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EVALUATION OF PROSPECTIVE TEACHERS IN TERMS OF METACOGNITIVE THINKING SKILLS

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Abstract. The concept of metacognition is defined as «*knowledge of one's own cognitive processes and the use of this knowledge to control cognitive processes*». The main purpose of the research is to reveal the level of metacognitive skills of prospective primary school teachers studying at Khoja Akhmet Yassawi International Kazakh-Turkish University. The study group of the research consists of 124 prospective teachers studying at various grade levels in the Department of Classroom Teaching in the 2023-2024 academic year. In the selection of prospective teachers, maximum diversity sampling method was used in quantitative research. In this study, the relational survey model, one of the general survey models among quantitative research methods, is used. With the relational survey model, it will be tried to determine whether the metacognitive awareness levels of prospective teachers and other variables change together and if there is a change, how it happens. Metacognitive Awareness Inventory (MAI) was used to determine the metacognitive awareness levels of prospective teachers. The results of the study showed that the prospective teachers responded to the items in the metacognitive awareness scale as «agree», there was no relationship between their metacognitive awareness levels and their grade levels, there was a weak positive relationship with their grade point averages, and there was a higher relationship in favor of those at higher socioeconomic levels.

Keywords: metacognitive thinking skills, primary school teaching, prospective teachers, metacognitive awareness, thinking skills

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БОЛАШАҚ МҰҒАЛІМДЕРДІ МЕТАКОГНИТИВТІ ОЙЛАУ ДАҒДЫЛАРЫ ТҮРҒЫСЫНАН БАҒАЛАУ

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Аннотация. Метатану ұғымы «адамның өз когнитивтік процестері туралы білімі және сол білімді осы процестерді басқару үшін пайдалану» деп анықталады. Зерттеудің негізгі мақсаты – Қожа Ахмет Ясауи атындағы Халықаралық қазақ-түрік университетінде білім алып жатқан бастауыш сынып мұғалімдерінің метакогнитивтік дағдыларының деңгейін анықтау. Метакогнитивтік дағдылар болашақ бастауыш сынып мұғалімдерінің кәсіби даярлығында оқу үдерісін жоспарлау, бақылау және бағалау қабілеттерін қалыптастыратын маңызды құрамдас бөлік ретінде қарастырылады. Зерттеу тобына 2023–2024 оқу жылында аталған университеттің бастауыш білім беру кафедрасында әртүрлі курстарда оқитын 124 болашақ мұғалім енгізілді. Болашақ мұғалімдерді іріктеу кезінде сандық зерттеулерде қолданылатын ең көп әртүрлілікке негізделген іріктеу әдісі пайдаланылды. Әртүрлілікті қамтамасыз ету үшін негізгі критерийлер ретінде: оқу деңгейі, кітап оқу жиілігі, орта білім беру жетістіктері және университеттің орташа балл көрсеткіштері алынды. Зерттеуде сандық зерттеу әдістерінің жалпы модельдерінің бірі – корреляциялық зерттеу моделі қолданылды. Бұл модель болашақ мұғалімдердің метакогнитивтік хабардарлық деңгейлері мен басқа айнымалылардың өзара өзгерісін және олардың арасындағы ықтимал байланыстардың бағыты мен сипатын анықтауға мүмкіндік береді. Метакогнитивтік хабардарлық деңгейлерін өлшеу үшін Метакогнитивтік хабардарлық инвентары (MAI) пайдаланылды. Зерттеу нәтижелері болашақ мұғалімдердің метакогнитивтік хабардарлық шкаласындағы тұжырымдарға көбіне «келісемін» деп жауап бергенін, олардың метакогнитивтік хабардарлық деңгейлері мен курс бойынша

оқу жылдары арасында айқын байланыс болмағанын көрсетті. Сонымен қатар орташа балл көрсеткіштерімен әлсіз оң корреляция анықталды, ал әлеуметтік-экономикалық деңгейі жоғары қатысушыларда метакогнитивтік хабардарлық деңгейінің біршама жоғары екені байқалды.

