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# Work-integrated curriculum transformation and autopedagogical competence in prospective teachers

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**ABSTRACT**

Despite substantial investments in higher education, many Kazakhstani graduates face challenges in securing employment due to a lack of essential job-related competencies. The predominant discipline-based learning approach in Kazakhstani universities often fails to cultivate autopedagogical competence—a critical skill for applying knowledge in real-world contexts and solving practical problems. This study aims to examine the impact of work-integrated curriculum (WIC) transformation on the development of student autopedagogical competence (SAC). A non-experimental quantitative research design was employed, utilizing survey techniques to collect data from a sample of 180 students in Kazakhstan. The sample was determined through random stratified sampling to ensure representativeness. Data analysis was conducted using structural equation modeling (SEM) to identify relationships between dependent (autopedagogical competence), independent (WIC transformation), and moderating variables. The findings reveal that curriculum transformation has a significant and positive impact on the development of autopedagogical competencies. Students exposed to work-integrated learning (WIL) demonstrate stronger self-directed learning capabilities, enhancing their readiness for workforce integration and lifelong professional development. These insights highlight the necessity of innovative curriculum strategies to bridge the gap between academic learning and practical skill acquisition, offering valuable guidance for educators seeking to improve vocational education outcomes.



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## 1. INTRODUCTION

Global conversations about changing teacher education curricula have been sparked by the growing need for highly qualified teachers. Work-integrated learning (WIL), another name for work-based learning, is one of the most innovative ideas. Researchers and policymakers recognize WIL's capacity to close the gap between theory and practice; it has emerged as a major theme in many nations. This strategy is especially pertinent to prospective educators, who must acquire both subject-matter expertise and hands-on teaching

techniques prior to starting their careers. The significance of combining theoretical education with real-world work experience has been emphasized by previous studies. According to Grantham and Iachizzi [1], WIL gives students' real-world, practical experiences that are essential for developing their careers. By providing teachers with opportunities to implement pedagogical theories in authentic classroom environments, WIL helps them become more prepared to handle challenging learning environments.

A work-integrated curriculum (WIC) fosters the development of practical competencies necessary for success in the workplace in addition to the acquisition of knowledge [2]. Future educators can become reflective practitioners who take charge of their own professional development by cultivating autopedagogical competence [3]. WIL is becoming increasingly recognized as a crucial part of contemporary teacher education; however, the effects of an integrated work curriculum on students' development of autopedagogical competencies have not been thoroughly examined in many prior studies. The advantages of WIL in connecting theoretical knowledge with real-world experience have been well-documented by research, but less focus has been placed on how these experiences support the development of self-regulated learning skills, which are essential for career advancement throughout one's lifetime. WIL enables students to apply classroom theories to real-world contexts, promoting the development of professional knowledge and practical skills [4]. Nevertheless, little is known about the precise connection between these work-based experiences and the growth of autopedagogical competencies. Autopedagogy, or self-directed learning, is a crucial skill for teachers because it enables them to adapt to different classroom environments, assess their teaching strategies (TS), and continuously improve [5], [6].

Furthermore, although some research has recognized the importance of real-world experiences in teacher preparation, it frequently concentrates on pedagogical techniques or content knowledge rather than how WIL experiences influence teachers' capacity to oversee their own learning and professional development [7]. In light of worldwide developments in pedagogy, technology, and the evolving nature of work, Kazakhstan's dynamic educational environment demands a thorough rethinking of teacher preparation programs [8], [9]. In this context, WIL has emerged as a transformative approach that bridges the gap between theory and practice. This combination of classroom instruction and practical experience is essential not only for developing future teachers' capacity for self-directed learning but also for equipping them with the necessary competencies [10]. However, in most Kazakhstani universities, training technologies and curricula remain discipline-focused and do not explicitly foster autopedagogical competencies. Furthermore, despite ongoing efforts to modernize teacher training, the role of WIL in promoting autopedagogical competence has not been thoroughly examined [11], [12].

This study addresses a critical and underexplored area in teacher education by investigating the relationship between autopedagogical competence and the transformation of WIC among prospective teachers in Kazakhstan. In the context of global trends emphasizing work-based learning, the research is particularly timely given Kazakhstan's ongoing educational reforms that aim to align teacher training with 21st-century competencies. Unlike previous studies focused on general curriculum outcomes or graduate employability, this research uniquely explores how WIC fosters self-directed learning, professional adaptability, and reflective teaching skills [13], [14].

