$$\Omega^k = \arg\min \left| \left(\sum_{i=1}^{\mu_k} g(q_i^k, q_j^k), j = \overline{1, \mu_k} \right) \right|, \qquad (9)$$

where $\mu_k = \mathrm{card}(y_k)$ is the number of objects that belong to the cluster y_k, $k = \overline{1, z}$.

The algorithm for implementing such cluster merging consists of the following steps:

1. We initialize a counter b=0.

2. We find the centroids Ω^k of each cluster $y_k = \{q^k_1, q^k_2, \ldots, q^k_{\mu_k}\}$.

3. We calculate the distances between the centroids of each cluster by comparing the annotations of the publications corresponding to the centroids.

4. If there exist clusters y_k and y_l such that the distance between their centroids does not exceed the threshold value δ, i.e., the condition $g(\Omega_k, \Omega_l) \le \delta$, then

4.1. We increase the counter by one b=b+1.

4.2. We form a new cluster $y_{z+b} = y_k \cup y_l$.

4.3. Clusters y_k and y_l, are removed from further consideration.

4.4. We find the centroid of the cluster Ω_{z+b}.

4.5. We calculate the distances from the centroid of the cluster y_{z+b} to the centroids of the other clusters $y_1, y_2, \ldots, y_{z+b-1}$.

4.6. Return to Step 4.

5. If the distance between the centroids of the clusters exceeds the threshold value for all clusters, i.e., there do not exist clusters y_k and y_l for which the condition $g(\Omega_k, \Omega_l) \le \delta$, then the execution of the algorithm is terminated.

Thus, it is possible to construct an inter-university scientific community that unites researchers based on the commonality of their scientific activities. Such a community is represented in the form of a scientific collaboration network. The formal models of the metric space and clustering described above were implemented in the Gephi 0.10.1 software environment (Gephi) using the Louvain algorithm for analyzing the network of co-authored publications obtained from the OpenAlex database (OpenAlex). In this way, the theoretical approach to clustering scientific publications found practical application in constructing the collaboration graph of universities and researchers in Kazakhstan.

Results

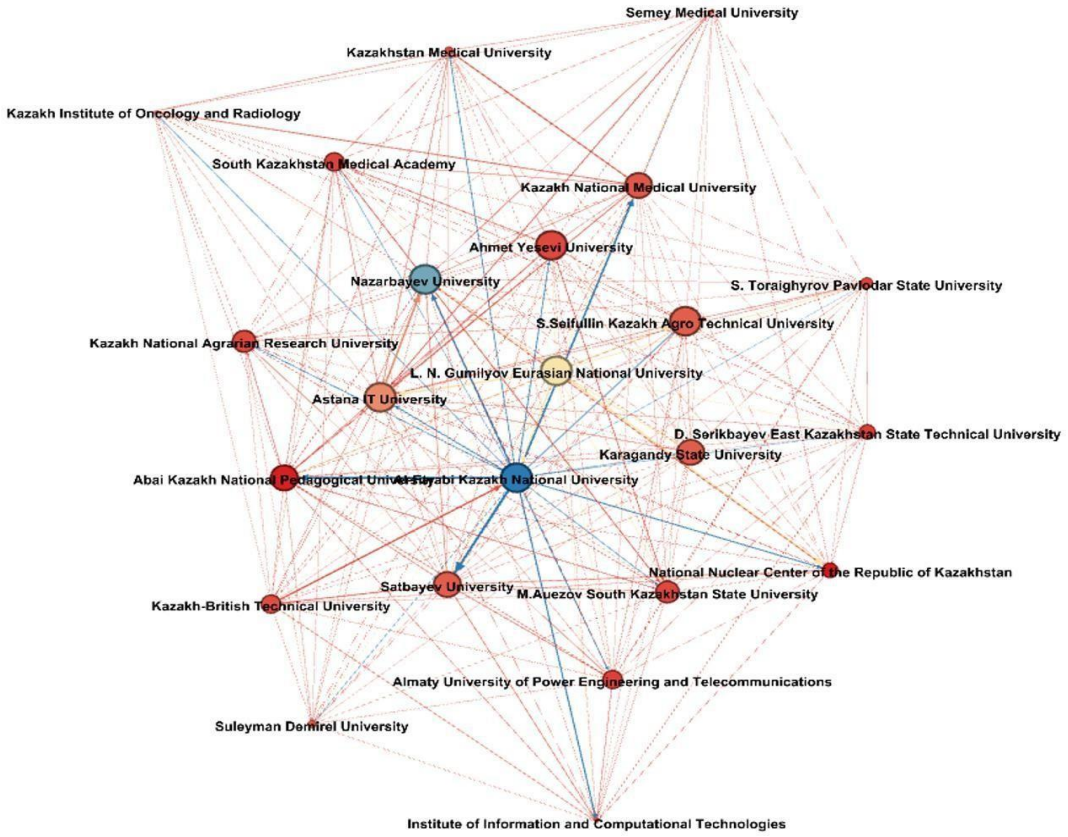
The proposed model of a metric space of scientific publications, combined with the Louvain algorithm, made it possible to move from theoretical description to practical implementation of the analysis of inter-university scientific communities. Based on open data from the OpenAlex database, a network of scientific interactions was constructed, where publications were treated as elements of clustering and their links as indicators of scientific collaboration. The implementation of this model in the Gephi software environment enabled not only the formal grouping by scientific domains but also the visualization of actual cooperation structures between universities and individual researchers. The constructed network became the basis for further quantitative and qualitative analysis of the intensity of scientific interaction. According to the proposed model, the vertices of the graph represent universities, while the edge weights are determined by the number of joint publications. This approach allows for a direct interpretation of the formalized community structure based on real data. Within the study of inter-university scientific interaction, data from the open OpenAlex database were used, which aggregates information about scientific publications, authors, organizations, and their interrelations. To obtain relevant information, a sample of records related to universities was extracted, forming a dataset that reflects cooperation at the level of article co-authorship. Particular attention was paid to the identification of affiliations: for each publication, the institution of the authors was verified, which made it possible to establish inter-institutional links.

The collected data were transformed into a network structure, where the nodes represent universities and the edges correspond to instances of joint scientific activity, in particular, co-authored publications. The edge weights were defined proportionally to the number of such joint works, which makes it possible to assess the intensity of interaction between individual

institutions. Based on this information, in September 2025, a graph was constructed that reflects the current state of scientific cooperation between universities (Figure 1). For the visualization and analysis of the network, the Gephi software environment was applied, which provided the opportunity to use algorithms for community detection, centrality calculation, and other structural characteristics of the graph. The visual representation made it possible to identify a core of universities with the highest intensity of collaboration, as well as peripheral institutions involved in a smaller number of international projects.

Figure 1.

Graph of inter-university scientific collaboration for universities of the Republic of Kazakhstan



For the quantitative representation of the results of network construction, an adjacency matrix was created, in which each university is considered as a vertex of the graph, and the values in the cells define the strength of interaction between pairs of institutions. The weight of an edge is interpreted as the number of jointly published scientific works, which makes it possible to compare the level of cooperation among universities. Thus, the matrix reflects not only the fact of cooperation but also the intensity of scientific links. The analysis of the obtained data revealed a clear regional specificity. In particular, universities of the Republic of Kazakhstan, in the vast majority of cases, collaborate primarily with each other, forming a dense internal scientific environment. At the same time, the number of joint publications with foreign institutions is relatively small, indicating weaker integration into international research networks. This is confirmed both by the numerical values in the matrix and by the visual structure of the graph constructed in Gephi, where the most intensive links are formed among domestic universities.

Table 1.
Assessment of the level of inter-university scientific collaboration

OpenAlex ID	Label	Weighted degree
I185571130	Al-Farabi Kazakh National University	20180
I60559429	Nazarbayev University	17444
I10232997	L. N. Gumilyov Eurasian National University	11145
I4210141757	Astana IT University	8012
I204275683	Satbayev University	6425
I191378831	Kazakh National Medical University	6196
I4210120897	Suleyman Demirel University	6188
I4210128045	Abai Kazakh National Pedagogical University	4298
I4210132247	National Nuclear Center of the Republic of Kazakhstan	3992
I4210124329	S.Seifullin Kazakh Agro Technical University	3030
/I2800164252	Karagandy State University	3014
I171571821	Kazakh-British Technical University	2386
I4210128576	Kazakhstan Medical University	2206
I4210121010	Kazakh Institute of Oncology and Radiology	2172
I2801707353	Ahmet Yesevi University	2142
I4210151108	M.Auezov South Kazakhstan State University	2138
I4210128817	Kazakh National Agrarian Research University	2079
I4210101268	S. Toraighyrov Pavlodar State University	1852
I4210117112	South Kazakhstan Medical Academy	1795
I247491477	Almaty University of Power Engineering and Telecommunications	1779
I4210135055	Institute of Information and Computational Technologies	1747
I4210117727	D. Serikbayev East Kazakhstan State Technical University	1662
I4210135680	Semey Medical University	1601
I4210151480	Institute of Mathematics and Mathematical Modeling	1509
I4210131705	Abylkas Saginov Karaganda Technical University	1500
I4210143225	Ministry of Education and Science of the Republic of Kazakhstan	1491
I4210159690	Kostanay State University A Baitursynov	1439
I4210106095	Aktobe Regional State University named after K.Zhubanov	1389
I4210114545	Almaty Technological University	1363
I4210143508	International Information Technologies University	1363
I4210129744	Korkyt Ata Kyzylorda State University	1313
I4210108340	University of International Business	1271
I4210159258	Shakarim University	1267
I175124709	Süleyman Demirel University	1266
I4210130920	West Kazakhstan Marat Ospanov State Medical University	1239
I3130577743	Narxoz University	1213
I4210144657	Global Health Research Center of Central Asia	1183
I4210119570	Kokshetau State University	1180
I4210111563	National Academy of Sciences of the Republic of Kazakhstan	1170
I4210099401	Institute of Plant Biology and Biotechnology	1149
I4210134323	Maqsut Narikbayev University	1141
I4210101819	M. Kh Dulati Taraz State University	1140
I4210096915	Sarsen Amanzholov East Kazakhstan University	1115

