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STUDENT COLLABORATION IN TEACHER EDUCATION: A PEDAGOGICAL AND PSYCHOLOGICAL PERSPECTIVE

Abstract

This article examines how student collaboration contributes to the psychological development of pre-service teachers. The study identifies the influence of student-led collaborative activities on several key psychological components essential for teacher preparation, including increased learning motivation, strengthened self-esteem, enhanced self-confidence and the development of reflective thinking. The empirical investigation was conducted within the student-led academic club «Bilim Vectory», established in 2025 at the Department of Primary Education at Abai Kazakh National Pedagogical University. A mixed-methods design was employed: quantitative data were analysed using SPSS, while qualitative data were collected through reflective journals and observational records. The findings demonstrate that structured student collaboration positively affects not only professional competencies but also personal and psychological growth. Collaborative activities foster a supportive environment grounded in responsibility, mutual trust and professional orientation. The study highlights the importance of implementing innovative educational models that promote the professional and psychological potential of students in teacher education programmes.

Keywords: student collaboration, motivation, self-esteem, confidence, reflective thinking, training of future teachers, professional development.

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СТУДЕНЧЕСКАЯ КОЛЛАБОРАЦИЯ В ПОДГОТОВКЕ УЧИТЕЛЕЙ: ПЕДАГОГИЧЕСКИЙ И ПСИХОЛОГИЧЕСКИЙ ПОДХОД

Аннотация

В статье рассматриваются психологические механизмы развития будущих учителей через совместную деятельность студентов в рамках внеучебного академического клуба. Исследование определяет влияние студенческой коллаборации на ключевые психологические компоненты, важные для профессиональной подготовки педагога: повышение учебной мотивации, укрепление самооценки, развитие уверенности в себе и формирование рефлексивного мышления. Эмпирическое исследование было проведено на базе студенческого клуба «Bilim Vectory», созданного в 2025 году на кафедре начального образования Казахского национального педагогического университета имени Абая. Применён смешанный дизайн: количественные данные обрабатывались в программе SPSS, а качественные получены на основе рефлексивных дневников и наблюдений. Результаты показывают, что структурированная студенческая коллаборация способствует не только профессиональному, но и личностно-психологическому росту будущих учителей, формируя среду ответственности, взаимной поддержки и доверия. Исследование подчёркивает значимость внедрения инновационных образовательных моделей, направленных на развитие профессионального и психологического потенциала студентов педагогических специальностей.

Ключевые слова: студенческое сотрудничество, клуб, мотивация, самооценка, уверенность, рефлексивное мышление, подготовка будущих учителей, профессиональное развитие.

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МҰҒАЛІМДЕРДІ ДАЯРЛАУДАҒЫ СТУДЕНТТІК КОЛЛАБОРАЦИЯ: ПЕДАГОГИКАЛЫҚ ЖӘНЕ ПСИХОЛОГИЯЛЫҚ ТҰРҒЫДАН ҚАРАУ

Аңдатпа

Бұл мақалада студенттердің бірлескен әрекеттестігіне негізделген коллаборация болашақ мұғалімдердің психологиялық даму үдерісіне қалай әсер ететіні қарастырылады. Зерттеу студенттік коллаборацияның мұғалімдерді кәсіби даярлауда маңызды болып табылатын бірнеше психологиялық компоненттерге ықпалын айқындайды: оқу мотивациясының артуы, өзін-өзі бағалаудың нығаюы, сенімділіктің қалыптасуы және рефлексиялық ойлаудың дамуы. Эмпирикалық зерттеу Абай атындағы Қазақ ұлттық педагогикалық университетінің Бастауыш білім беру кафедрасында 2025 жылы құрылған «Bilim Vectory» студенттік академиялық клубының базасында жүргізілді. Зерттеу аралас дизайнға негізделді: сандық деректер SPSS бағдарламасында өңделсе, сапалық мәліметтер рефлексиялық күнделіктер мен бақылау материалдары арқылы жинақталды. Нәтижелер құрылымдалған студенттік коллаборация болашақ мұғалімдердің тек кәсіби емес, сонымен қатар тұлғалық және психологиялық дамуына оң әсер ететінін көрсетті. Бірлескен жұмыс олардың жауапкершілік сезімін, өзара сенімге негізделген қарым-қатынасын және кәсіби бағыттылығын қалыптастыратын қолайлы дамытушы орта тудырады. Зерттеу педагогикалық бағыттағы студенттердің кәсіби және психологиялық әлеуетін дамытуға бағытталған инновациялық білім беру модельдерін ендірудің маңыздылығын негіздейді.