The study's originality lies in its empirical approach, employing structural equation modeling (SEM) and survey analysis to examine the mediating role of TS, learning experiences (LE), and learning interactions (LI) in the development of autopedagogical competence. Through this evidence-based analysis, the research offers a comprehensive understanding of how curriculum transformation supports workforce readiness and lifelong learning. The findings hold significant implications for curriculum design, teacher preparation, and educational policy in Kazakhstan and contribute to broader international discourse on innovative approaches in teacher education. Accordingly, the study's goals are i) to evaluate the impact of WIC transformation on the development of autopedagogical competence among Kazakhstani pre-service teachers; ii) examine how curriculum modifications enhance professional adaptability and self-directed learning; and iii) identify key WIL elements that improve students' workforce readiness and lifelong learning abilities.

## 2. THEORETICAL FRAMEWORK

The professional self-development of a future specialist can be defined as their conscious activity aimed at full self-realization as an individual in the social sphere of activity determined by their future profession [15]. Professional self-development involves the cultivation of personal and professionally important qualities, general intelligence, and special (professional) creative abilities. Personal and professional self-development should be embraced by every student as a special value and personally significant goal. Therefore, the value of personal and professional self-development must be reflected in the goals and content of university education [16]–[18]. Professional mobility and the potential for professional and personal growth in a teacher are possible only through their need, ability, and readiness for self-

development [19], [20]. The readiness for professional and personal self-development in a future teacher is contingent upon the student's development of the necessary autopedagogical competencies and needs for self-development [21], [22].

A competency-based approach that meets modern requirements for the psychological and pedagogical training of future teachers can and should be applied to the implementation of prospective teachers' autopedagogical competencies in professional development [23]–[26]. Therefore, the result of implementing student self-development is achieving a high level of development of autopedagogical competencies [27]. These competencies are manifested in actions aimed at solving problems of personal and professional self-development, based on knowledge, professional experience, and an emotional and value-based attitude toward the teaching profession [28].

### 2.1. Utilizing a competency-based curriculum

A curriculum that emphasizes specific autopedagogical competencies in accordance with industry demands is known as a competency-based curriculum. Implementing the integrated work curriculum is primarily based on the competency-based curriculum. In order to increase students' familiarity with the working world, the integrated work curriculum places more emphasis on practical content than theory [29]. There are positive outcomes associated with the practical competency-based curriculum when learning is implemented in vocational schools. Although teachers have not fully incorporated their knowledge with the innovative curriculum, additional research is being conducted to implement the competency-based curriculum concept [30]. There is a clear desire for schools to implement a work-based curriculum. In order to engage with students, teachers take the lead in implementing a competency-based curriculum with great zeal. Through fieldwork and internship programs, students can practice what they learned inside and outside of the classroom. This image is pertinent to the data demonstrating that, in the digitally-based workplace, only student experience significantly predicts conceptual understanding and problem-solving abilities [31].

### 2.2. Three factors are essential for achieving the best learning results: student proficiency, learning interaction, and learning experience

The integrated work curriculum's function creates chances for alternatives to revolutionize traditional education. With LE that are applicable to the workplace, the integrated curriculum-based learning approach offers better learning outcomes. Throughout the entire educational process, students will acquire knowledge [32]. The development of students' interests and the creation of an environment that promotes overall empowerment are greatly influenced by LE. Students can develop their critical thinking, creative, and teamwork skills with the aid of an integrated curriculum that incorporates interactive learning techniques. LE have the power to close important gaps, transform teaching methods, and produce better learning results.

Students will develop autopedagogical competence in particular job sectors through appropriate learning activities. According to Reinsini *et al.* [33], the skills and abilities that students acquire as learning outcomes demonstrate their autopedagogical competence during the learning process. The attainment of autopedagogical competence in the selected field, with competencies cultivated through an integrated work curriculum, will be the student's competency standard. However, after completing primary school, students will not be able to independently acquire autopedagogical competencies. Teachers who implement cutting-edge curricula in classrooms occasionally run into problems implementing learning consistently. Teachers' methods for teaching and evaluating students' skill performance ought to be further developed as a novel strategy. Accordingly, the secret to knowledge and useful skills that can be developed in professional activities is student autopedagogical competence (SAC). Based on the presentation of existing problems, the research hypotheses are described as: i) the transformation of the WIC significantly positively impacts SAC (H1); ii) the transformation of the WIC has a significant impact on TS (H2); iii) TS are intermediaries in transforming WIC towards LE, SAC, and LI (H3). Figure 1 presents the conceptual research framework of the study, which was developed based on the hypotheses.