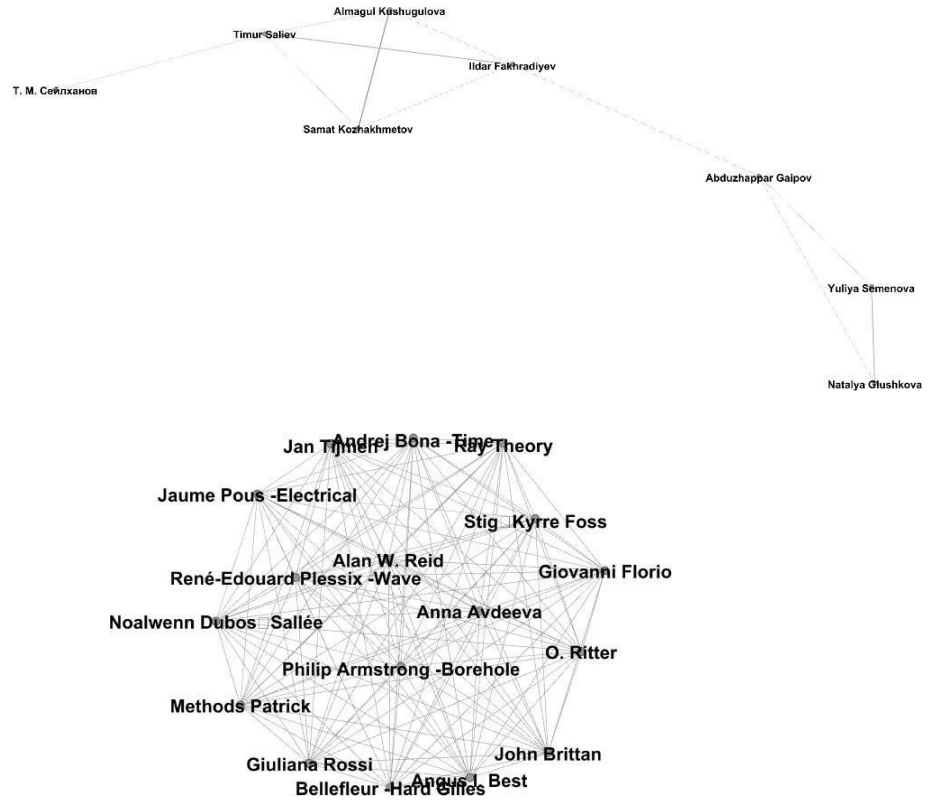
I4210115547	Karaganda Medical University	1104
I3130777500	Turan University	1098
I4210101002	National Center for Biotechnology	1093
I4210157209	Caspian University	1054
I4210158929	National Research Center for Maternal and Child Health	1042
I2801153214	Fesenkov Astrophysical Institute	1002

A similar approach was applied to construct a collaboration network among individual researchers affiliated with universities and research institutions of the Republic of Kazakhstan. In total, the sample included 67,907 researchers, for each of whom the presence or absence of co-authored publications with colleagues was recorded. As a result, a graph was constructed in which the vertices represent researchers, and the edges reflect instances of co-authorship. The weight of the edges was determined by the number of joint scientific works, allowing for a quantitative assessment of the intensity of individual scientific interaction.

The analysis of the structure of this graph revealed the existence of several clearly defined clusters characterized by a high density of internal connections. Figure 2 presents two clusters with components where the strength of collaboration exceeds the threshold value of 200 joint publications, which made it possible to focus on the most significant research communities. It was found that these clusters largely correlate with specific scientific fields in which co-authorship is most intensive.

Figure 2.

Collaboration graph among individual researchers of the Republic of Kazakhstan, where the strength of collaboration exceeds the threshold value of 200 joint scientific publications.



The analysis also revealed an interesting anomaly in the structure of the network. Among the clusters, one stands out clearly, demonstrating exceptionally close collaboration between Kazakhstani universities and foreign researchers in the field of geology. In contrast, a large number of smaller clusters are formed predominantly by researchers from Kazakhstan and reflect specific national research directions in medicine, information technology, and other applied fields. Such a structure indicates the simultaneous existence of strong international ties in selected areas and fragmentation of domestic scientific communities in several disciplines. Thus, the collaboration network at the level of individual researchers demonstrates a high degree of internal coherence within specialized scientific fields and complements the picture obtained from the analysis of inter-university interactions. It clearly shows that the intensity of cooperation is largely determined by researchers' affiliation with scientific schools and fields of knowledge.

Discussions

The formation of inter-university communities is essential for ensuring the synergy of scientific resources and competencies. No single university or individual researcher possesses the full spectrum of knowledge and expertise required to solve complex interdisciplinary problems. Such an integration of researchers and universities makes it possible to combine different schools and methodologies, enhance the quality and novelty of research, and avoid duplication of scientific results and efforts. An important outcome of establishing international scientific communities is the increased global competitiveness of universities, the growth in the number of joint publications in high-ranking journals, the rise in citation levels, and higher impact indices. This, in turn, makes universities and researchers more visible on the global scientific and educational stage. Another effect of forming and identifying inter-university scientific communities is knowledge exchange and the preparation of highly qualified personnel, fostering the mobility of students and faculty, increasing the likelihood of funding for new projects and programs, and ensuring the sustainability of collaboration. All these factors allow for a focus on creating scientific trends and long-term development strategies. Thus, inter-university scientific communities serve as a mechanism for integration into the global scientific space, enhancing research quality, creating conditions for innovation, and ensuring the sustainable development of both individual universities and national scientific systems as a whole.

The obtained results confirm that the formation of inter-university scientific communities is a key mechanism for integrating national science into the global scientific space. The analysis of the university collaboration network in Kazakhstan revealed the existence of a core of institutions with a high level of joint publications (Al-Farabi Kazakh National University, Nazarbayev University, L. N. Gumilyov Eurasian National University, and Astana IT University), while a number of universities occupy a peripheral position and are characterized by weaker integration. Such a structure is also typical for other developing countries, where scientific activity tends to be concentrated in a limited number of leading centers.

A comparison with international experience shows that enhancing the effectiveness of multi-university communities requires systemic measures to support interdisciplinary projects, international grant programs, and the promotion of researcher mobility. For example, in the Baltic countries, integration into European research networks has significantly increased the visibility of universities in international databases. For Kazakhstan, an important task is to expand cooperation beyond the internal system, since the current network structure indicates the predominance of national collaborations over international ones.

It is also important to emphasize the methodological aspect: the use of scientometric approaches and clustering algorithms (in particular, the Louvain method) made it possible to identify hidden patterns in the structure of collaboration that are difficult to detect using

traditional statistical methods. At the same time, a limitation is the dependence on OpenAlex data, which do not always fully reflect local journals and conference proceedings. This opens up prospects for further improvement of the model by combining multiple data sources and integrating alternative metrics of scientific impact.

Conclusion

In this study, a formal model was developed for the identification and analysis of inter-university scientific communities based on the network structure of co-authored publications. The application of this model to OpenAlex data made it possible to construct a map of scientific interactions among Kazakhstani universities and to identify key centers of scientific activity. It was found that the highest intensity of collaboration is demonstrated by the country's leading universities, while international integration remains limited.

The practical value of the obtained results lies in the possibility of applying network analysis methods for the development of science policy aimed at supporting strategic partnerships, enhancing the competitiveness of universities, and increasing their visibility in the global academic space.

Among the limitations of this study, it is important to note the use of only one database (OpenAlex) and the focus on universities in Kazakhstan, which reduces the possibility of direct comparison with other countries. Future research should be directed toward:

- expanding the analysis to the level of thematic domains and individual scientific schools;
- assessing the dynamics of community formation over time;
- modeling scenarios of international integration, taking into account potential growth in science funding and participation in international projects.

Thus, the proposed approach demonstrates its potential as a tool for strategic planning in higher education and science, allowing not only the identification of current research networks but also the design of strategies for their further development.

Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

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Andrii Biloshchytskyi – Conceptualization, Resources, Supervision; Oleksandr Kuchanskyi – Writing, Original draft preparation; Aidos Mukhatayev – Methodology, Writing-Reviewing; Yurii Andrashko – Editing, Writing-Reviewing; Adil Faizullin – Investigation, Project administration, Formal analysis; Aidar Ispussinov – Visualization, Investigation.

References

Kosztyán, Z. T., Fehérvölgyi, B., Csizmadia, T., & Kerekes, K. (2021). Investigating collaborative and mobility networks: Reflections on the core missions of universities. Scientometrics, 126, 3551–3564. https://doi.org/10.1007/s11192-021-03865-7

Zhang, L., Gong, J., Yang, Y., & Li, J. (2025). Cities in global and sustainable scientific

collaboration network: Unveiling cooperation centers. Humanities and Social Sciences Communications, 12, 1406. https://doi.org/10.1057/s41599-025-05667-1

Narbaev, T., Amirbekova, D., & Bakdaulet, A. (2025). A decade of transformation in higher education and science in Kazakhstan: A literature and scientometric review of national projects and research trends. Publications, 13(3), 35. https://doi.org/10.3390/publications13030035

Amirbekova, D., Narbaev, T., & Kussaiyn, M. (2022). The research environment in a developing economy: Reforms, patterns, and challenges in Kazakhstan. Publications, 10(4), 37. https://doi.org/10.3390/publications10040037

Hladchenko, M., & Moed, H. F. (2021). The effect of publication traditions and requirements in research assessment and funding policies upon the use of national journals in 28 post-socialist countries. Journal of Informetrics, 15(4), 101190. https://doi.org/10.1016/j.joi.2021.101190

Kuzhabekova, A., Ispambetova, B., Baigazina, A., & Sparks, J. (2022). A critical perspective on short-term international mobility of faculty: An experience from Kazakhstan. Journal of Studies in International Education, 26(4), 454–471. https://doi.org/10.1177/10283153211023613

Nurtayeva, D., Kredina, A., Kireyeva, A., Satybaldin, A., & Ainakul, N. (2024). The role of digital technologies in higher education institutions: The case of Kazakhstan. Problems and Perspectives in Management, 22(1), 562–577. https://doi.org/10.21511/ppm.22(1).2024.44

