IRSTI https://doi.org/10.26577/JES86120266

U. Malik[1*], M. Shvetsova[2]

[1]M.Kh. Dulaty Taraz University, Taraz, Kazakhstan
[2]Moscow Pedagogical State University, Moscow, Russia
* e-mail: malik.umit@mail.ru

NARRATIVE REVIEW OF METACOGNITION DEVELOPMENT FOR BEGINNER RESEARCHERS

Metacognition is the thinking about the process of cognition that helps to regulate it. The development of metacognition and metacognitive skills of learners is a broad topic, the concept and scope of which has already been outlined in the scientific literature. It is possible to develop metacognition, and the body of applied research in this area is growing. In this regard, this paper provides an overview of research on metacognition development published primarily in the journal 'Metacognition and Learning', supplemented by relevant studies from other peer-reviewed sources. Despite the abundance of articles on metacognition itself, there are not many sources of information on its development. The material presented in this article aims to be a useful aid for novice researchers into the development of metacognition in order to form initial ideas and to learn about research perspectives. Articles addressing development, facilitation, and scaffolding were manually selected from the 'Metacognition and Learning' journal, complemented by additional studies from other scholarly sources. The study differs from similar ones in that it does not concentrate on metacognition in general, but on its development. The materials were analysed using a qualitative method. Based on the articles focusing specifically on the development of metacognition, we organized knowledge about directions for activities in the field of metacognition development. The results produced a structured knowledge that synthesises the data in the field of metacognition development. The research results also contribute to the development of theoretical ideas about the metacognition development.

Keywords: metacognition, metacognitive skills, development, facilitation, theory.

Ү. Мәлік[1*], М. Швецова[2]

[1] М.Х. Дулати атындағы Тараз университеті, Тараз, Қазақстан
[2]Мәскеу педагогикалық мемлекеттік университеті, Мәскеу, Ресей
* e-mail: malik.umit@mail.ru

Метатанымды дамыту туралы жас зерттеушілерге арналған ревью

Метатаным – бұл таным үдерісіне бағытталған ойлау, яғни оны реттеуді көмектесетін танымдық бақылау. Метатаным мен метатанымдық дағдыларының дамуы – ғылыми әдебиетте тұжырымдамасы мен ауқымы кеңінен сипатталған кең тақырып. Метатанымды дамыту мүмкін, әрі бұл саладағы қолданбалы зерттеулер саны артып келеді Осыған байланысты бұл мақала метатанымның дамуы жөніндегі зерттеулерге шолу ұсынады. Шолу негізінен Metacognition and Learning журналында жарияланған жұмыстарға сүйенеді, сондай-ақ рецензиядан өткен басқа ғылыми дереккөздерден алынған тиісті зерттеулермен толықтырылады. Метатанымға қатысты мақалалар көп болғанымен, оның даму аспектілеріне арналған дереккөздер саны аз. Осы мақалада ұсынылған материалдар метатанымның дамуын зерттеп жатқан жас зерттеушілерге бастапқы түсініктер қалыптастыруға және болашақ зерттеу бағыттарымен танысуға көмектесу мақсатында дайындалды. Даму, фасилитация және скаффолдинг мәселелерін қамтитын мақалалар Metacognition and Learning журналынан таңдалып алынды, сондай-ақ басқа ғылыми дереккөздердегі қосымша зерттеулермен толықтырылды. Бұл зерттеу өзге шолулардан метатаным ұғымының өзін емес, оның даму аспектілерін мақсатты түрде қарастыруымен ерекшеленеді. Мақалалар сапалық (qualitative) әдіс арқылы талданды. Метатанымның дамуына тікелей бағытталған мақалалар негізінде осы саладағы әрекет түрлері бойынша білім жүйеленіп ұсынылды. Зерттеу нәтижесінде метатанымның дамуына қатысты құрылымдалған, жинақталған білім қалыптастырылды. Сондай-ақ бұл зерттеу метатаным дамуы жөніндегі теориялық түсініктердің кеңеюіне өз үлесін қосады.

Түйін сөздер: метатаным, метатанымдық дағдылар, даму, фасилитация, теория.