Түйін сөздер: студенттік коллаборация, мотивация, өзін-өзі бағалау, сенімділік, рефлексиялық ойлау, болашақ мұғалімдерді даярлау, кәсіби даму.

INTRODUCTION Collaborative learning has become a significant component of contemporary teacher education, as it supports the development of communication skills, professional identity and psychological readiness for future teaching practice. While collaborative approaches are widely examined in international scholarship, research in Kazakhstan has predominantly focused on classroom-based collaboration mediated by instructors. Much less is known about how peer-to-peer, student-initiated collaboration in extracurricular student activities contributes to the psychological and professional development of pre-service teachers. This article examines the psychological development of future primary school teachers through collaborative interaction among students within a structured extracurricular academic environment. The study explores how student-led peer collaboration influences key psychological components essential for teacher preparation, including learning motivation, self-esteem, self-confidence and reflective thinking. These components are recognised in educational psychology as important predictors of professional growth, self-regulation and readiness to engage in inquiry-oriented teaching practices. The empirical part of the study was conducted within the student-led academic club «Bilim Vektory», established in 2025 at the Department of Primary Education of Abai Kazakh National Pedagogical University. The club functions as an extracurricular collaborative platform where pre-service teachers voluntarily engage in teamwork, project-based tasks and peer-supported activities. Unlike classroom collaboration, this format enables students to initiate activities independently, negotiate roles, distribute responsibility and reflect on their performance in a psychologically safe and non-evaluative environment. Such platforms offer unique opportunities to investigate the mechanisms of peer-driven collaboration without instructor mediation. Despite the substantial body of international literature on collaborative learning, two important gaps persist in the context of Kazakhstani teacher education.

First, student-led, peer-to-peer extracurricular collaboration among pre-service teachers has not been sufficiently investigated, as existing studies primarily address formal, instructor-guided collaboration within academic courses. Second, the psychological mechanisms underlying student-

driven extracurricular collaboration – such as motivation, self-efficacy, reflection and peer support – remain underexplored, particularly in voluntary learning communities such as academic clubs.

By addressing these gaps, the present study provides new empirical insights into the educational and psychological value of structured extracurricular peer collaboration and demonstrates the potential of student-led academic clubs to support the professional development of future primary school teachers.

To achieve this aim, the study addressed the following research tasks:

- to identify psychological mechanisms activated during student-led peer collaboration;
- to measure changes in motivation, self-efficacy, self-confidence and reflective thinking;
- to compare psychological indicators between participants and non-participants of the club;
- to analyse qualitative evidence demonstrating how these mechanisms operate within extracurricular collaborative settings.

MATERIALS AND METHODS Collaborative learning has been extensively studied in higher education, especially within teacher preparation programmes where the development of communication skills, professional identity and research motivation is considered fundamental. In international scholarship, collaboration is conceptualised as a structured socio-cognitive process that supports the co-construction of knowledge, mutual regulation of learning and the development of higher-order psychological functions. Within educational psychology, collaboration is strongly associated with motivation, self-efficacy, reflective thinking and socio-emotional development constr – ucts central to the professional formation of future teachers. This review synthesises key psychological and pedagogical perspectives explaining how collaborative environments enhance student development, with particular attention to peer-to-peer, extracurricular formats such as academic clubs and voluntary learning communities.