Түйін сөздер: метакогнитивтік ойлау дағдылары, бастауыш білім беру, болашақ мұғалімдер, метакогнитивтік хабардарлық, ойлау дағдылары

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ОЦЕНКА БУДУЩИХ УЧИТЕЛЕЙ С ТОЧКИ ЗРЕНИЯ МЕТАКОГНИТИВНЫХ НАВЫКОВ МЫШЛЕНИЯ

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Аннотация. Понятие метакогниции определяется как «знание о собственных когнитивных процессах и использование этих знаний для управления этими процессами». Основная цель исследования — выявить уровень метакогнитивных навыков студентов факультета начального образования Международного казахско-турецкого университета имени Ходжи Ахмеда Ясави. В выборку исследования вошли 124 будущих учителя, обучающихся на различных курсах кафедры начального образования в 2023–2024 учебном году. Для отбора участников использовался метод максимального разнообразия, применяемый в количественных исследованиях. Основными критериями отбора выступили: уровень обучения, частота чтения книг, показатели академической успеваемости в средней школе и средний балл успеваемости в университете. В исследовании применялась корреляционная модель, являющаяся одной из распространённых моделей количественных исследований. Данная модель позволила установить, изменяются ли уровни метакогнитивной осведомлённости будущих учителей совместно с другими переменными и, если да, то каково направление этих изменений. Для определения уровней метакогнитивной осведомлённости использовалась шкала MAI (Metacognitive Awareness Inventory). Результаты исследования показали, что большинство будущих учителей выбирали ответы типа «согласен» по шкале MAI. Связи между уровнем метакогнитивной осведомлённости и курсом обучения выявлено не было. При этом установлена

слабая положительная корреляция между уровнем метакогнитивной осведомлённости и средним баллом успеваемости, а также более высокая корреляция у участников с более высоким социально-экономическим уровнем.

Ключевые слова: метакогнитивные навыки мышления, начальное образование, будущие учителя, метакогнитивная осведомленность, навыки мышления

Introduction. Metacognitive awareness, often referred to as «thinking about thinking», encompasses an individual's ability to understand and regulate their own cognitive processes (Blakey & Spence, 1990). This concept has gained significant attention in educational research due to its critical role in fostering lifelong learning and problem-solving efficiency. Metacognition involves two primary components: knowledge of cognition and regulation of cognition (Schraw & Moshman, 1995). Knowledge of cognition pertains to understanding declarative, procedural, and conditional knowledge, while regulation of cognition includes skills such as planning, monitoring, and evaluation. These dimensions are indispensable for promoting self-directed and reflective learning (Brown, 1987).

Flavell (1979), a pioneer in metacognitive research, emphasized that individuals with high metacognitive awareness can effectively identify gaps in their comprehension, adjust their strategies, and achieve learning goals more efficiently. Building on this foundation, Veenman, Van Hout-Wolters, and Afflerbach (2006) argued that metacognition is a learnable and transferable skill that can significantly enhance academic achievement. Importantly, the cultivation of metacognitive awareness is not limited to students; it is equally essential for teachers, as they are responsible for modeling and fostering these skills in their classrooms.

In the context of primary education, teachers play a pivotal role in shaping students' higher-order thinking and problem-solving abilities (Anderson & Krathwohl, 2001). Prospective teachers, particularly those preparing to educate young learners, must possess robust metacognitive skills to design and implement effective instructional strategies. Paris and Winograd (1990) highlighted that teachers with high metacognitive awareness are more likely to create active and reflective learning environments that cater to diverse student needs. Furthermore, studies by Wilson and Bai (2010) have demonstrated a strong correlation between teachers' metacognitive awareness and their ability to enhance student engagement and achievement.

Despite the extensive research on metacognition in various educational contexts, there is a noticeable gap in understanding its development within multicultural and multilingual environments. Kazakhstan, with its unique educational landscape, presents an opportunity to explore how cultural and linguistic diversity influences metacognitive development. Khoja Akhmet Yassawi International Kazakh-Turkish University serves as an ideal setting for such research, as it brings together prospective teachers from diverse backgrounds. This institution not only offers insights into the development of metacognitive skills but also highlights the challenges and opportunities of teacher training in a globalized world.

Recent studies have emphasized the influence of external factors, such as socioeconomic status and academic achievement, on the development of metacognitive skills (Pintrich, 2002; Efklides, 2011). For instance, students from higher socioeconomic backgrounds often have greater access to resources and opportunities that support metacognitive development. Similarly, academic achievement has been shown to correlate positively with metacognitive awareness, as successful learners tend to employ more sophisticated self-regulation strategies (Zimmerman, 2002).