 © 2026 Al-Farabi Kazakh National University

Ұ. Мәлік[1*], М. Швецова[2]
[1]Таразский университет им. М.Х. Дулати, Тараз, Казахстан
[2]Московский педагогический государственный университет, Москва, Россия
*e-mail: malik.umit@mail.ru

Нарративный обзор развития метапознания для начинающих исследователей

Метапознание – это мышление о процессе познания, которое несет в себе функцию регуляции обучения. Развитие метапознания и метакогнитивных навыков учащихся – это обширная тема, концепция которой изложена в научной литературе. Развивать метапознание возможно, и объем прикладных исследований в этой области растет. В этой связи данная статья представляет обзор исследований по развитию метакогниции, основанный преимущественно на публикациях в журнале «Metacognition and Learning» и дополненный релевантными работами из других рецензируемых научных источников. Несмотря на обилие статей о метапознании как таковом, источников информации о его развитии не так много. Материал, представленный в этой статье, призван помочь начинающим исследователям в развитии метапознания, чтобы сформировать первоначальные идеи и узнать о перспективах исследований. Статьи, посвящённые вопросам развития, фасилитации и скаффолдинга, были вручную отобраны из журнала «Metacognition and Learning» и дополнены дополнительными исследованиями из других научных источников. Исследование отличается от аналогичных тем, что оно сосредоточено не на метапознании в целом, а на его развитии. Материалы были проанализированы с использованием качественного метода. Основываясь на статьях, посвященных развитию метапознания, мы систематизировали знания о направлениях деятельности в области развития метапознания. В результате были получены структурированные знания, которые обобщают данные в области развития метапознания. Результаты исследования также способствуют развитию теоретических представлений о развитии метапознания.

Ключевые слова: метапознание, метакогнитивные навыки, развитие, фасилитация, теория.

Introduction

The term metacognition means thinking about one's cognitive process, it is a category above the cognitive, regulating it. Metacognition is auxiliary to learning. Knowing about your own knowing or thinking about your own thinking – metacognition – involves thinking about your own thought processes and the products of your thinking. Definitions of metacognition in the psycho-educational literature vary: 'metacognition as awareness and control of thinking for learning' (Cross & Paris, 1988), 'metacognition as thinking about thinking, knowing what we know and what we don't know' (Blakey & Spence, 1990), 'a form of cognition involving active control of thinking' (Devine, 1993). Knowing about your own knowing or thinking about your own thinking – metacognition – involves thinking about your own thought processes and the products of your thinking (Hartman, 2001). Metacognition refers to meta-level knowledge and cognitive processes related to our knowledge, learning, cognition, understanding and performing all kinds of cognitive tasks (Kleitman & Narciss, 2019).

The acquisition of metacognitive skills is a significant pillar of the global idea of lifelong learning. It means that if a graduate needs entirely new knowledge and competencies, they will be able to acquire them independently, using metacognitive skills. It is important for a modern student to learn to learn, to shape own development directions, to adapt quickly.

Literature review

The theoretical framework for the development of metacognition is detailed by Veenman, M. V., Van Hout-Wolters, B. H., Afflerbach, P. (2006). A comprehensive and in-depth review paper by Azevedo R. (2020) on the field of metacognition belongs to a number of valuable review articles of recent years in our view. Here the author outlines, in particular, the trajectories relevant at the time of our study for research in the field of metacognition development and instruction: the question of how to teach domain-general and domain-specific skills in the best way; what should be the sequence of metacognition instruction; who or what should be the main link in metacognitive learning; conditions for acquiring and instructing metacognition; teacher training for metacognitive learning. This article reveals the most important theoretical aspects that require further development and will be useful for already experienced researcher. A critical analysis

of the trajectories of metacognition development, which are labelled based on the component composition of self-regulated learning – metacognitive processes; cognitive strategies; internal resource management (such as motivation and emotion); external resource management (environment structuring, help-seeking) can be found in Hoyle R., Dent A. (2018) in the context of age-specific development of self-regulated learning, educational, social, cognitive psychology. This article is for those researchers who are already familiar with the concept of self-regulated learning and have ideas about its relationship to the concept of metacognition.

Articles of an advisory nature presenting strategies for application help the researcher, including the novice, to immediately start practicing. For example, the work of Voorhees et al. (2022) with a series of selected metacognitive strategies that can be implemented in the educational process: a class-length presentation and discussion about metacognition, as described by David Voorhees;

a class notebook and letter to self, as described by Lynsey LeMay;

online discussion forums, as described by Adriana Perez;

the end of class reflection and follow-up exercise, as described by Elizabeth Nagy, which also includes organisational recommendations for teachers, faculty, administrators and educational researchers. The following practical recommendations from the article can also be used to help the researcher experience the factors that promote metacognition: engaging curriculum, assessment integration, consistent practice, explicit strategy instruction, planning, monitoring, and evaluating thinking. Ellis et al. (2014) also provides some reflections on methods and forms of metacognition development. One such is the importance of explicit instruction in the author's view: 'alerting' students to the importance of strategy, 'making explicit' and talking through the ongoing process of modelling strategies more effectively. Recommendations for developing metacognition in brief structured into two categories: strategies for developing metacognitive behaviour (identifying what you know and don't know; 'talking' about thinking'; keeping a thinking diary; planning and self-regulation; debriefing, thinking process; self-evaluation) and establishing metacognitive atmosphere as a separate factor are presented by Blakey E., Spence S. (1990).