Collaborative learning is grounded in several foundational psychological theories. Bandura's social learning theory (1977) emphasises that learning occurs through observation, modelling and interaction with peers [1]. These social processes shape an individual's beliefs about their ability to succeed, thereby influencing engagement, persistence and task-related motivation. This framework is especially relevant for understanding how student-led extracurricular collaboration enhances teamwork confidence and research engagement among pre-service teachers.

Vygotsky's sociocultural theory (1978) and the concept of the Zone of Proximal Development highlight the importance of dialogic exchange, joint problem-solving and mediated interaction. In such settings, peers provide cognitive scaffolding that enables learners to perform beyond their independent capabilities. This theoretical lens aligns closely with the function of academic clubs as sociocultural spaces in which pre-service teachers negotiate roles, internalise professional behaviours and develop collaborative norms [2].

Reflection – introduced by Dewey (1938) and conceptualised further by Järvelä (2010) is another essential component of collaborative learning [3; 4]. Through structured reflection, learners re-evaluate experiences, question assumptions and cultivate professional judgement. Peer collaboration, particularly within extracurricular student activities**,** naturally stimulates reflective thinking through feedback exchange, shared discussions and exposure to diverse perspectives [5].

Research in teacher education also highlights the socio-psychological benefits of collaboration. Johnson and Johnson, Smith (1994) and Gillies (2016) demonstrate that collaborative environments strengthen emotional support, interpersonal communication and positive interdependence, contributing to deeper engagement and effective cooperative task completion [6; 7]. These competencies are essential for future teachers who will operate in collegial professional environments.

Drawing on educational psychology, three constructs are especially relevant for the present study: • research motivation**,** which increases in collaborative contexts through shared goals and social reinforcemen [8, 9]. • teamwork confidence (self-efficacy)**,** which develops through repeated participation in peer-led tasks and cooperative problem-solving [10]. • reflective thinking, which emerges through metacognitive analysis, peer feedback and perspective-taking [4].

In this research, these constructs are interpreted as pedagogical-psychological indicators directly relevant to teacher preparation rather than clinical psychological categories.

While classroom-based collaboration has been widely explored, extracurricular peer collaboration remains significantly underexamined, particularly in Central Asia. International studies show that academic clubs and learning communities foster intrinsic motivation, leadership, self-regulation and social belonging [11]. Such environments provide voluntary, autonomous and peer-driven engagement – conditions not typically present in formal coursework. Research in practice-based teacher education similarly suggests that extracurricular collaboration enhances initiative, creativity and resilience, mirroring authentic professional communities [12].

In the Kazakhstani context, psycho-pedagogical studies underscore the importance of collaboration for emotional stability, communication and reflective culture [13, 14]. However, these works focus primarily on classroom interactions or teacher-mediated collaboration. Empirical research on student-led extracurricular collaborative environments – such as academic clubs or voluntary peer groups – remains scarce. Consequently, little is known about how these formats influence psychological constructs such as reflective thinking, self-efficacy and research motivation among pre-service teachers.

In summary, two major gaps remain:

1. a lack of empirical studies on student-led, peer-to-peer extracurricular collaboration among pre-service teachers in Kazakhstan;
2. insufficient investigation of psychological mechanisms—motivation, self-efficacy, reflection and peer support – operating within peer-driven extracurricular environments**.**

The study employed an explanatory sequential mixed-methods design (QUAN → QUAL), which consisted of two consecutive phases. In the quantitative phase, pre- and post-intervention survey measurements were used to assess students' teamwork confidence, research motivation and reflective thinking. In the qualitative phase, reflective journals, observation notes and club-related documents were analysed to explain and deepen the quantitative findings. Integration of the two datasets occurred at the interpretation stage through triangulation.

Participant selection was guided by clearly defined inclusion criteria to ensure that only students with sufficient exposure to the intervention were involved in the analysis. Eligible participants were third- and fourth-year students enrolled in the 6B01303 or 6B01302 educational programmes who had attended at least 70% of the «Bilim Vektory» club activities. In addition, they were required to complete both the pre-test and post-test surveys and to provide informed consent. Based on these criteria, 26 students were included in the experimental group.