This study seeks to address these critical aspects by evaluating the metacognitive awareness levels of prospective primary school teachers at Khoja Akhmet Yassawi International Kazakh-Turkish University. Specifically, it examines whether their metacognitive thinking skills vary based on class level, academic achievement, and socioeconomic status.

This study aims to answer the following research questions:

1. Do the metacognitive thinking skills of prospective primary school teachers differ by class level?
2. Do they vary according to academic achievement levels?
3. Are there differences in metacognitive thinking skills based on socioeconomic status?

By addressing these questions, the study contributes to the growing body of research on teacher education and provides practical recommendations for curriculum development. Furthermore, it highlights the importance of integrating metacognitive training into teacher preparation programs to ensure that future educators are well-equipped to foster reflective and independent learning in their students.

Materials and Methods. This study investigates the metacognitive awareness levels of prospective primary school teachers in relation to various demographic and academic variables. For this purpose, a descriptive and relational survey model was employed. This research design is commonly used in quantitative studies to determine the relationships and interactions between variables (Karasar, 2024). By utilizing this approach, the study aims to assess whether variables such as grade level, socioeconomic status, and academic achievement are associated with metacognitive awareness, and if so, the nature of these associations.

Research Design. The relational survey model enables researchers to identify relationships between two or more variables and to evaluate the direction and strength of these relationships. This model is particularly useful for studies that explore cognitive or psychological constructs in diverse populations. The descriptive aspect of the study allows for a comprehensive examination of the participants' metacognitive awareness levels, providing insights into how these levels vary across different subgroups (Büyükoztürk et al., 2024).

Working Group. The study group consisted of 124 prospective teachers enrolled in the Primary School Teaching Undergraduate Program at Khoja Akhmet Yassawi International Kazakh-Turkish University during the 2023-2024 academic year. The participants were selected using the maximum diversity sampling method, a

purposeful sampling technique. This method aims to ensure a wide representation of different subgroups based on predefined criteria such as grade level, academic performance, and family economic status (Balci, 2025).

This diverse sampling approach ensures that the results are not limited to a specific subgroup and provides a broader understanding of how metacognitive awareness is influenced by various factors. Furthermore, participants were selected to include representation from all grade levels and varying levels of academic achievement to enhance the generalizability of the findings.

Data Collection Tools. The primary instrument used to assess metacognitive awareness levels was the Metacognitive Awareness Inventory (MAI), developed by Schraw and Dennison (1994) and adapted into Turkish by Akın, Abacı, and Çetin (2007). This inventory is widely recognized for its reliability and validity in measuring metacognitive skills across different populations. The inventory consists of 52 items scored on a five-point Likert scale ranging from «always wrong» to «always right». Higher scores indicate greater metacognitive awareness, with total possible scores ranging from 52 to 260.

The inventory measures two key dimensions of metacognition:

1. Knowledge of Cognition, which includes declarative, procedural, and conditional knowledge.
2. Regulation of Cognition, which involves planning, monitoring, and evaluation strategies.

The Kazakh version of the MAI was adapted by the researchers for this study. The adaptation process included translation and back-translation procedures, expert reviews, and a pilot test to ensure cultural and linguistic compatibility.

Data Collection and Analysis. The Kazakh version of the scale was adapted by the researchers. For this purpose, firstly, the scale items were translated into Kazakh by the researchers, the translations were checked by 1 language expert, 1 field expert and 1 measurement and evaluation expert, and in case of incompatibility, corrections were made in line with the opinions of the experts and presented to the experts again, and the item was included in the scale after full agreement was achieved.

The scale was first administered to 25 prospective primary school teachers, who were not included in the main study group, as a trial, and the reliability coefficient of the scale was calculated as .81.

As the final application, the scale was applied by the researchers to prospective primary school teachers in a 25-minute period in the fall semester of the 2023-2024 academic year. During the application, necessary explanations were made for the students to understand the items in the scale correctly and a general information was given about the importance of the study in order for them to give sincere answers.

Inventory administration time is approximately 20-25 minutes

In the analysis of the data, t-test for independent groups, one-way analysis of variance, Pearson correlation analysis and descriptive statistical techniques were used to reveal the relationships.