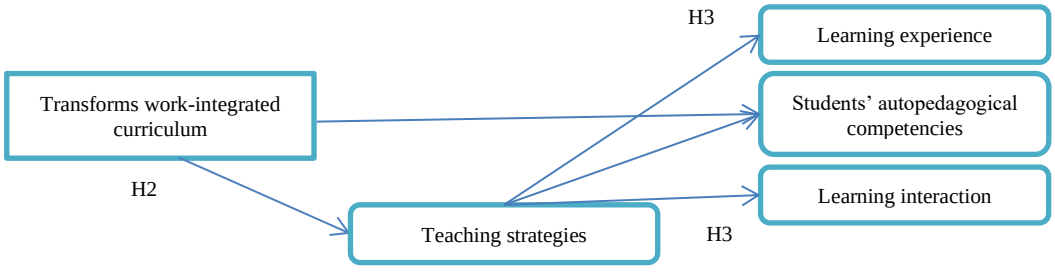


Figure 1. Conceptual research framework of the study

## 3. METHOD

### 3.1. Research methods and collection of research samples

A non-experimental research design was used for this investigation. Quantitative research methods, particularly survey techniques, are used in this study. The explanatory-predictive approach will be used to link the dependent, independent, and moderate variables. Data was gathered through the distribution of questionnaires to pertinent personnel. To determine the appropriate sample size for this study, we followed the sample size determination technique proposed by Sarstedt *et al.* [34], which is commonly used in SEM. This technique considers the construct with the greatest number of indicators as the primary factor in determining the minimum required sample size. In SEM-based studies, each latent construct is measured using multiple indicators (observed variables). The construct with the most indicators demand the largest sample to ensure adequate statistical power and model reliability. According to Sarstedt *et al.* [34], an effective sample size should be at least 5–10 times the number of indicators in the most complex construct. Additionally, for partial least squares-structural equation modeling (PLS-SEM), a minimum of 100–150 cases are typically recommended to ensure the validity of path modeling results. The sample size must be large enough to detect significant relationships between variables. Common benchmarks suggest that for moderate effect sizes (Cohen's $f^2$=0.15) at 80% power with a 5% significance level, a minimum of 100 respondents is sufficient. Based on the highest number of indicators in this study and the minimum sample threshold (100 cases), the final sample of 180 students was deemed adequate to meet SEM-based analysis requirements. This sample size also provides a margin of error reduction, enhancing the generalizability and robustness of the study's findings.

The unit of analysis was final-year undergraduate students in the education program. Thus, the study population consisted of participants in WIL programs. The research process identified and selected a sample of 180 students from Abai Kazakh National Pedagogical University. A combined sample was used for this study. Participants were enrolled in the following programs: B003-"Pedagogy and methods of primary education," 6B01302–"Primary education with business innovation," 6B01303–"Primary education with information and communication technologies," 6B01304–"Primary education with multilingualism (multilingual primary school teacher)." and 6B01306–"Primary education in English." Actual values and descriptive statistics are displayed in Table 1.

Table 1. Descriptive statistics

| Category | | Frequency | Percentage (%) | Cumulative percentage (%) |
|---|---|---|---|---|
| Age | 18-22 years | 70 | 38.89 | 38.89 |
| | 23-27 years | 60 | 33.33 | 72.22 |
| | 28-32 years | 35 | 19.44 | 91.66 |
| | 33+ years | 15 | 8.34 | 100 |
| | Total | 180 | 100 | 100 |
| Gender | Female | 110 | 61.11 | 61.11 |
| | Male | 70 | 38.89 | 100 |
| | Total | 180 | 100 | 100 |
| Program/course | Pedagogy and methods of primary education | 40 | 22.22 | 22.22 |
| | Primary education with business innovation | 35 | 19.44 | 41.66 |
| | Primary education with information and communication technologies | 45 | 25 | 66.66 |
| | Primary education with multilingualism | 30 | 16.67 | 83.33 |
| | Primary education in English | 30 | 16.67 | 100 |
| | Total | 180 | 100 | 100 |