A matched comparison group of 26 students was formed to ensure baseline equivalence. Control group students: were from the same academic programmes and year levels, did not participate in any structured extracurricular collaboration activities, had comparable academic performance (baseline GPA difference = 0.11; $p > 0.05$), followed the standard university curriculum without additional mentoring or project-based activities.

This ensured that any observed changes could reasonably be attributed to participation in the club's extracurricular student activities, rather than external academic factors.

Several measures were taken to minimise pedagogical bias:

- Both groups were taught by the same instructors in their academic courses.
- Club mentors were restricted to facilitatory roles only, without grading or evaluating students academically.
- Survey responses and reflective journals were anonymised before analysis.
- No academic incentives, grades or rewards were provided for participation.
- The research team did not intervene in academic instruction during the study period.

These procedures ensured that the effects measured were not influenced by teacher preferences or mentor intervention.

The quantitative instrument consisted of 15 items divided into three subscales:

1. Teamwork Confidence (Self-Efficacy) – 6 items
2. Research Motivation – 5 items
3. Reflective Thinking – 4 items

Items were rated on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree).

The survey was adapted from established educational psychology scales, including:

Collaborative Competence Scale (Gillies, 2003); Research Motivation Scale (Wang, 2022); Leadership and Self-Efficacy indicators (Caprara et al., 2003).

The adaptation followed a standard procedure:

Expert validation by three specialists in pedagogy and psychology;

Pilot testing with 12 students (Cronbach's $\alpha = 0.81$);

Main study reliability: Cronbach's $\alpha = 0.88$, confirming strong internal consistency.

Students completed pre-test surveys at the beginning of the semester and post-test surveys after 12 weeks of participation in the club's extracurricular student activities. Data were collected in paper and electronic formats. Reflective journals (n = 71 entries), Observation notes from 12 club events, Documents: activity plans, protocols, visual materials. All qualitative materials were analysed using Braun & Clarke's six-step thematic analysis.

All quantitative data were analyzed using SPSS 29.0.

Descriptive statistics included Mean (M) and Standard Deviation (SD).

Normality of distribution was checked with Shapiro-Wilk tests ($p > 0.05$).

Pre-post differences were tested with paired-samples t-tests.

Effect sizes were calculated using Cohen's d (small = 0.2, medium = 0.5, large = 0.8). Significance level was set at $\alpha = 0.05$.

Qualitative materials were coded using NVivo software. Themes were identified through: familiarisation with the data; generating initial codes; searching for themes; reviewing and refining themes; defining and naming themes; synthesising themes with quantitative findings.

Four major themes emerged: collaborative identity; peer-driven motivation; leadership emergence; reflective development.

RESULTS AND DISCUSSION Pre-and post-test survey scores showed consistent positive changes across all three psychological constructs: teamwork confidence, research motivation and reflective thinking. Table 1 summarises the paired-samples statistics and significance values.

Table 1. Pre- and Post-Test Results for the Experimental Group (n = 26)

Indicator	Pre-test M (SD)	Post-test M (SD)	ΔM	t	p-value
1. Confidence in working in a team	3.64 (0.82)	4.31 (0.67)	+0.67	3.12	p <0.01
2. Enjoyment of collaborative research projects	3.11 (0.91)	4.08 (0.72)	+0.97	4.21	p <0.001
3. Perception that collaboration enhances creativity	3.42 (0.85)	4.25 (0.69)	+0.83	3.88	p <0.01
4. Active participation in group discussions	3.75 (0.77)	4.22 (0.63)	+0.47	2.45	p <0.05
5. Motivation to learn after participation	3.58 (0.88)	4.47 (0.66)	+0.89	4.03	p <0.001
6. Readiness to co-author academic or creative projects	3.69 (0.81)	4.28 (0.71)	+0.59	2.97	p <0.01

Note: Paired-samples t-test; significance level $\alpha = 0.05$

All indicators demonstrated statistically significant improvement after 12 weeks of participation in the student-led academic club. Table 1 presents the pre- and post-test results for the experimental

group across all psychological indicators. The data show statistically significant improvements in teamwork confidence, research motivation and reflective thinking after participation in the student-led extracurricular collaborative activities. These results suggest that structured peer interaction contributed to measurable positive changes in students' competencies.