The collected data were analyzed using the following statistical techniques:

Descriptive Statistics: To summarize the central tendencies and distributions of metacognitive awareness scores; **t-Test for Independent Groups:** To compare mean scores between two groups, such as gender or socioeconomic status; **One-Way Analysis of Variance (ANOVA):** To examine differences among multiple groups based on variables such as grade level or academic achievement; **Pearson Correlation Analysis:** To determine the strength and direction of relationships between metacognitive awareness and continuous variables (e.g., GPA).

These statistical methods were chosen to provide a comprehensive understanding of the data and to test the research hypotheses effectively. Data analysis was performed using SPSS software, and results were interpreted with a significance level of $p < 0.05$.

Results. This study examined the general level of metacognitive awareness among prospective primary school teachers, with the descriptive statistics for these levels presented in Table 1. The data were analyzed based on the dimensions of the Metacognitive Awareness Inventory, revealing significant insights into the participants' self-perceived metacognitive skills.

Table 1 provides the mean scores and standard deviations for each dimension of metacognitive awareness. The overall mean score of the sample was 3.58 (SD = 0.53), indicating that participants generally agreed with the metacognitive awareness statements on the scale. This suggests that the prospective teachers perceive themselves as having a moderate to high level of metacognitive skills.

Table 1. Descriptive Statistics of Metacognitive Awareness Levels by Dimension

Dimension	N	Mean ($\bar{X}$)	Standard Deviation (SD)
Explanatory Knowledge	124	3.71	0.56
Procedural Knowledge	124	3.44	0.89
Situational Knowledge	124	3.70	0.61
Planning	124	3.54	0.64
Monitoring	124	3.49	0.62
Evaluation	124	3.54	0.84
Debugging	124	3.62	0.84
Knowledge Management	124	3.63	0.59
Overall	124	3.58	0.53

When the dimensions are analyzed individually, the highest mean score was observed in the Explanatory Knowledge dimension ($\bar{X} = 3.71$, SD = 0.56). This indicates that participants feel particularly confident in their ability to explain and understand their cognitive processes. Conversely, the lowest mean score was recorded in the Procedural Knowledge dimension ($\bar{X} = 3.44$, SD = 0.89), suggesting potential areas for improvement in systematically applying cognitive strategies.

Other dimensions, such as Situational Knowledge ($\bar{X} = 3.70$, SD = 0.61) and Knowledge Management ($\bar{X} = 3.63$, SD = 0.59), also received relatively high scores. These findings highlight the participants' awareness of when and how to use specific strategies in various learning situations, as well as their ability to regulate and manage

their cognitive processes effectively. The dimensions of Planning, Monitoring, and Debugging also showed consistent mean scores around 3.50, further supporting the conclusion that participants possess a solid foundation in metacognitive strategies necessary for effective learning.

Although all dimensions received positive mean scores, the variation between Explanatory Knowledge and Procedural Knowledge warrants further discussion. The relatively lower score in Procedural Knowledge may indicate a need for targeted training to enhance prospective teachers' ability to implement cognitive strategies in a systematic manner. This finding aligns with prior research, which suggests that while declarative and situational knowledge often develop naturally through experience, procedural knowledge may require a more deliberate to ensure that individuals can apply their cognitive strategies effectively in real-world contexts.

The standard deviations across the dimensions suggest varying levels of consistency among participants. For example, the higher standard deviation in Procedural Knowledge ($SD = 0.89$) indicates greater variability in participants' responses, which could reflect differences in individual experiences or training. On the other hand, dimensions like Explanatory Knowledge showed relatively low variability, suggesting more uniform perceptions among the sample group. These findings have important implications for teacher training programs. Enhancing procedural knowledge and other lower-scoring dimensions could be a priority for curriculum designers. Additionally, the relatively high scores in dimensions like Explanatory Knowledge and Knowledge Management suggest that current training programs are effective in fostering certain aspects of metacognitive awareness. However, these results should be interpreted within the context of the study's limitations and the specific characteristics of the sample group, including cultural and institutional factors that may influence metacognitive awareness levels.

The relationship between prospective primary school teachers' metacognitive awareness and their grade levels is presented in Table 2.