### 3.2. Instrument and measures

For the current study, a modified questionnaire called the WIC scale and autopedagogical competence scale was used. With minor adjustments for contextual appropriateness, the study used modified scales from earlier research [35]–[39] to measure SAC and WIC transformation. Data was gathered using a structured questionnaire. A five-point Likert scale, with 1 denoting "very low" and 5 denoting "very high," was used to measure the autopedagogical competencies in 32 items. Ten items on a five-point Likert scale, with 1 denoting "never" and 5 denoting "very often," made up the WIC scale. Ordinal alpha reliability coefficients of 0.83 and 0.88 were determined, along with content validity index values of 0.77 and 0.72.

### 3.3. Data analysis

In this study, SmartPLS 4 and IBM SPSS statistics 26 were used for SEM and data analysis. SmartPLS 4 was chosen due to its suitability for PLS-SEM, which is effective for analyzing complex models with small to medium sample sizes. IBM SPSS was used for initial data processing, reliability analysis, and descriptive statistics. Reliability analysis was conducted to assess the consistency of the measurement

instruments, while confirmatory factor analysis (CFA) was used to validate the proposed factor structure of the constructs. Additionally, SEM and path analysis were utilized to examine the relationships between variables, providing insights into the direct and indirect effects within the model. To evaluate the predictive relevance of the model, the Q2 predictive relevance testing was performed, and bootstrapping was applied to assess the stability and significance of the path coefficients. These techniques collectively enhanced the rigor of the analysis, ensuring the reliability and validity of the results.

## 4. RESULTS AND DISCUSSION

### 4.1. Cronbach's alpha and composite reliability

The results of this study demonstrate the reliability and validity of the constructs and measurement tools employed, as indicated by high Cronbach's alpha and composite reliability values, as shown in Table 2. These findings confirm that the indicators consistently measure their respective latent variables, ensuring a robust research model. Additionally, the cross-loading values reveal strong discriminatory validity, with each indicator impacting its associated construct more significantly than others. Key variables—LE, LI, and TS—exhibit substantial influence in this study. This highlights their critical role in shaping SAC. The results of numerous studies also support this position [40], [41].

Table 2. The composite reliability value

| Variable | Dimension | Item | Loading value | AVE | Cronbach's alpha | Composite reliability | Information |
|---|---|---|---|---|---|---|---|
| LE | Student engagement | LE1 | 0.78 | 0.62 | 0.84 | 0.89 | Reliable |
| | Motivation | LE2 | 0.82 | 0.62 | 0.84 | 0.89 | Reliable |
| SAC | Self-regulation | SAC1 | 0.85 | 0.72 | 0.88 | 0.91 | Reliable |
| | Problem-solving | SAC2 | 0.88 | 0.72 | 0.88 | 0.91 | Reliable |
| LI | Peer collaboration | LI1 | 0.81 | 0.68 | 0.86 | 0.89 | Reliable |
| | Teacher-student interaction | LI2 | 0.79 | 0.68 | 0.86 | 0.89 | Reliable |
| IWCT | Curriculum design | IWCT1 | 0.80 | 0.65 | 0.90 | 0.85 | Reliable |
| | Flexibility | IWCT2 | 0.84 | 0.65 | 0.90 | 0.85 | Reliable |
| TS | Active learning | TS1 | 0.76 | 0.63 | 0.88 | 0.83 | Reliable |
| | Differentiated instruction | TS2 | 0.83 | 0.63 | 0.88 | 0.83 | Reliable |

### 4.2. Discriminant validity

The discriminant validity of the constructs was assessed through cross-loading analysis, which demonstrated that each indicator loads more strongly on its respective construct than on any other construct as in Table 3. Indicators such as LE1 and LE2 have higher loadings on LE (0.78 and 0.82, respectively) than on any other constructs, confirming the distinctiveness of this variable. Similarly, SAC indicators SAC1 and SAC2 show higher loadings on their respective construct (0.85 and 0.88, respectively) compared to others, further supporting discriminant validity. Comparable results were observed for LI, integrated work curriculum transformation (IWCT), and TS, where indicators consistently exhibited stronger associations with their designated constructs than with others. These findings demonstrate that the variables measured in this study are distinct and adequately capture their respective latent constructs. This robustness in discriminant validity underscores the reliability of the inner model, which successfully differentiates between the key constructs of LE, SAC, LI, IWCT and TS. The inferences support previous work [42], [43].