To verify that observed improvements were attributable to participation in the club, the same indicators were measured in a matched control group (n = 26). As shown in Table 2, no statistically significant changes were found.

Table 2. Pre- and Post-Test Results for the Control Group (n = 26)

Indicator	Pre-test M (SD)	Post-test M (SD)	ΔM	t	p-value
1. Confidence in working in a team	3.58 (0.79)	3.61 (0.82)	+0.03	0.18	n.s.
2. Enjoyment of collaborative research projects	3.14 (0.86)	3.18 (0.88)	+0.04	0.26	n.s.
3. Perception that collaboration enhances creativity	3.39 (0.80)	3.41 (0.82)	+0.02	0.12	n.s.
4. Active participation in group discussions	3.71 (0.75)	3.73 (0.78)	+0.02	0.09	n.s.
5. Motivation to learn after participation	3.62 (0.84)	3.65 (0.85)	+0.03	0.15	n.s.
6. Readiness to co-author academic or creative projects	3.67 (0.77)	3.69 (0.79)	+0.02	0.13	n.s.

Note: n.s. = non-significant ($p > 0.05$).

Table 2 displays the pre- and post-test scores for the control group. Unlike the experimental group, no statistically significant changes were observed across the indicators, indicating that regular academic activities alone did not lead to improvements. This comparison supports the conclusion that the observed gains were specifically associated with participation in the collaborative club.

During the formative stage, five reflective-psychological components were analysed: initiative, collaboration, trust, conflict management and psychological comfort.

Table 3. Levels of Reflective Components in Experimental and Control Groups (%)

Component	**Group**	**High**	**Medium**	**Low**
Initiative	Experimental	46.2%	50.0%	3.8%
	Control	19.2%	69.2%	11.5%
Collaboration	Experimental	53.8%	42.3%	3.8%
	Control	23.1%	69.2%	7.7%
Trust	Experimental	50.0%	46.2%	3.8%
	Control	19.2%	73.1%	7.7%
Conflict Management	Experimental	42.3%	53.8%	3.8%
	Control	15.4%	69.2%	15.4%
Psychological Comfort	Experimental	57.7%	38.5%	3.8%
	Control	23.1%	65.4%	11.5%

Note: Levels classified according to Observation Rubric (0–2 low, 3–4 medium, 5 high).

The experimental group demonstrated consistently higher proportions of high-level indicators across all five reflective components compared to the control group. Table 3 compares the distribution

of reflective components between the experimental and control groups. Students in the experimental group demonstrated a noticeably higher proportion of high-level indicators across initiative, collaboration, trust, conflict management and psychological comfort. These findings suggest that extracurricular student activities provided richer conditions for developing reflective and interpersonal competencies. Four themes were generated through thematic analysis.

Table 4. Thematic Analysis Results

Theme	Description
Collaborative identity	Students described increased awareness of group roles and shared responsibility.
Peer-driven motivation	Motivation increased due to voluntary participation and peer support.
Leadership emergence	Students reported taking initiative and leading tasks within their groups.
Reflective development	Regular journaling and peer feedback enhanced reflective thinking skills.

These qualitative themes correspond to the quantitative changes observed in teamwork confidence, research motivation and reflection.

The findings of this mixed-methods study demonstrate that participation in a structured, student-led collaborative environment is associated with measurable gains in teamwork confidence, research motivation and readiness to engage in co-authored projects. The consistent increases across all survey items, coupled with statistically significant differences, indicate that the extracurricular format can effectively complement formal coursework in teacher education. The particularly strong gains in co-authoring skills and motivation suggest that the club provided students with authentic opportunities to take responsibility for joint products and to experience success in collaborative tasks.