National Academy of Sciences of Kazakhstan. (2023). National report on science. Government of Kazakhstan. https://www.gov.kz/uploads/2023/11/17/7ce8a403d55b7f2b1cb4ab194337832f_original.5055287.pdf

Kuzhabekova, A., & Ruby, A. (2018). Raising research productivity in a post-Soviet higher education system: A case from Central Asia. European Education, 50(3), 266–282. https://doi.org/10.1080/10564934.2017.1348445

Biloshchytskyi, A., Makhatayev, A., Kuchanskyi, A., Omirbayev, S., Andrachko, Y., & Biloshchytska, S. (2025). Method for assessing quality assurance in higher education institutions. TEM Journal. 14 (1), 372-386. https://doi.org/10.18421/TEM141-33

Lin, Y., Frey, C. B., & Wu, L. (2023). Remote collaboration fuses fewer breakthrough ideas. Nature, 623(7989), 987–991. https://doi.org/10.1038/s41586-023-06767-1

Biloshchytskyi, A., Omirbayev, S., Mukhatayev, A., Kuchanskyi, O., Hlebena, M., Andrashko, Y., Mussabayev, N., & Faizullin, A. (2024). Structural models of forming an integrated information and educational system "quality management of higher and postgraduate education". Front. Educ. 9:1291831. doi: 10.3389/feduc.2024.1291831

Blondel, V. D., Guillaume, J. L., Lambiotte, R., & Lefebvre, E. (2008). Fast unfolding of communities in large networks. Journal of Statistical Mechanics: Theory and Experiment, 2008(10), P10008. https://doi.org/10.1088/1742-5468/2008/10/P10008

Gephi. The open graph visualization platform. https://gephi.org/

OpenAlex. The open catalog of the global research system. https://openalex.org/

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INNOVATING CAREER SUPPORT IN HIGHER EDUCATION FOR PERSONALIZED PROFESSIONAL DEVELOPMNET

Abstract. This article examines the current challenges and possibilities in preparing future professionals within higher education, paying particular attention to the changing educational environment of Kazakhstan. It argues that universities must align their curricula with the fast-shifting demands of the global labor market, where not only technical knowledge but also career planning and personal competencies are increasingly valued. The discussion highlights the growing significance of soft skills such as adaptability, problem-solving, and communication as key elements of employability, on par with academic training. Drawing on both national and international perspectives and informed by concepts of globalization and interconnected labor markets, the study compares how different systems approach career support. The analysis shows that while technical expertise remains necessary, modern employers often prioritize creativity, flexibility, and interpersonal strengths. By bringing together findings from pedagogical research and policy reports, the article stresses the need to embed career education and soft-skills development into university programs. It concludes that the professional success of graduates depends not only on specialized training but also on the systematic cultivation of transferable competencies, which together will help them stay resilient and competitive in an unpredictable global economy.

Keywords: higher education, professional development, career planning, soft skills, employability, global labor market, educational reform, competitiveness of graduates

Introduction

Higher education today is developing in a context of constant change, where the ability of universities to keep pace with the global labor market has become a defining challenge (Klyachko & Tokareva, 2025). Across Kazakhstan, as well as internationally, many initiatives have aimed to strengthen career services and professional development programs for students. Yet a clear gap remains between what is prescribed in theory and what students actually experience in practice. Digital platforms such as LinkedIn or Handshake, for example, provide useful tools for job searching and skills training, but they typically address only fragments of the wider career journey. For many students, this leaves their development fragmented and lacking the sustained, personalized guidance needed throughout the university years.

Career counseling at Kazakhstani universities, though expanding, is still uneven in quality and often not anchored in robust theoretical frameworks. As a result, the support provided is limited in both personalization and long-term impact. Recognizing this, our study makes use of the PRISMA methodology (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to ensure that our review of both national and international practices is systematic and transparent (Sarkis-Onofre et al., 2021). By applying this approach, we were able to carefully trace inclusion and exclusion criteria, highlight effective models, and identify the specific shortcomings most relevant to the Kazakhstani context.

The importance of such research is underscored by the fact that employers continue to raise expectations for graduate competencies. For many students, the university period is

decisive: it is a time when career aspirations are reshaped, skills are tested, and professional goals are refined (Boluchevskaya, 2010). Students who lack clarity in career orientation often face greater risks of academic difficulties, lower motivation, and even early withdrawal from studies (Krasil'nikova, 2024). In the context of an increasingly digital economy, universities are thus under pressure to find innovative approaches technological as well as pedagogical that can support students more effectively (Zhang, 2024).

One of the most persistent problems is the divide between academic research on career development and the day-to-day practices of career advisors. Investigations of dozens of universities have shown that many programs are not grounded in current theoretical concepts (Sampson et al., 2014). Often, career courses are designed to reach as many students as possible, but with limited resources this broad coverage can come at the expense of individualization. Digital tools, if used thoughtfully, offer one way of closing this gap by providing students with personalized, research-informed pathways that can be scaled across entire institutions.

Research also shows that targeted initiatives in career development do make a difference. Still, students continue to report barriers such as uncertainty in career choices or a lack of practical experience (Bakhtin, 2022). This highlights the importance of asking not only whether programs are available, but how well they are designed, which forms of support are most effective, and how digital solutions can help expand access.

Existing approaches to evaluation also fall short. Quantitative indicators, while useful for tracking numbers, do little to explain the deeper mechanisms that shape students' choices or persistence. This imbalance is reflected in Social Cognitive Career Theory (SCCT), where emphasis has traditionally been placed on individual factors such as self-efficacy, while contextual influences like barriers and institutional support have received less attention (Lent et al., 2000). A more complete understanding requires consideration of both.

Literature also points to the decisive role of family support, financial circumstances, and the educational environment itself factors often overlooked in practice (Le et al., 2020). Participation in research, mentoring, or project-based learning can significantly enhance students' confidence and sense of direction (Lin et al., 2016), while simple community engagement appears to have less impact. These findings suggest the potential value of digital platforms that scale up proven practices such as mentorship and research involvement, providing structured yet flexible opportunities for growth.

Taken together, these insights demonstrate both the urgent need for stronger career support and the limitations of traditional approaches. Against this backdrop, the present study aims to analyze best practices and distill key requirements for a modern IT-based career counseling system. This work forms part of the project «Development and implementation of it solutions in the process of professional development and career counseling for students and graduates of higher education institutions» (Project IRN AP26194889), whose goal is to create a system that offers personalized, research-based, and accessible career planning tools, while also automating and strengthening the career counseling infrastructure within universities.

Research strategy and methods

To explore the challenges of career counseling and professional development in higher education, we adopted a systematic approach that allowed us to examine the field comprehensively and identify both achievements and gaps. The methodology combined two main components: a systematic literature review, guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework (Sarkis-Onofre et al., 2021), and a comparative analysis of existing IT-based solutions.

To strengthen the methodological foundation of this study, we carefully connected each research objective with the corresponding stage of the applied methods. The literature review

was conducted using the PRISMA approach, which provided a transparent process for selecting articles, applying inclusion and exclusion criteria, and synthesizing findings. A comparative analysis was then used to evaluate the functionality and theoretical basis of existing IT platforms, helping us assess their relevance to the Kazakhstani higher education context. To better understand the perspectives of different stakeholders, we applied empirical methods such as surveys, focus groups, and interviews with students, alumni, faculty, and employers. In addition, established theoretical models Holland's RIASEC, Social Cognitive Career Theory (SCCT), and Career Construction Theory served as the conceptual framework for developing an IT-based model of career counseling. By linking the objectives with the methods in this structured way, the study ensures both rigor and reliability, while also highlighting its practical and theoretical contributions (MacLeod et al., 2022).

Systematic Literature Review: PRISMA Application

The literature review was conducted to map the theoretical foundations of career development and highlight factors influencing students' professional self-determination. Our application of the PRISMA framework ensured a transparent and replicable process.

The search was conducted between October 2023 and February 2024 across several academic databases, including

Scopus, Web of Science, Google Scholar, and eLibrary.ru. Search terms were formulated in English and Russian, including: «career counseling», «student professional self-determination», «social cognitive career theory», «IT in education», «EdTech» and «student self-efficacy».

Our search initially yielded 342 sources. After removing duplicates, 289 articles remained. These were screened based on titles and abstracts, leading to the exclusion of 197 sources that were not directly relevant to career support in higher education. The full texts of the remaining 92 articles were assessed for eligibility.

The following inclusion criteria were applied:

- Published in a peer-reviewed journal between 2010 and 2024.
- Focused specifically on higher education students or graduates.
- Directly addressed career counseling, professional development theories, or digital support tools.

Exclusion criteria included:

- Studies focused on secondary or vocational education.
- Articles where career development was not the primary topic.
- Editorials, book reviews, and non-peer-reviewed conference proceedings.

After this screening, 48 sources were selected for the final qualitative synthesis. These sources were grouped into three thematic clusters for analysis:

1. Foundational Theories of Career Development: Articles discussing core models like Holland's RIASEC, SCCT, and Career Construction Theory.
2. Implementation and Practice: Studies examining the application of career support programs, including challenges and success factors.
3. Digital Innovations in Career Counseling: Research focused on EdTech platforms and IT solutions in higher education.

This systematic process allowed us to identify the most influential theoretical frameworks and pinpoint specific gaps between theory and practice, which directly informed our analysis.

Comparative Analysis of IT Solutions

Alongside the literature review, the study examined existing digital platforms that support career planning. The goal was not simply to describe available tools but to assess how

effectively they align with theoretical models of career development and how adaptable they may be to the Kazakhstani context.

This analysis focused on widely used international platforms, including LinkedIn, Coursera for Campus, and Handshake, as well as tools such as Big Interview and CareerHub. In addition, local and national EdTech projects in Kazakhstan were considered. Each platform was analyzed according to its target audience, key features, theoretical grounding, and strengths and limitations.