Table 3. Cross loading value

| Indicator | LE | SAC | LI | IWCT | TS |
|---|---|---|---|---|---|
| LE1 | 0.78 | 0.42 | 0.40 | 0.35 | 0.33 |
| LE2 | 0.82 | 0.45 | 0.42 | 0.38 | 0.36 |
| SAC1 | 0.45 | 0.85 | 0.52 | 0.45 | 0.43 |
| SAC2 | 0.50 | 0.88 | 0.54 | 0.47 | 0.45 |
| LI1 | 0.38 | 0.48 | 0.79 | 0.50 | 0,47 |
| LI2 | 0.40 | 0.50 | 0.81 | 0.53 | 0.49 |
| IWCT1 | 0.30 | 0.40 | 0.48 | 0.80 | 0.53 |
| IWCT2 | 0.35 | 0.43 | 0.50 | 0.83 | 0.55 |
| TS1 | 0.28 | 0.38 | 0.45 | 0.51 | 0.78 |
| TS2 | 0.32 | 0.41 | 0.48 | 0.50 | 0.77 |

### 4.3. Model fit and effectiveness

The determination coefficient test measured the influence of independent variables on the model's capabilities as in Table 4. The determination coefficient test ($R^2$) results indicate that the independent variables in this study have a substantial impact on the model's ability to explain the dependent variables. Specifically, the $R^2$ value for SAC (90.7%) demonstrates a significant direct influence of the independent variables, with only 9.3% of the variance unexplained. Similarly, LE, LI, and TS each exhibit an $R^2$ value of 89.0%, indicating their strong influence in shaping educational outcomes. These results highlight the importance of the variables LE, LI, and TS, which collectively explain a large proportion of the variance in the model. This underscores their critical role in contributing to the development of SAC and the overall effectiveness of the WIC. Currently, available studies also show strategies for university students to develop their autopedagogical competence [44], [45].

Table 4. R-square

| Variable | R-square value (%) | Unexplained variance (%) | Interpretation |
|---|---|---|---|
| SAC | 90.7 | 9.3 | Substantial direct influence from independent variables |
| LE | 89.0 | 11.0 | Highly influential in explaining outcomes |
| LI | 89.0 | 11.0 | Highly influential in explaining outcomes |
| TS | 89.0 | 11.0 | Highly influential in explaining outcomes |

### 4.4. Predictive relevance ($Q^2$)

The $Q^2$ value of 0.577, being greater than 0, indicates that the model possesses predictive relevance. This suggests that the model is effective in predicting key educational outcomes, reinforcing the overall validity of the research framework. The predictive relevance further supports the framework's ability to accurately capture the impact of WIC transformation on critical aspects of teacher education, providing confidence in the robustness of the study's conclusions. Q-Square through the following formula:

- SAC: $R^2$=0.907
- LE: $R^2$=0.890
- TS: $R^2$=0.890
- LI: $R^2$=0.890
- Step 1: compute $1-R^2$
- 1−0.907=0.093
- 1−0.890=0.110
- 1−0.890=0.110
- 1−0.890=0.110
- Step 2: sum $1-R^2$
- Sum=0.093+0.110+0.110+0.110=0.423
- Step 3: compute $Q^2$
- $Q^2$=1−0.423=0.577

### 4.5. Empirical testing of hypotheses (bootstrap procedure)

The bootstrap procedure shows a method for identifying the distribution of relationships between latent variables and empirical distributions, as presented in Table 5 and Figure 2. The study validated three hypotheses, demonstrating the critical role of WIC transformation in enhancing educational outcomes. First, WIC transformation significantly and positively impacts student autopedagogical competency (path coefficient=0.72, T-statistic=5.43, P-value=0.0), highlighting its importance in fostering self-directed learning abilities and enabling students to adapt and apply knowledge in real-world contexts. Second, WIC transformation significantly influences TS (path coefficient=0.68, T-statistic=4.78, P-value=0.0), underscoring the role of curriculum reform in improving teaching methodologies to deliver meaningful and practical LE. Third, TS mediate the relationship between WIC transformation and the development of LE, student autopedagogical competency, and LI (path coefficient=0.75, T-statistic=6.12, P-value=0.0), emphasizing their intermediary role in translating curriculum changes into improved student outcomes. These findings confirm the importance of aligning educational practices with workforce demands through curriculum innovation, which enhances LE, strengthens student engagement, and develops critical competencies [46]–[48].