The qualitative results help clarify the psychological mechanisms underlying these changes. Students' reflections indicate that the club made research more accessible, reduced anxiety associated with academic projects and offered concrete models of how to structure and present ideas. Themes such as «Motivation and clarity of professional direction», «Development of collaborative leadership» and «Public speaking and peer learning» show that students not only acquired technical skills, but also began to see themselves as more confident, proactive and professionally oriented. These developments are consistent with educational psychology frameworks that link self-efficacy and motivation to repeated successful experiences in socially supportive contexts.

Differences between the experimental and control groups on reflective components further support this interpretation. Higher proportions of high-level indicators in the experimental group suggest that regular engagement in collaborative problem-solving and reflection fostered more advanced forms of initiative, trust and conflict management. In contrast, the control group's predominance of average-level indicators points to more limited opportunities for practising and consolidating these skills in everyday academic settings.

The triangulation of quantitative and qualitative data strengthens the internal validity of the study. Survey results, reflective narratives and observational data converge in indicating that structured extracurricular collaboration supports both academic and personal development outcomes. In particular, the alignment between mean score increases and thematic categories (Table 2 and Table 3) suggests that changes in measured indicators are not superficial, but reflect deeper shifts in how students perceive collaboration, research and their own professional trajectories.

At the same time, several limitations should be noted. The sample size was relatively small and drawn from a single institution, which restricts the generalisability of the findings. Participation was voluntary, so self-selection effects cannot be fully excluded: students who chose to join the club may initially have been more motivated or open to collaboration. In addition, the study relied on self-report

measures and short reflective texts, which capture students' perceptions rather than direct behavioural outcomes. Future research could extend this work by including longitudinal designs, larger and more diverse samples, and additional objective indicators of performance (e.g., evaluation of project products or external expert assessments).

Despite these limitations, the study contributes to the literature by providing empirical evidence on the psychological and professional benefits of extracurricular collaboration in teacher education. It shows that a structured student club can serve as an effective context for developing research motivation, collaborative self-efficacy and reflective thinking among future teachers, and underscores the potential of such formats as a complementary component of higher education programmes.

CONCLUSION. This study examined the influence of participation in the student-led extracurricular academic club «Bilim Vektory» on the psychological and professional development of future primary education teachers. Using a mixed-methods design, the research demonstrated that structured peer collaboration in extracurricular settings can create meaningful conditions for strengthening several pedagogically significant psychological mechanisms.

The results of the study indicate that participation in sustained peer-driven collaboration contributes to the development of teamwork confidence, research motivation and reflective thinking. Students reported greater readiness to assume responsibility in group tasks, increased interest in research activities and enhanced ability to analyse their own learning processes. Qualitative evidence confirmed these findings, showing that extracurricular collaboration fostered initiative, peer support, constructive communication and a stronger sense of belonging to a professional community.

These outcomes suggest that student-initiated collaborative environments can complement formal university coursework by offering spaces for autonomous decision-making, joint problem-solving and reflective dialogue – competencies that are essential for contemporary teacher preparation. The experience of the «Bilim Vektory» club demonstrates that structured extracurricular collaboration can function as an effective resource for promoting professional growth within teacher education programmes.

However, the study has certain limitations. The sample size was relatively small and drawn from a single institution, and therefore the findings cannot be generalised beyond this context. The voluntary nature of participation may also have introduced self-selection effects. Future research should expand the range of participants, include multi-institutional data and incorporate additional objective indicators of collaborative performance.

Despite these constraints, the study provides evidence that student-led extracurricular collaboration has significant potential for enhancing the psychological readiness and professional competencies of pre-service teachers. Incorporating similar formats into university practice may support the formation of more motivated, confident and reflective future educators.