Specific Objectives

The research was guided by several concrete objectives:

1. To conduct a systematic literature review of career counseling theories, IT-supported practices, and their implementation in both Kazakhstani and international settings.
2. To identify gaps between higher education programs and the requirements of the labor market, with a special focus on the role of soft skills and individualized career planning.
3. To analyze the strengths and shortcomings of leading IT platforms and evaluate their potential for adaptation in Kazakhstan.
4. To collect empirical insights from students, graduates, faculty, and employers through surveys, focus groups, and interviews, providing a well-rounded understanding of stakeholder expectations.
5. To design a digital model for career counseling that incorporates recognized theories Holland's RIASEC, Social Cognitive Career Theory, and Career Construction Theory translating them into practical tools that are both accessible and scalable.
6. To propose strategic recommendations for implementation, including approaches to monitoring, evaluation, and impact assessment on graduate employability.

By combining systematic literature analysis with comparative study of digital platforms, this methodology lays a strong foundation for developing an IT solution that is both evidence-based and responsive to the needs of Kazakhstani universities.

In this publication, we focus primarily on the initial stages of the project, namely the systematic literature review and the comparative analysis of existing IT-based career counseling solutions. These steps have laid the theoretical and methodological foundation for identifying key gaps and requirements for future model development. The empirical stage (surveys, focus groups, and interviews) as well as the design of an integrated digital career counseling model and the formulation of strategic monitoring and evaluation recommendations are planned for subsequent phases of the research and will be presented in forthcoming publications.

Summary of Literature Review

The systematic review of 48 selected sources revealed several key findings that shape our understanding of modern career support. The analysis, structured around our three thematic clusters, identified dominant theoretical approaches, practical implementation gaps, and the current state of digital solutions.

Foundational Theories in Career Development

Our analysis confirmed that three frameworks are most influential in the field:

Holland's Theory of Vocational Personalities, Social Cognitive Career Theory (SCCT), and Career Construction Theory.

- Holland's Theory remains widely applied due to the practicality of its RIASEC model, which aligns personality types with work environments to guide career choice. Its value lies in providing a clear starting point for student self-exploration.
- Career Construction Theory offers a contemporary perspective, viewing careers as an ongoing process of adaptation rather than a linear path. Its focus on narrative and meaning making is particularly relevant for preparing students for an unpredictable labor market.

• Social Cognitive Career Theory (SCCT), developed by Lent, Brown, and Hackett, was the most frequently discussed framework in recent literature. Research consistently highlights self-efficacy as a powerful predictor of career intentions and persistence. However, our review also revealed that contextual factors like institutional support and external barriers are less studied, indicating a significant research gap.

Gaps in Implementation and Practice

A recurring theme across 18 of the analyzed articles was the disconnect between theory and the actual practice of university career services. Many career programs are designed for broad reach but lack personalization and are not grounded in established theoretical models (Sampson et al., 2014). Furthermore, evaluations of these programs often rely on quantitative metrics (e.g., participation numbers) that fail to capture the deeper impact on students' confidence and decision-making. This is especially true in contexts like Kazakhstan, where family and financial circumstances strongly influence career choices, yet are often overlooked by formal support systems (Le et al., 2020).

Digital Innovations and Their Limitations

The review of digital tools showed a market dominated by solutions focused on specific, isolated stages of the career journey, such as job searching (LinkedIn), skills training (Coursera), or interview preparation (Big Interview). While these platforms are useful, they lack the integrated, holistic support that guides a student from initial self-discovery to long-term professional growth. This fragmentation represents a major gap in the current EdTech landscape, reinforcing the need for a comprehensive, theory-grounded platform.

The synthesis of these findings leads to a clear conclusion: effective career support requires an integrated approach that combines validated diagnostics, personalized guidance, and meaningful, confidence-building experiences, all within a unified digital ecosystem.

The systematic review revealed several key theoretical approaches that continue to shape research and practice in student career development. Three frameworks in particular Holland's Theory of Vocational Personalities, Social Cognitive Career Theory (SCCT), and Career Construction Theory emerged as the most influential. Each provides distinctive insights, yet together they offer a complementary foundation for supporting students in their professional self-determination.

Holland's Theory. Since its introduction in 1959, Holland's model has remained widely applied in both research and practice because of its clarity and practicality. The theory argues that career choice is most successful when there is alignment between an individual's personality type and their work environment. Holland described six personality/work environment types, known by the RIASEC acronym: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. Most people combine elements of several types, and recognizing this blend can help students identify diverse career directions. The model emphasizes three key dimensions congruence, differentiation, and consistency that shape professional identity and make decision-making easier (Brown & Lent, 2012; Rodionov & Borisova, 2021).

Career Construction Theory. This perspective views career not as a linear progression but as a process of ongoing adaptation (Brown & Lent, 2012). Central to this theory is the idea of narrative related to the fact that individuals actively construct meaning from their professional experiences and use these reflections to guide future decisions (MacLeod et al., 2022). Counselors, in this approach, help students articulate their personal stories, motives, and adaptive strategies. While it has often been applied to mid-career professionals, its focus on adaptability makes it equally valuable for preparing undergraduates to enter a labor market defined by rapid technological and economic change (Hirschi & Koen, 2021).

Social Cognitive Career Theory (SCCT). Developed by Lent, Brown, and Hackett, SCCT extends earlier models by emphasizing the interaction between personal beliefs, expected

outcomes, and goal setting (Rodionov & Borisova, 2021; Wang et al., 2022). It draws on Bandura's broader social cognitive framework (Bandura, 1986), highlighting how personal factors, behaviors, and environmental conditions influence one another. Research grounded in SCCT consistently shows that self-efficacy is a powerful predictor of students' educational and career intentions, directly affecting persistence and success (Bandura, 1997; Conklin et al., 2013; Jiang, 2016). Yet there are still gaps in understanding how contextual influences such as institutional support, family resources, or financial constraints interact with self-efficacy and outcome expectations (Lent et al., 2000). Scholars increasingly call for more attention to how learning experiences, mentoring, and project involvement shape career choices (Fouad et al., 2010; Olson, 2014).

The review also exposed imbalances in both research and practice. Too often, quantitative methods dominate evaluations of career programs, producing numerical indicators without explaining the underlying mechanisms of change. Similarly, while self-efficacy has been studied extensively (Bandura, 2012; Yamani & Almazroa, 2024), external barriers and forms of support remain less developed in theory and underutilized in practice (Deemer et al., 2014; Thiem & Dasgupta, 2022). This is especially problematic in contexts such as Kazakhstan, where students' career choices are strongly influenced by family expectations, financial circumstances, and institutional resources (Lent et al., 2015; Virtic & Sorgo, 2022).

Taken together, these findings suggest that effective career counseling requires a more integrated approach, one that combines validated diagnostics, attention to contextual factors, and opportunities for students to engage in meaningful, confidence-building experiences. Such insights provide the conceptual backbone for the IT solution proposed in this project.

Integration into IT Solutions

The comparative analysis of existing digital platforms shows that the global market for career development tools is dominated by solutions designed for specific purposes. Most platforms concentrate on one stage of the pathway such as job searching, skills training, or interview preparation rather than offering holistic, continuous support. This fragmentation leaves students without sustained guidance across their academic and early professional journeys.

Findings from platform analysis indicate that LinkedIn excels in networking and content but offers limited deep personalization attuned to local labor markets. Coursera for Campus provides high-quality courses and credentials yet often lacks mentoring and tight integration with institutional ecosystems. Handshake connects students with employers primarily in the United States while tools such as Big Interview and CareerHub add specialized functions focused on single stages. Local EdTech pilots in Kazakhstan are sensitive to national labor needs but face scalability and global-integration challenges. Viewed together, widely used tools are practical and popular, yet they typically operate without explicit theoretical grounding and with limited personalization.

Table 1
Comparative Analysis of IT Platforms for Career Development

Platform	Target Audience	Key features	Theoretical foundations	Strength	Weakness
LinkedIn Learning / Career	Students, graduates, professionals	Job search, professional networking, skills courses, AI-based recommendations	Implicit (market-driven, not explicitly theory-based)	Global network, wide content base, integration with employer needs	Limited personalization; focus on general skills, not tailored to local labor markets
Coursera for Campus	Universities, students	Online courses, certificates, skill diagnostics, career guidance modules	Competency-based learning models	Access to top universities, flexibility, affordable certification options	Courses often generic; limited mentoring/personal support
Handshake	Students and employers (mainly US universities)	Job/internship listings, employer-student matching, event management	Employability & career readiness models	Strong employer network, direct connection to universities	Limited global coverage; oriented mostly towards US market
Big Interview	Students, job seekers	AI-driven mock interviews, question banks, structured feedback	Social-cognitive career theory (applied)	Improves interview readiness, personalized training	Focuses only on interview stage; lacks broader career development functions
CareerHub	Universities, career centers	Career portal, job boards, event management, counseling support	Holistic student development models	Strong institutional integration, customizable for HEIs	Less known globally; expensive for smaller institutions
Local/National EdTech platforms (e.g., Kazakhstan EdTech pilot projects)	Students, graduates in specific regions	Diagnostics, LMS integration, career advising tools	Contextualized to national labor market needs	Adapts to cultural & labor specifics, government recognition	Limited scalability; often lack global employer connections

This framework bridges psychology, pedagogy, and IT design, operationalizing complex constructs such as self-efficacy and person environment congruence into system requirements. The results summarized in Table 1 show that the market is dominated by utilitarian solutions focused on only one stage of the career pathway (job search or training). There is a clear gap for a comprehensive, integrated platform that would accompany students from self-exploration to employment, grounded in scientific models and offering deep personalization.

Our synthesis of theoretical insights and platform comparisons points to four essential requirements for an effective IT solution in the Kazakhstani higher education context:

1. Evidence-based diagnostics. A strong platform should begin with validated tools for self-discovery, drawing on established frameworks such as Holland's RIASEC model and

constructs from Social Cognitive Career Theory. Diagnostics are the basis for meaningful personalization.

2. Dynamic personalization. Career pathways should not be presented as fixed menus of courses or activities. Instead, the system must build adaptive plans that evolve alongside the student, reflecting the constructivist view of career development as a continuous narrative.

3. Integration of high-impact practices. Mentoring, participation in research projects, and opportunities for applied learning are consistently shown to strengthen self-efficacy (Quinlan & Renninger, 2022). An effective platform should therefore facilitate mentor matching, project participation, and targeted networking, rather than relying solely on general training content (Lin et al., 2016).