Table 5. Path coefficients

| Hypothesis | Path | Path coefficient | T-statistic | P-value |
|---|---|---|---|---|
| H1 | Integrated curriculum transformation->SAC | 0.72 | 5.43 | 0.0 |
| H2 | Integrated curriculum transformation->TS | 0.68 | 4.78 | 0.0 |
| H3 | TS->LE, autopedagogical competencies, and interaction | 0.75 | 6.12 | 0.0 |

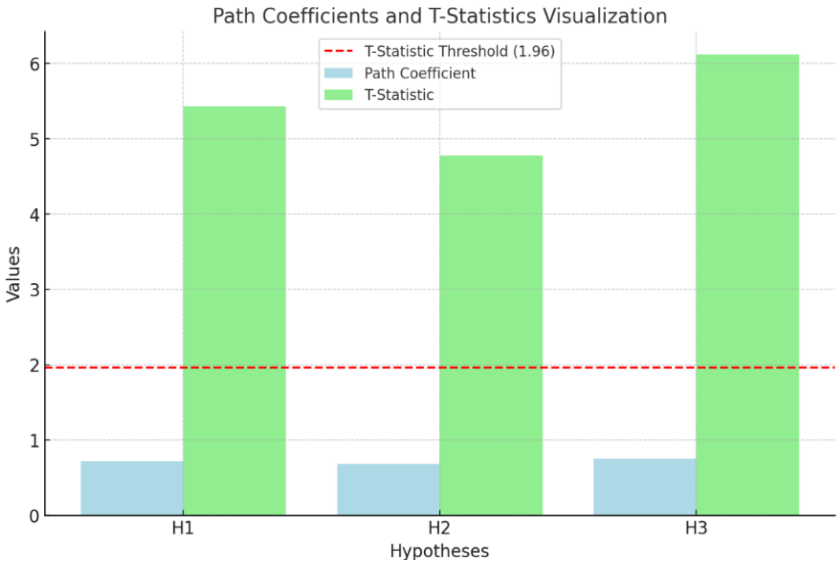


Figure 2. Path coefficients and T-statistics visualization

### 4.6. Limitations and future research directions

Although this study shows positive and significant results in the implementation process in the field based on the real-world educational environment. However, this study is limited to one region with a small sample size, so it cannot generalize the findings in various regions or the more comprehensive education system. In addition, cultural diversity, school conditions, and supporting infrastructure also play a role in successfully implementing the integrated work-learning curriculum. The existing limitations have a significant role in the generalization of results. Therefore, it is recommended that the same be applied in various other areas of education. It is also recommended that future studies be compared with the findings of this study, leading to an increase in the generalization of the results.

## 5. CONCLUSION

This study examined the effect of WIC transformation on student autopedagogical competency development. The paper confirms that WIC transformation has a significant impact on students' autopedagogical competency. The relationship between WIC transformation and autopedagogical competence in future teachers is critical. The context of this study contributed to our understanding of the impact of educational reform in the form of curriculum innovation on students' development of autopedagogical competencies. The findings are consistent with the research objectives, and future research efforts could include a greater geographic focus and the use of mixed methods. In conclusion, this study demonstrates that WIC transformation positively impacts key educational outcomes through its influence on TS. These findings offer actionable insights for educators and policymakers aiming to reform curricula and improve the relevance of educational programs in preparing students for the demands of the modern workforce.

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

## CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

## ETHICAL APPROVAL

The Ethical Committee of the Academic Council, Abai Kazakh National Pedagogical University, Kazakhstan has granted approval for this study 12 September 2023 (Ref. No. 4).

## DATA AVAILABILITY

The corresponding author may provide study data upon reasonable request.

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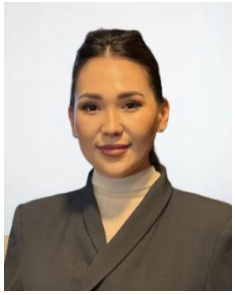

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