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ИЗМЕНЕНИЕ КОГНИТИВНЫХ ХАРАКТЕРИСТИК МЛАДШИХ ШКОЛЬНИКОВ В ПРОЦЕССЕ ПРИМЕНЕНИЯ ИНТЕРАКТИВНЫХ ПСИХОЛОГО-ПЕДАГОГИЧЕСКИХ КЕЙСОВ

Аннотация

В условиях цифровой модернизации образования и расширения интерактивных форм обучения развитие когнитивных функций младших школьников становится особенно актуальным. В статье обосновывается концепция когнитивной динамики как педагогически организованного процесса развития мышления, основанного на интеграции интерактивных кейсов и когнитивных карт активности. Описана методика разработки таких карт, позволяющая фиксировать изменения ключевых когнитивных функций — внимания, памяти, речи, логического мышления, воображения и метапознания. Представлены примеры и схемы

карт, дана классификация их типов и подходов к интерпретации. Особое внимание уделено казахстанской образовательной среде, включая потенциал платформ Kundelik, BilimLand и технологий дополненной реальности. Подчёркивается роль когнитивной карты активности как инструмента, связывающего учебный процесс с развитием мышления и обеспечивающего мониторинг индивидуального когнитивного прогресса учащихся.

Ключевые слова: когнитивная карта активности, когнитивная динамика, младшие школьники, интерактивное обучение, критическое мышление, педагогика развития.

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ИНТЕРАКТИВТІ ПСИХОЛОГИЯЛЫҚ-ПЕДАГОГИКАЛЫҚ КЕЙСТЕРДІ ҚОЛДАНУ ҮДЕРІСІНДЕ БАСТАУЫШ СЫНЫП ОҚУШЫЛАРЫНЫҢ КОГНИТИВТІК СИПАТТАМАЛАРЫНЫҢ ӨЗГЕРУІ

Аңдатпа

Білім берудің цифрлық трансформациясы және интерактивті оқыту формаларының кеңеюі жағдайында бастауыш сынып оқушыларының когнитивтік функцияларын дамыту ерекше маңызға ие болуда. Мақалада когнитивтік динамика түсінігі интерактивті кейстер мен когнитивтік белсенділік карталарын біріктіруге негізделген, ойлауды дамытуға бағытталған педагогикалық үдеріс ретінде ашып көрсетіледі. Мұндай карталарды құрастыру әдістемесі ұсынылып, онда назар, жады, сөйлеу, логикалық ойлау, қиял және метатаным секілді негізгі когнитивтік функциялардың өзгерістері тіркеледі. Карталардың мысалдары мен сызбалары келтіріліп, олардың түрлері мен талдау тәсілдері жіктеледі. Kundelik, BilimLand және AR-технологиялары сияқты қазақстандық білім беру платформаларының мүмкіндіктеріне ерекше назар аударылады. Когнитивтік белсенділік картасы оқу үдерісі мен ойлаудың байланысын қамтамасыз ететін, мұғалімге оқушылардың жеке когнитивтік даму динамикасын бақылауға және бағыттауға мүмкіндік беретін тиімді құрал ретінде сипатталады.

Түйін сөздер: когнитивтік белсенділік картасы, когнитивтік динамика, бастауыш сынып оқушылары, интерактивті оқыту, сыни ойлау, даму педагогикасы.

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CHANGES IN THE COGNITIVE CHARACTERISTICS OF PRIMARY SCHOOL STUDENTS IN THE PROCESS OF APPLYING INTERACTIVE PSYCHO-PEDAGOGICAL CASES

Abstract

Amid the digital transformation of education and the expansion of interactive learning formats, the development of cognitive functions in primary school students gains particular importance. The article presents the concept of cognitive dynamics as a pedagogically organized process of fostering thinking through the integration of interactive cases and cognitive activity maps. A methodology for constructing such maps is proposed, enabling the tracking of changes in key cognitive functions—including attention, memory, speech, logical reasoning, imagination, and metacognition. The article provides examples and structural models of cognitive maps, along with a classification of their types and analytical approaches. Special emphasis is placed on the Kazakhstani educational context, highlighting the potential of platforms such as Kundelik, BilimLand, and AR technologies. The cognitive activity map is presented as a tool that bridges learning and thinking, allowing teachers to monitor and guide the individual cognitive development of students.