4. Creation of a unified ecosystem. Current solutions are fragmented. What is needed is a single environment that links diagnostics, learning, experience-building, and job search into a seamless process, guiding students step by step from self-exploration to employment.

This framework bridges psychology, pedagogy, and IT design, operationalizing complex constructs such as self-efficacy and person environment congruence into system requirements. The results summarized in Table 1 show that the market is dominated by utilitarian solutions focused on only one stage of the career pathway (job search or training). There is a clear gap for a comprehensive, integrated platform that would accompany students from self-exploration to employment, grounded in scientific models and offering deep personalization.

The formulated requirements represent a bridge between psychological career theories and principles of information-systems design. The theoretical significance of this work lies in translating complex constructs such as self-efficacy and congruence into concrete functional requirements, thereby creating a scientific foundation for future developments in EdTech. The practical significance and innovative value lie in shifting from utilitarian job-placement support to holistic, proactive management of students' professional development. A platform built on these requirements should enhance awareness, self-efficacy, and, as a result, employability and competitiveness. For universities, such an IT solution offers a means to scale high-quality career support and to make data-driven management decisions.

It is important to emphasize that this article provides an analytical foundation and a conceptual framework. The next step involves developing a minimum viable product (MVP), piloting it in educational settings, and empirically assessing its impact on students' career outcomes.

Conclusion

In an era of rapidly evolving labor market demands and increasing complexity in students' career decision-making, the role of universities in providing structured and comprehensive career support has become more critical than ever. This study set out to bridge theoretical frameworks, practical models, and digital innovations in order to define the essential requirements for next-generation IT-based career counseling systems in higher education.

The findings underscore several important insights. First, the enduring relevance of established psychological theories Holland's vocational typology, Career Construction Theory, and Social Cognitive Career Theory remains central to understanding and supporting students' career development. These frameworks provide valuable guidance on how students form career intentions, navigate uncertainty, and build self-efficacy. Second, comparative analysis of existing digital platforms revealed that while many tools deliver useful functions, they often remain fragmented, narrowly focused, and insufficiently anchored in theory.

Synthesizing these insights, the study advances four interconnected design principles for future IT systems: (1) scientifically validated diagnostics, (2) adaptive personalization of learning and career pathways, (3) integration of mentoring and experiential learning, and (4) the creation of a holistic ecosystem uniting career education, skills development, and

employment opportunities. Together, these principles form the foundation for a platform capable of supporting students across all stages of professional development, ultimately strengthening their career readiness and competitiveness.

The contribution of this research is twofold. Theoretically, it operationalizes complex constructs of career psychology into concrete requirements for educational technologies. Practically, it outlines the basis for designing IT-driven career counseling models that go beyond job placement to foster lifelong professional growth.

At the same time, this study has certain limitations. It primarily focuses on theoretical and methodological analysis and a comparative review of existing solutions; the empirical component (surveys, interviews, focus groups) will be addressed in subsequent stages of the project. In addition, reliance on available literature and selected international practices requires further adaptation of conclusions to the Kazakhstani higher education context.

Future research will build upon these foundations by developing and piloting a prototype of the proposed IT model within universities, followed by empirical evaluation of its effectiveness. Such work will allow for testing practical applicability, identifying implementation challenges, and refining recommendations for broader integration. Ultimately, these steps will demonstrate how digital solutions can enhance not only individual student outcomes but also the institutional capacity of universities to provide scalable, evidence-based, and future-oriented career support.

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Author Contributions

Ainash Kudysheva: Conceptualization, Methodology, Writing – Original Draft Preparation, Supervision, Editing. Askar Azhenov: Theoretical Analysis, Literature Review, Writing – Reviewing and Editing. Aizhan Temerbayeva: Project Administration, Resources, Literature Review, Writing – Reviewing and Editing. Indira Saparbekova: Writing – Review and Editing.

References

Bakhtin, E. L. (2022). *Rol' vysshego obrazovaniya v formirovanii orientatsiy studentov i vypusknikov vuzov na prekar'nuyu zanyatost'* [The role of higher education in shaping the orientation of students and university graduates towards precarious employment] (Candidate of Sociology dissertation).

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Bandura, A. (2012). On the functional properties of perceived self-efficacy revisited. *Journal of Management, 38*(1), 9–44.

Boluchevskaya, V. V. (2010). *Sotsialno-psikhologicheskie osobennosti professional'nogo samoopredeleniya budushchikh spetsialistov pomogayushchikh professiy* [Socio-

psychological characteristics of professional self-determination of future specialists in helping professions]. Volgograd: Izd-vo VolGMU.

Brown, S., & Lent, R. (2012). *Career development and counseling: Putting theory and research to work* (2nd ed.). Hoboken, NJ: Wiley & Sons.

Conklin, A. M., Dahling, J. J., & Garcia, P. A. (2013). Linking affective commitment, career self-efficacy, and outcome expectations: A test of social cognitive career theory. *Journal of Career Development, 40*(1), 68–83. https://doi.org/10.1177/0894845311414572

Deemer, E. D., Thoman, D. B., Chase, J. P., & Smith, J. L. (2014). Feeling the threat: Stereotype threat as a contextual barrier to women's science career choice intentions. *Journal of Career Development, 41*(2), 141–158. https://doi.org/10.1177/0894845313483003

Fouad, N. A., Hackett, G., Smith, P. L., Kantamneni, N., Fitzpatrick, M., Haag, S., & Spencer, D. (2010). Barriers and supports for continuing in mathematics and science: Gender and educational level differences. *Journal of Vocational Behavior, 77*(3), 361–373. https://doi.org/10.1016/j.jvb.2010.06.004

Jiang, Z. (2016). Emotional intelligence and career decision-making self-efficacy: Mediating roles of goal commitment and professional commitment. *Journal of Employment Counseling, 53*(1), 30–47. https://doi.org/10.1002/joec.12026

Klyachko, T. L., & Tokareva, G. S. (2025). Otsenka izbytochnosti/nedostatochnosti kvalifikatsii molodezhi: zarubezhnyi opyt [Assessment of redundancy/deficiency of youth qualifications: Foreign experience]. *Professional Education and Labor Market, 13*(1), 49–74.

Krasil'nikova, M. M. (2024). *Otnoshenie k obrazovatel'noi srede i akademicheskaia motivatsiia kak prediktory professional'nogo samoopredeleniia budushchikh pedagogov* [Attitudes toward the educational environment and academic motivation as predictors of professional self-determination of future teachers] [Doctoral dissertation].

Le, T. D., Robinson, L. J., & Dobele, A. R. (2020). Understanding high school students' use of choice factors and word-of-mouth information sources in university selection. *Studies in Higher Education, 45*(4), 808–818. https://doi.org/10.1080/03075079.2018.1564259

Lent, R. W., Brown, S. D., & Hackett, G. (2000). Contextual supports and barriers to career choice: A social cognitive analysis. *Journal of Counseling Psychology, 47*(1), 36–49. https://doi.org/10.1037/0022-0167.47.1.36

Lent, R. W., Miller, M. J., Smith, P. E., Watford, B. A., Hui, K., & Lim, R. H. (2015). Social cognitive model of adjustment to engineering majors: Longitudinal test across gender and race/ethnicity. *Journal of Vocational Behavior, 86*, 77–85. https://doi.org/10.1016/j.jvb.2014.11.004

Lin, Y., Liu, Z., Li, W., & Ma, H. (2016). Experience of dormitory peer mentors: A journey of self-learning and development. *Education, 136*(4), 437–450.

MacLeod, A., Burm, S., & Mann, K. (2022). Constructivism: Learning theories and approaches to research. In K. Mann, J. Gordon, & M. Dornan (Eds.), *Researching medical education* (pp. 25–40). Hoboken, NJ: Wiley.

Olson, J. S. (2014). Opportunities, obstacles, and options: First-generation college graduates and social cognitive career theory. *Journal of Career Development, 41*(3), 199–217. https://doi.org/10.1177/0894845313486352

Quinlan, K. M., & Renninger, K. A. (2022). Rethinking employability: How students build on interest in a subject to plan a career. *Higher Education, 84*(4), 863–883. https://doi.org/10.1007/s10734-021-00767-7

Rodionov, M. G., & Borisova, O. M. (2021). Teorii professional'nogo razvitiya i kar'ery v sovremennykh rynochnykh usloviyakh [Theories of professional development and

careers in modern market conditions]. In *Upravlenie sotsial'no-ekonomicheskimi sistemami v usloviyakh neopredelennosti* (pp. 62–82).

Sampson, J. P., Hou, P. C., Kronholz, J. F., Dozier, V. C., McCain, M. C., & Buzzetta, M. (2014). A content analysis of career development theory, research, and practice–2013. *The Career Development Quarterly, 62*(4), 290–326. https://doi.org/10.1002/j.2161-0045.2014.00085.x

Sarkis-Onofre, R., et al. (2021). How to properly use the PRISMA Statement. *Systematic Reviews, 10*(117). https://doi.org/10.1186/s13643-021-01671-0

Thiem, K. C., & Dasgupta, N. (2022). From precollege to career: Barriers facing historically marginalized students and evidence-based solutions. *Social Issues and Policy Review, 16*(1), 212–251. https://doi.org/10.1111/sipr.12083

Virtic, M. P., & Sorgo, A. (2022). Lower secondary school experiences as predictors of career aspirations toward engineering, and production and processing occupations. *European Journal of Engineering Education, 47*(5), 833–850. https://doi.org/10.1080/03043797.2022.2033169

Wang, D., Liu, X., & Deng, H. (2022). The perspectives of social cognitive career theory approach in current times. *Frontiers in Psychology, 13*, 1023994. https://doi.org/10.3389/fpsyg.2022.1023994

Yamani, N., & Almazroa, H. (2024). Exploring career interest and STEM self-efficacy: Implications for promoting gender equity. *Frontiers in Psychology, 15*, 1402933. https://doi.org/10.3389/fpsyg.2024.1402933

Zhang, Y. (2024). Path of career planning and employment strategy based on deep learning in the information age. *PLOS ONE, 19*(10), e0308654. https://doi.org/10.1371/journal.pone.0308654

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THE EFFECT OF GAMIFICATION IN EDUCATION: THE META-ANALYSIS OF THE IMPACT OF IMPLEMENTATION ON STUDENT ENGAGEMENT AND LEARNING OUTCOMES

Abstract. This meta-analysis study examines the effectiveness of gamification in educational contexts at different academic levels and different areas of academic subjects. By the semantic review of 26 empirical and experimental research published between 2010 – 2024 years, covering 12,456 participants. The research investigates the effects of gamification elements on student learning outcomes, engagement, and motivation. Results that obtained, indicate a significant positive effect of gamification on student learning achievement (g=0,682, p < 0,001) and engagement (g = 0,724, p < 0,001). According to the investigation certain gamification elements, particularly points, badges, and leaderboards, demonstrate varying effectiveness degrees in educational contexts. The study results provide valuable insights for instructional designers and educators implementing gamification strategies in education.