Table 2. The relationship between metacognitive awareness and grade levels (ANOVA)

Factor	Source of Variance	Sum of Squares	df	Mean Squares	F	Sig
Explanatory Information	Between Groups	.755	3	.252	.762	.516
	Within Groups	102.734	120	.330		
	Total	103.489	123			
Procedural Knowledge	Between Groups	1.208	3	.403	.573	.633
	Within Groups	218.452	120	.702		
	Total	219.661	123			
Situational Knowledge	Between Groups	.654	3	.218	.565	.638
	Within Groups	119.851	120	.385		
	Total	120.505	123			

Planning	Between Groups	2.062	3	.687	1.679	.171
	Within Groups	127.300	120	.409		
	Total	129.362	123			
Monitoring	Between Groups	1.811	3	.604	1.627	.183
	Within Groups	115.406	120	.371		
	Total	117.217	123			
Evaluation	Between Groups	1.141	3	.380	.538	.656
	Within Groups	219.794	120	.707		
	Total	220.935	123			
Debug	Between Groups	.537	3	.179	.226	.878
	Within Groups	246.132	120	.791		
	Total	246.669	123			
Managing Knowledge	Between Groups	.214	3	.071	.206	.892
	Within Groups	107.688	120	.346		
	Total	107.902	123			
GENERAL	Between Groups	.430	3	.143	.487	.692
	Within Groups	91.499	120	.294		
	Total	91.928	123			

Based on the data in the Tables given above, it was concluded that the responses of the pre-service primary school teachers to the whole metacognitive awareness scale did not show a significant difference according to the grade variable $F(3-311) = .487, p > .05$.

Similarly, the answers given to each dimension of the scale did not show a significant difference according to the class variable ($p > .05$).

The results of the Pearson correlation analysis conducted to determine whether there is any relationship between the grade point average variable and the metacognitive awareness levels of the prospective primary school teaching are shown in Table 3.

Table 3. The relationship between metacognitive awareness and grade point averages (pearson correlation analysis)

Variables		Explanatory Knowledge	Procedural Knowledge	Situational Knowledge	Planning	Monitoring	Evaluation	Debug	Mathematical Knowledge	General
Grade Point	r	.072	.129	.107	.101	.118	.118	.133	.55	.174
Average	P	.098	.003	.014	.021	.007	.007	.002	.206	.009
	N	124	124	124	124	124	124	124	124	124

According to the results presented in Table 3, a very weak positive correlation was found between GPA and the overall scores of the metacognitive awareness scale and the scores obtained from all dimensions of the scale and GPA ($p < 0.05$).

The relationship between prospective primary school teachers' metacognitive awareness and their socio-economic status is presented in Table 4.

Table 4. The relationship between metacognitive awareness and socio-economic status (t test)

	Groups	N	$\bar{X}$	Ss	t	p
Explanatory Knowledge	Top	77	3,77	.57	1,979	.049
	Middle	47	3,62	.58		
Procedural Knowledge	Top	77	3,50	.90	1,723	.086
	Middle	47	3,31	.59		
Situational Knowledge	Top	77	3,73	.63	1,662	.097
	Middle	47	3,60	.59		
Planning	Top	77	3,62	.65	3,387	.001
	Middle	47	3,34	.65		
Monitoring	Top	77	3,55	.63	3,122	.002
	Middle	47	3,31	.51		
Evaluation	Top	77	3,61	.91	2,414	.016
	Middle	47	3,35	.56		
Debug	Top	77	3,69	.64	2,557	.011
	Middle	47	3,40	1.21		
Knowledge Management	Top	77	3,68	.60	3,839	.000
	Middle	47	3,40	.49		
GENERAL	Top	77	3,65	.55	3,361	.001
	Middle	47	3,42	.49		

In Table 4, it is seen that the mean scores of the metacognitive awareness of the prospective primary school teachers with upper and middle socio-economic status are higher in favor of the upper economic level students when the whole scale is considered.

However, according to the results of the independent samples t-test conducted to determine the significance of the aforementioned mean difference, it was found that the difference in scores in favor of students with higher socio-economic status was statistically significant $t(239) = 3.361$, $p < 0.05$. It can be said that it can be generalized to all other dimensions except "procedural knowledge" and "situational knowledge" dimensions ($p > 0.05$).

Discussion. First of all, when the findings related to the metacognitive awareness of prospective primary school teachers were examined, it was seen that they had a metacognitive awareness above the average. Akın et al. (2007), Yavuz (2009), Yıldırım (2010), Bars (2016) and Baysal, Ayvaz, Çekirdekçi and Malbeği (2013) similarly stated that the metacognitive awareness of prospective teachers was at a high level in total and sub-dimensions.