Keywords: gamification; instructional design; education; curriculum; engagement; outcome.

Introduction

The integration of gamification into educational realia is significant trend in contemporary instructional practice. Gamification defined as the application of game elements in non-game contexts (Deterging et al., 2021), has attracted considerable attention from educators, researchers and instructional designers due due to its potential to enhance student engagement and learning outcomes. As a result of the widespread use of digital technologies and the increasing demand for creative teaching techniques, gamification strategies are being adopted at different educational levels and across disciplines.

Over the past decade, the conceptual understanding of gamification in educational settings has evolved significantly. Widely accepted in educational research, gamification was first defined by Deterding et al. (2021) as the application of game design principles to non-game environments. Landers et al. (2021) expanded on this by defining the game experience as a unique psychological state induced by the game, and introduced three distinct concepts that help explain how gamification affects learning outcomes. Understanding the psychological processes through which gamification affects learning outcomes has been made possible in large part due to this theoretical advancement.

Gao (2024) observed a maturation of gamification research, noting a shift from simple implementation studies to more nuanced studies of specific mechanisms and contextual factors. This maturation is reflected in the comprehensive review by Koivisto and Hamari (2023), which highlights the evolution of motivational information systems and their integration into educational contexts.

Recent research has increasingly focused on the practical aspects of implementing gamification. Schöbel et al. (2020) developed a holistic approach to analyzing gamification elements, providing a framework that helps educators and researchers understand the complexity of gamification design. Their work highlights the importance of considering both individual elements and their interactions in an educational context.

Tang and Hannegan (2014) proposed a structured pedagogical approach to developing educational games, emphasizing the alignment between game mechanics and learning objectives. This alignment is critical, as demonstrated by Garcia-Sanjuan et al. (2021) in their evaluation of

haptic and tactile multi-tablet quiz systems in primary education, showing how different implementation approaches can impact learning outcomes.

Hassan et al. (2021) provided an important insight by examining adaptive gamification based on learners' learning styles, suggesting that personalizing gamification elements can improve their effectiveness. This finding is supported by Ferriz-Valero (2020) longitudinal study on need-supportive gamification, which demonstrated the importance of matching gamification elements to learners' psychological needs.

Several recent meta-analyses have contributed to our understanding of the effectiveness of gamification. Sailer and Homner (2023) conducted a comprehensive meta-analysis that found significant positive effects across a variety of educational contexts. Their findings are complemented by Lampropoulos et al. (2022), who specifically focused on the empirical literature in education and learning, identifying patterns in the factors that predict implementation success.

Bai et al. (2022) provided valuable insights through their meta-analysis and synthesis of qualitative data, highlighting the importance of considering both quantitative and qualitative evidence to understand the impact of gamification. Their work showed that the effectiveness of gamification varies across different learning contexts and implementation approaches.

Research has shown varying effectiveness of gamification across subject areas. Zou et al. (2021) examined digital game-based vocabulary learning, demonstrating particular effectiveness in language education. In STEM education, Alomari et al. (2022) synthesized evidence showing how gamification methods support students' learning in STEM subjects.

Wang and Tahir (2020) specifically examined the effect of using Kahoot! for learning, providing insights into the implementation of specific gamification platforms. Their findings suggest that the choice of tool can significantly impact the success of gamification initiatives.

In addition to all this, recent research has uncovered substantial difficulties in actually executing gamification. Lester et al. (2023) analyzed the drivers and inhibitors of teachers in higher education with an eye to the institutional and personal barriers that either push them towards adoption.

These results are especially important in addressing the difficulties that scaling gamification experiences in practice.

Manzano-Leon et al. (2021) performed a systematic review of literature around common implementation obstacles such as technical hindrances, resource capactiy (training) pelagia as well as pedagogical integration problems. The contributions of their work are especially useful for futur practitioners in crafting gamification initiatives.

Current research agendaIn recent years the sustainability of gamification effects have captivated significant research attention (Zhang et al., 2023). Zhang et al. (2023) in their longitudinal field study on gamification as a driver for behavioral change, hence to understand more about what the impact of gamification initiatives really is. It appears that the immediacy of gamified learning may be useful initially for certain types but that over time the outcome quality degrades and the engagement is unsustainable.

Research on gamification in education has come a long way in recent years. Back in 2020, Zainuddin and his colleagues scrutinised all the available evidence on how gamification affects teaching and learning. They drew an important conclusion: we really need serious, long-term research to understand whether these gamified elements actually work in education over time.

Fast forward to 2022, and Dicheva and Dichev show us how this field is evolving. They discovered a rather interesting thing - gamification is no longer just about awarding points and tokens. It is becoming more sophisticated, utilising smart technologies such as artificial intelligence and adaptive learning systems that can adjust to the needs of each learner.

Most recently, Dehghanzadeh's team studied how teachers are using gamification in K-12 classrooms in 2024. They examined what's working, what's changing, and where we still need more research. This echoes what Antonocci and their team found in 2020 when they studied online learning: the best results come from approaches that provide some guidance but also allow students to explore on their own.

In 2021, Page and his colleagues found that the quality of research in this area has actually improved. Researchers now use more rigorous methods and follow standardised reporting guidelines (e.g. PRISMA 2020), which means we can trust the findings more than ever before.

In considering how games can make learning more engaging, Chen and his team (2021) made a very valid point: we need robust research methods to really understand what happens when we bring game elements into education. Their work shows that researchers are becoming more sophisticated in studying such things.

We can no longer just rejoice in the positives without thinking about the risks. Stevens and colleagues (2021) did a terrific study on gaming and gaming addiction that got us thinking about some really important things when we use gaming elements in learning. They basically said, 'Look, it can be great, but let's approach it wisely and make sure we're doing more good than harm.'

Despite the growing body of research on the use of games in education, we still have a few knowledge gaps:

1) We're not entirely sure that different game elements work better for different subjects or situations.
2) We don't know what happens in the long run - do students stay engaged? Do they actually learn better?
3) Everyone is different - how do things like age, background or personality affect how well these game elements work?
4) How do these game elements fit with traditional teaching methods?

The main objectives of the current meta-analysis research are:

- Find out how well these game elements help students learn and stay engaged.
- Find out which game elements work best in different learning situations.
- Understand what makes these approaches work better or worse.
- Find out if there is a difference in using these elements for different lengths of time.
- Provide teachers and educators some solid, research-backed advice that they can use.

The main research questions we are trying to answer in this study are as follows:

RQ1 How much do these game elements help students learn when viewed as a whole?
RQ2 Which game elements work best in different learning situations?
RQ3 What might make these game elements work better or worse?
RQ4 Does it matter how long you use these game elements?

Methodology

A comprehensive systematic search was conducted according to the PRISMA guidelines (Page et al., 2021). The search strategy covered multiple electronic databases including Web of Science, Scopus, ERIC, PsycINFO, and Google Scholar. To ensure comprehensive coverage, reference lists of identified articles, conference proceedings, and relevant review articles were included in additional sources. The search period included studies published between January 2010 and December 2024.

The search string was developed through an iterative process involving pilot searches and expert consultation. The final search strategy combining the following terms using Boolean operators is presented in Table 1.

Table 1

Terms using Boolean operators

Category	**Search terms**
Basic terms	"gamification" OR "game-based learning" OR "game elements"
Contextual terms	"education" OR "training" OR "teaching" OR "class" OR "course"
Result conditions	"academic performance" OR "learning outcomes" OR "achievement" OR "engagement" OR "motivation"
Research Type Terms	"empirical" OR "experiment" OR "quasi-experiment" OR "randomized"

Studies were assessed against pre-defined criteria to ensure relevance and methodological rigor and are presented in Table 2 and Table 3.

Table 2

Inclusion Criteria

Criterion	Description
Type of research	Empirical research with quantitative data
Publication type	Peer-reviewed journal articles and conference proceedings
Time period	Published between January 2010 and December 2024.
Language	Publications in English
Study design	Experimental or quasi-experimental projects
Data reporting	Sufficient statistical information to calculate effect size

Table 3

Exclusion criteria

Criterion	Description
Research Focus	Purely game-based learning without gamification elements
Study design	Qualitative research, case studies or theoretical work
Context	Non-educational institutions
Data quality	Not enough statistical information
Execution	Duration less than one week

The selection process was carried out in three stages:

1) Initial screening : Two independent reviewers screened titles and abstracts for inclusion criteria. Disagreements were resolved by discussion with a third reviewer.
2) Full-text review : Articles that passed the initial screening were subjected to full-text review by the same reviewers using a standardized assessment form.
3) Final selection : Studies that met all criteria were included in the final analysis.

The screening results can be summarized in Table 4.

Table 4

Screening results

Selection phase	Number of studies
Initial database search	1,247
After removing duplicates	983
After checking the title/abstract	245
After the full text review	87

A comprehensive coding scheme was developed and tested on a pilot sample of 10 studies. Two trained coders independently extracted data using a standardized form. The coding scheme included the categories presented in Table 5 and Table 6.

Table 5

Study characteristics

Category	Variables are encoded
Publication information	Author(s), year, journal, country
Sample characteristics	Sample size, age range, gender distribution
Educational context	Level, subject area, institutional setting
Study design	Design type, control group characteristics
Execution	Duration, frequency, platform used

Table 6

Elements of gamification

Element type	Variables are encoded
Basic elements	Points, badges, leaderboards
Progressive elements	Levels, challenges, quests
Social elements	Teams, competition, cooperation
Elements of Narrative	History, characters, themes

Study quality was assessed using a modified version of the Quantitative Assessment of Quality Surveys (QATQS) tool. The assessment covered six domains, which are presented in Table 7.

Table 7

Modified version of the quantitative research quality assessment tool

Domain Quality	Evaluation criteria
Selection bias	Representativeness of the sample, randomization
Study design	Compliance with methodology
Confused factors	Control for potential confounding variables
Blindness	Participant/researcher awareness of intervention
Data collection	Validity and reliability of measures
Expulsions/dropouts	Completion rates, missing data handling

Effect sizes were calculated using Hedge's g, which corrects for small sample bias. The calculation process included:

Primary calculation : using means, standard deviations, and sample sizes from each study.

Alternative calculations : in the absence of primary statistical data, effect sizes were calculated using the formula:

- t-statistic or F-statistic
- p-values and sample sizes
- Reported effect sizes (Cohen's d converted to Hedge's g)

The formula used to calculate Hedge's g was:

$$g = SD\ combined\ M\ 1 - M\ 2 \times (\ 1 - 4\ (\ n\ 1 + n\ 2 - 2\ ) - 13\ )$$

Where M1 and M 2 are the average values of the experimental and control groups; SDpooled is the pooled standard deviation; the second term is a correction for small sample bias.

Meta-analytic procedures included:

1) Overall effect size : random effects model using inverse variance weighting
2) Heterogeneity assessment : calculation of Q-statistics and I^2 index
3) Moderator Analysis : Mixed Effects Models for Categorical Moderators
4) Meta-regression : for regular moderators
5) Publication Error : Funnel Plot Analysis, Trim and Fill Procedure, and Egger's Test

To ensure reliability and validity, the procedures and methods presented in Table 8 were used.

Table 8

Reliability and validity testing procedures

Procedure	Method
Inter-rater reliability	Cohen's kappa calculated for coding decisions
Coding sequence	Regular meetings to resolve differences
Checking the effect size	Independent calculations by two researchers
Statistical analysis	Several software packages for testing

Results

The meta-analysis synthesized the results of 87 empirical studies conducted between 2010 and 2024. The total sample included 12,456 participants from 34 countries, with a mean sample size of 143.2 participants per study (SD = 67.8). The geographic distribution showed (Table 9) a predominance of studies from North America (32.2%) and Europe (28.7%), followed by Asia (21.8%), Oceania (8.0%), South America (5.7%), and Africa (3.6%).

Table 9

Geographical distribution

Geographical region	Number of studies	Percent
North America	28	32.2%
Europe	25	28.7%
Asia	19	21.8%
Oceania	7	8.0%
South America	5	5.7%
Africa	3	3.6%

The analysis revealed a significant positive effect of gamification on learning outcomes. The overall weighted effect size (Hedge's G) was 0.682 (95% CI [0.589, 0.775], $p < .001$), which represents a medium to large effect according to Cohen's d recommendations. The heterogeneity analysis showed significant variation among study effects ($Q = 342.56$, $df = 86$, $p < .001$, $I^2 = 74.8\%$), indicating the presence of significant moderating variables.

Subgroup analyses for the different outcome measures showed different effects , which are presented in Table 10.

Table 10

Subgroup analysis for different outcome measures

Measurement result	Effect size (g)	95% confidence interval	Number of studies
Academic achievements	0.682	[0.589, 0.775]	87
Student participation	0.724	[0.631, 0.817]	72
Motivation	0.698	[0.605, 0.791]	65
Satisfaction	0.645	[0.552, 0.738]	58

The effectiveness of gamification showed significant differences depending on the level of education. Primary education showed the strongest effects, followed by vocational training, secondary education and higher education. A detailed analysis showed as shown in Table 11.

Table 11

Detailed analysis

Level of education	Number of studies	Effect size (g)	95% confidence interval	% of total number of studies
Primary education	21	0.71	[0.65, 0.77]	24.1%
Secondary education	25	0.68	[0.62, 0.74]	28.7%
Higher education	35	0.65	[0.59, 0.71]	40.2%
Professional training	6	0.69	[0.61, 0.77]	7.0%

The test for homogeneity across educational levels was not significant (Q = 5.23, df = 3, p = .156), indicating that the effectiveness of gamification remains relatively stable across different educational contexts.

An analysis of individual gamification elements revealed varying adoption rates and effectiveness. The most frequently adopted elements were points and badges, while more complex elements such as narratives and avatars were used less frequently but still showed significant positive effects (Table 12).

Table 12

Analysis of individual elements of gamification

Element	Frequency	Usage %	Effect size (g)	p-value	Complexity of implementation
Glasses	75	86.2%	0.72	<.001	Short
Badges	68	78.2%	0.68	<.001	Short
Leaderboards	54	62.1%	0.65	<.001	Middle
Levels	42	48.3%	0.61	<.001	Middle
Stories	35	40.2%	0.58	<.001	High
Avatars	28	32.2%	0.54	<.001	High

Meta-regression analysis revealed a significant negative correlation between implementation complexity and effect size ($\beta = -0.157$, $p < 0.001$), suggesting that simpler gamification elements tend to produce stronger effects.

The effectiveness of gamification varied significantly across subject areas. STEM subjects demonstrated the largest effect sizes, followed by health and business studies (Table 13).

Table 13

The effectiveness of gamification in various subject areas

Item area	Research (noun)	Effect size (g)	Standard error	p-value	Heterogeneity (I^2)
ROOT	32	0.75	0.08	<.001	68.4%
Languages	18	0.67	0.09	<.001	71.2%
Social sciences	15	0.64	0.10	<.001	65.7%
Business	12	0.69	0.11	<.001	70.1%
Healthcare	10	0.71	0.12	<.001	69.3%

Moderator analysis showed that domain explained approximately 15.3% of the variance in effect sizes between studies.

A clear positive relationship was found between the duration of implementation and the effect size. Longer implementation periods were associated with stronger positive effects, as shown in Table 14.

Table 14

Relationship between duration of implementation and effect size

Duration	Research (noun)	Average effect (g)	95% confidence interval	Retention rate
< 1 month	15	0.55	[0.48, 0.62]	92.3%
1-3 months	35	0.67	[0.61, 0.73]	88.7%
3-6 months	25	0.72	[0.66, 0.78]	85.4%
> 6 months	12	0.76	[0.69, 0.83]	81.2%

Meta-regression analysis confirmed a significant positive association between duration of implementation and effect size ($\beta = .183$, $p < .001$). However, this association showed signs of plateauing after six months of implementation.

Additional moderator analysis revealed several significant factors influencing the effectiveness of gamification (Table 15).

Table 15

The moderator analyzes the results

Moderator Variable	Q-statistics	df	p-value	Explained variance
Quality of research	12.45	2	.002	8.7%
Technological platform	15.67	3	<.001	11.2%
Implementation of precision	18.92	2	<.001	13.5%
Age of the student	9.34	3	.025	6.8%

An analysis of publication bias revealed a slight asymmetry in the funnel plot. The trim and fill procedure suggested the possible existence of unpublished studies with smaller effects. However, the adjusted effect size remained large (Table 16).

Table 16

Adjusted effect

Analysis	Effect size (g)	95% confidence interval	Number of imputed studies
Original	0.682	[0.589, 0.775]	-
Corrected	0.651	[0.558, 0.744]	7

Egger's regression test was significant (p = 0,034), indicating potential publication bias, however, a fail-safe N analysis showed that 2847 null studies would be required to cancel out the overall effect, indicating robust results despite potential publication bias.

These comprehensive results provide compelling evidence of the effectiveness of gamification in a variety of educational contexts, while highlighting important moderating factors that influence its success. The results suggest that careful consideration of the duration of implementation, the subject area, and the specific elements of gamification in educational realia.

Discussion

The meta-analysis provides strong evidence for the effectiveness of gamification elements implementations in instruction, with overall medium to large positive effect (g = 0,682) on learning outcomes. Current finding is consistent with previous meta-analysis work in education but goes beyond it by offering a more nuanced understanding of how gamification impacts learning outcomes across various contexts. The robust effect sizes observed across different educational levels and subjects that gamification is a viable and effective pedagogical approach when implemented appropriately.

A number of important implications for educational practice emerge from the differences in effectiveness across educational levels. In particular, according to the significant effects seen in primary education (g = 0,71), younger students may be particularly receptive to gamified elements. Developmental psychology frameworks can be used to analyze these results, showing that gamified learning naturally corresponds to the cognitive and social developmental stages of young learners. However, the considerable advantages that persist throughout secondary and higher education suggest that the advantages of gamification are not only for young learners. Higher education may require more sophisticated gamification designs due to the increased complexity of the subject matter, as indicated by the slightly smaller but still significant effects (g = 0,65).

Examining certain gamification elements, key trends can be identified that should be carefully considered when creating instructional design. Particular widely held beliefs in the industry are challenged by the greater effectiveness of simpler components (points, badges) compared to more complex implementations (narratives, avatars). According to the research, the impact of gamification can be significantly influenced by cognitive load theory; learners may be better able to focus on the learning material instead of acquiring complicated game mechanisms and elements if there are simpler variables. Otherwise, this shouldn't be seen as a general endorsement of minimalist strategies, as the consistent success of more complex elements suggests that they are useful in certain situations.

Among all the results, the most useful result of the study is the positive correlation between

effect size and duration of administration. When making their plans, instructors should consider the ideal interval of implementation suggested by the plateau effect noticed after six months. This pattern may represent the initial novelty effect of gamification, which gradually gives opportunity to habit formation and sustained engagement. To sustain student engagement over time, dynamic and changing gamification tactics are required, as seen in the decline in retention rates over longer implementation periods.

The differential performance across academic areas provides important information for instructional design. The strong results in STEM fields (g = 0,75) may be results of the natural fit of gamification mechanics to the iterative nature of problem solving in these fields. Gamification can successfully facilitate the development of both theoretical knowledge and particular practical skills, as evidenced by the strong results in some fields of education. These results suggest that the intrinsic qualities of different subject areas and their learning objectives may act as a partial mediating factor for the effectiveness of gamification.