In this study, the highest level of metacognitive awareness of prospective primary school teachers was found in the «explanatory knowledge» sub-dimension. It is seen that prospective teachers have higher awareness in the skills of recognizing their mental strengths and weaknesses, understanding which information is important in the subject they will learn, organizing their knowledge, remembering their knowledge, deciding to what extent they understand a situation and knowing what they are expected to learn compared to other skills.

In addition, it was seen that the «procedural knowledge» sub-dimension of prospective primary school teachers was at a low level compared to other sub-dimensions. It was seen that prospective teachers' metacognitive awareness was at a lower level in the skills of reusing the strategies they used, determining a specific purpose in the learning strategies they used, being aware of what kind of strategies they used and automatically finding the useful strategy compared to other skills.

It can be concluded that prospective primary school teachers' skills such as choosing the strategies they apply while teaching or learning and being aware of the strategy they use are less developed compared to mental states such as understanding, remembering and organizing information. In his study, Bars (2016) found that the average in the «procedural knowledge» sub-dimension was lower than the other sub-dimensions, as in this study.

In the study, it was examined whether the metacognitive awareness levels of prospective primary school teachers differed in terms of the grade level variable and it was seen that no significant difference was found. It is seen that similar results were reached in the study of Bağçeci, Döş and Sarıca (2011) examining the relationship between metacognitive awareness levels and academic achievement scores of prospective teachers, Kaçar and Sarıçam (2015) examining the relationship between metacognitive awareness and mathematics anxiety levels of prospective primary teachers and Tuncer and Bahadır (2017). In the studies conducted by Tunca and Alkın (2014) and Kılınç and Uygun (2015) no significant difference was found in terms of class variable. It is seen that the aforementioned results overlap with the results of this study.

In the study, the relationship between the grade point average variable and metacognitive thinking skill levels of prospective primary school teachers was examined and a very weak positive relationship was found in all sub-dimensions of the scale.

In the literature on this subject, Aykut, Karasu and Kaplan (2016) found a relationship in terms of grade point average variable in the study in which they determined the metacognitive awareness of prospective special education teachers.

In the study, the relationship between the socio-economic status variable and the metacognitive thinking skill levels of prospective primary school teachers was examined and it was seen that the average scores of the metacognitive awareness of the prospective primary school teachers with upper and middle socio-economic status were higher in favor of the upper economic level students based on the whole scale.

However, according to the results of the independent samples t-test conducted to determine the significance of the aforementioned mean difference, it was determined that the difference in scores in favor of students with higher socio-economic status was statistically significant $t(239) = 3.361, p < 0.05$. It can be said that it can be generalized to all other dimensions except «procedural knowledge» and «situational knowledge» dimensions ($p > 0.05$).

Conclusion. This study investigated the metacognitive awareness levels of prospective primary school teachers in relation to demographic and academic variables, including class level, academic achievement, and socioeconomic status. The findings revealed that while prospective teachers generally exhibited above-average metacognitive awareness, certain dimensions of metacognition, such as procedural knowledge, were less developed compared to others like explanatory knowledge. These results underscore the need for targeted interventions to enhance procedural metacognitive skills, which are critical for effective teaching and learning.

No significant differences were observed in metacognitive awareness levels based on class level, indicating that metacognitive skills may not automatically develop with progression through teacher education programs. However, a weak positive correlation was found between grade point averages and metacognitive awareness levels, suggesting that academic success may be modestly associated with metacognitive skills.

The study also highlighted significant differences in metacognitive awareness levels based on socioeconomic status. Prospective teachers from higher socioeconomic backgrounds demonstrated greater metacognitive awareness, particularly in planning, monitoring, and evaluation dimensions. This finding points to the potential influence of external factors, such as access to resources and prior educational experiences, on the development of metacognitive skills.

These results have important implications for teacher training programs, particularly in multicultural and multilingual contexts like Kazakhstan. Enhancing teacher candidates' procedural knowledge and addressing disparities related to socioeconomic status should be prioritized in curriculum design. Integrating explicit metacognitive training and reflective practices into teacher education can equip future educators with the skills necessary to foster independent and self-regulated learning among their students. Future research should explore longitudinal changes in metacognitive awareness levels and examine the effectiveness of specific interventions designed to enhance these skills. Additionally, further studies could investigate the impact of cultural and institutional factors on metacognitive development to provide a more comprehensive understanding of this critical construct in diverse educational settings.

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