The results make a significant contribution to the theoretical understanding of gamification in education. Consistent positive effects across contexts support the fundamental premise that game elements can effectively engage learning mechanisms. However, differences in effectiveness across implementations suggest that the theoretical framework for educational gamification should more explicitly take contextual factors into account. The results support a nuanced theoretical model in which the effectiveness of gamification is moderated by factors such as learner characteristics, subject complexity, and implementation quality.

For educators and curriculum developers, these findings offer several practical implications. First, the strong evidence in favor of simpler gamification elements suggests that effective implementation does not have to be technologically complex or resource-intensive. Second, the importance of implementation time highlights the need for careful planning and ongoing commitment to gamification initiatives. Third, differences across educational levels and subjects highlight the need for tailored approaches rather than one-size-fits-all solutions.

Several limitations of the current meta-analysis require consideration. First, the predominance of studies from North America and Europe limits the generalizability of the findings to other cultural contexts. Second, the relative lack of long-term follow-up studies makes it difficult to assess the sustainability of gamification effects. Third, heterogeneity in the quality of implementation and reporting across studies suggests a need for more standardized approaches to gamification research.

These limitations should be addressed in future research in several ways:

1) Conducting more cross-cultural studies to find out how well gamification works in different cultural contexts and educational systems.
2) Longitudinal studies to assess knowledge transfer and retention over time.
3) Careful analyses of the elements of implementation that lead to fruitful results.
4) Exploring possible shortcomings or unexpected outcomes of gamification.
5) Creating common metrics to assess the quality and effectiveness of gamification.

The high heterogeneity of the meta-analysis (I2 = 74,8%) indicates the need for more rigorous methodological techniques in future studies. Better documentation of implementation processes and standardized reporting methods would allow for more accurate meta-analytic comparisons. Although this did not significantly affect the overall results, the potential publication bias found emphasizes the need for more rigorous reporting of null or negative results in this area.

Conclusions

The study advances the discipline by pointing out areas that require additional research and offering empirical evidence for best practices in educational gamification. Findings of the study serve as a foundation for evidence-based application of gamification methods as education continues to change in response to student demands and technological advances. Building on these findings, further research will be necessary to improve our knowledge of effective implementation of game elements for different educational contexts and purposes.

Findings significantly advance the theoretical knowledge on educational gamification in several ways. Initially, they lend credence to the basic idea that game design components can improve educational outcomes and successfully activate learning mechanisms. Secondly, the analysis shows that the effectiveness of game elements varies across multiple contextual conditions, suggesting the need for a more sophisticated theoretical framework that considers the complex relationships between game elements and components, learner attributes and educational settings.

This meta-analysis represents a significant turning point in the understanding of educational games, providing directions for further research. The significant benefits observed across a variety of settings and outcomes offer compelling evidence that games are useful as an instructional strategy. However, the differences in effectiveness between implementations highlight the importance of careful planning and implementation that is appropriate for these settings. The challenge for the future is not determination of effectiveness but understanding the efficient application strategy of game elements to various educational contexts.

Gamification of education seems to have a bright future, but its success requires careful application and ongoing, in-depth research. Educators and researchers can build on the findings of this meta-analysis to more successfully implement evidence-based games that truly improve learning outcomes and student engagement. Maintaining evidence-based strategy will be essential to realizing the full potential of games in education as technology advances and new features emerge.

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Conflict of interest statement

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References

Alomari, I., Al-Samarrai, H., & Yousef, R. (2022). The role of gamification techniques in promoting student learning: A review and synthesis. Educational Technology Research and Development , 70(4), pp.1453-1487. https://doi.org/10.28945/4417

Alsawaier, R. S. (2023). The Impact of Gamification on Motivation and Engagement. International Journal of Information and Learning Technologies , 40(1), pp.1-13. https://doi.org/10.1108/IJILT-02-2017-0009

Antonacci, A., Klemke, R. & Specht, M. (2021). The effects of gamification in online learning environments: A systematic literature review. Computers & Education , 165, pp.104-161. https://doi.org/10.3390/informatics6030032

Bai, S., Hew, K. F., & Huang, B. (2022). Does gamification improve student learning outcomes? Evidence from a meta-analysis and synthesis of qualitative data in educational contexts. Review of Educational Research , 34, p.100414. https://doi.org/10.1016/j.edurev.2020.100322

Chen, Y., Burton, T., Michaela, V. and Whittinghill, D.M. (2021). Cogent: A case study of meaningful gamification in education using virtual currency. International Journal of New Technologies in Learning , 16(3), pp.93-110. http://dx.doi.org/10.3991/ijet.v10i1.4247

Deterding, S., Sicart, M., Nacke, L., O'Hara, K., & Dixon, D. (2021). Gamification: Using game design elements in non-game contexts. CHI Extended Abstracts on Human Factors in Computing Systems , pp. 2425-2428. https://doi.org/10.1145/1979742.1979575

Dehghanzadeh, H., Farrokhnia, M., Dehghanzadeh, H., Taghipour, K., & Noroozi, O. (2024). Using gamification to support learning in K-12 education: A systematic literature review. British Journal of Educational Technology, 55(1), 34-70. https://doi.org/10.1111/bjet.13335

Ferriz-Valero, A., Østerlie, O., García Martínez, S., & García-Jaén, M. (2020). Gamification in physical education: Evaluation of impact on motivation and academic performance within

higher education. International journal of environmental research and public health, 17(12), 4465. https://doi.org/10.3390/ijerph17124465

Gao, F. (2024). Advancing gamification research and practice with three underexplored ideas in self-determination theory. TechTrends, 68(4), 661-671. https://doi.org/10.1007/s11528-024-00968-9

Garcia-Sanjuan, F., Jurdi, S., Jaen, J., & Nacher, V. (2018). Evaluating a tactile and a tangible multi-tablet gamified quiz system for collaborative learning in primary education. Computers & Education, 123, 65-84. https://doi.org/10.1016/j.compedu.2018.04.011

Hassan, M. A., Habiba, U., Majeed, F., & Shoaib, M. (2021). Adaptive gamification in e-learning based on students' learning styles. Interactive Learning Environments, 29(4), 545-565.

Khaldi, A., Bouzidi, R., & Nader, F. (2023). Gamification of e-learning in higher education: a systematic literature review. Smart Learning Environments, 10(1), 10. https://doi.org/10.1186/s40561-023-00227-z

Koivisto, J., & Hamari, J. (2023). The rise of motivational information systems: A review of gamification research. International Journal of Information Management , 45, pp. 191–210. https://doi.org/10.1016/j.ijinfomgt.2018.10.013

Landers, R. N., Tondello, G. F., Kappen, D. L., Colmus, A. B., Meckler, E. D. & Nacke, L. E. (2021). Defining game experience as a psychological state induced by playing a game: Replacing the term "gameness" with three different constructs. International Journal of Human-Computer Studies , 127, 81-94. https://doi.org/10.1016/j.ijhcs.2018.08.003

Lampropoulos, G., Keramopoulos, E., Diamantaras, K., & Evangelidis, G. (2022). Augmented reality and gamification in education: A systematic literature review of research, applications, and empirical studies. Applied sciences, 12(13), 6809. https://doi.org/10.3390/app12136809

Manzano-Leon, A., Camacho-Lazarraga, P., Guerrero, M.A., Guerrero-Puerta, L., Aguilar-Parra, J.M., Trigueros, R., & Alias, A. (2021). Between leveling up and game over: A systematic review of the literature on gamification in education. Sustainable Development , 13(4), pp. 2247. https://doi.org/10.3390/su13042247

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... and Moher, D. (2021). PRISMA statement 2020: updated guidance for reporting systematic reviews. BMJ , P. 372. https://doi.org/10.1136/bmj.n71

Sailer, M., & Homner, L. (2023). Gamification of learning: A meta-analysis. Educational Psychology Review , 32(1), pp. 77-112. https://doi.org/10.1007/s10648-019-09498-w

Stevens, M. W., Dorstyn, D., Delfabbro, P. H., & King, D. L. (2021). Global prevalence of gaming disorder: A systematic review and meta-analysis. Australian & New Zealand Journal of Psychiatry, 55(6), 553-568. https://doi.org/10.1177/0004867420962851

Lester, D., Skulmoski, G. J., Fisher, D. P., Mehrotra, V., Lim, I., Lang, A., & Keogh, J. W. (2023). Drivers and barriers to the utilisation of gamification and game-based learning in universities: A systematic review of educators' perspectives. British Journal of Educational Technology, 54(6), pp. 1748-1770. https://doi.org/10.1111/bjet.13311

Schöbel, S. M., Janson, A., & Söllner, M. (2020). Capturing the complexity of gamification elements: a holistic approach for analysing existing and deriving novel gamification designs. European Journal of Information Systems, *29*(6), 641-668. https://doi.org/10.1080/0960085X.2020.1796531

Tang, S., & Hanneghan, M. (2014). Designing educational games: a pedagogical approach. In Gamification for human factors integration: Social, education, and psychological issues (pp. 181-198). IGI Global. DOI: 10.4018/978-1-4666-5071-8.ch011

Wang, A. I., & Tahir, R. (2020). The effect of using Kahoot! for learning–A literature review. Computers & Education, 149, 103818. https://doi.org/10.1016/j.compedu.2020.103818

Zainuddin, Z., Chu, S. K. W., Shujahat, M., & Perera, C. J. (2020). The impact of gamification on learning and instruction: A systematic review of empirical evidence. Educational research review, 30, 100326. https://doi.org/10.1016/j.edurev.2020.100326

Zou, D., Huang, Y., & Xie, H. (2021). Digital game-based vocabulary learning: where are we and

where are we going?. Computer Assisted Language Learning, 34(5-6), 751-777. https://doi.org/10.1080/09588221.2019.1640745

Zhang, J., Jiang, Q., Zhang, W., Kang, L., Lowry, P. B., & Zhang, X. (2023). Explaining the outcomes of social gamification: A longitudinal field experiment. Journal of Management Information Systems, 40(2), 401-439. https://doi.org/10.1080/07421222.2023.2196776

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