Ad hoc reviews have in turn focused on narrower aspects of metacognition development, for example reading (Channa et al., 2015); diverse aspects of online learning (Zhou & Lam, 2019; Azevedo & Hadwin, 2005). Researchers find metacognition beneficial and relevant to very different educational contexts (Henk & de Graaff, 2004).

Multiple reviews present meta-analyses with their valuable empirical findings: metacognitive knowledge and skills training has a positive impact on students' academic outcomes in schools (Perry et al., 2019); self-regulated learning (SRL) interventions have a positive impact on learning outcomes and self-regulatory processes (de Bruijn-Smolders et al., 2014).

Issues about learning strategies are highly valuable for metacognition researchers. The review by Hattie and Donoghue (2016) has synthesised knowledge about learning strategies as a whole.

There is a variety of existing classifications and typologies of metacognition development practices. Practices supporting metacognition are grouped according to metacognitive categories by Dennis and Somerville (2023). The category of declarative knowledge and understanding of the discipline includes: identifying existing knowledge, separating key issues from less important information; analysing discipline content: constructing concept maps and mind mapping, encouraging students to predict, observe and explain results, conceptual tests involving questioning, student questioning, discussion, re-questioning; metacognitive monitoring: checklists or prompts, self- and peer-assessment, thinking aloud; metacognitive evaluation; and metacognitive assessment. In the theoretical article by Millis B., ways and recommendations for the development of metacognition are presented in a typology of activities conducted before, during and after classes (Millis, 2016). Lin X. (2001) identifies two main directions for the development of metacognition: first, working on specific strategies in the study of disciplines, taking into account that they are not 'blind' and students know when and where to use them. Second, creating a social environment that supports metacognition (knowledge of oneself as a learner).

The above literature review allowed us to identify the fact that a beginner researcher building a basic primary picture of perceptions at the first stages can get information about metacognition development mainly from more extensive publications than from articles. Together with this, the above analysis of the literature has revealed in our view also such an aspect as the necessity of further multi-calibre systematisation of methods of metacognition development, especially classification, necessary among specific methods and techniques, which can be implemented

in the educational process. The material presented in this article is thus intended to be a useful aid for beginning researchers of metacognition development – an article that will give, let us emphasise, some primary ideas not about metacognition itself, but about its development. We would like to note that the idea of this article was born initially due to the fact that the author experienced some difficulties while doing dissertation work due to the paucity of publications summarising methods and techniques of metacognition development or providing some basic scientific systematisation to 'push back' at the initial stages of work on the topic of metacognition development.

Of the specific terms in this article: scaffolding – novice researchers will often come across the definition of scaffolding, it is the structuring and guiding of the learning experience of another: 'Scaffolding describes the way one individual (often a parent or teacher) structures and guides the learning experience of another (normally a child)' (Neale & Whitebread, 2019). The second term, the acronym SRL, stands for self -regulated learning. The third term, calibration accuracy, meaning the accuracy of the learner's own prediction of performance assessment.

Materials and methods

Type of review. This article is a narrative review. Narrative review involves analysing quantitative studies. Such reviews are intended to make valuable qualitative generalisations of quantitative studies 'without reference to the statistical significance of the findings' (Siddaway et al., 2019). In meta-analysis reviews, authors perform statistical analyses (Shaughnessy & Slawson, 1997). Such is not anticipated in the current work. The choice of the narrative style of writing a review is connected with the need for a deeper elaboration of various theoretical issues in the field of metacognition. In addition, the narrative approach allowed us to consider the most diverse types of articles. In the framework of the systematic review, the criteria for the selection of articles are more stringent.

Selection strategy. This article is a review article and is based on the analysis of other publications. We selected research articles mainly from the last years of the journal 'Metacognition and learning'. The journal is published by Springer Publishing House; the search for articles was carried out on the official page of the journal on the website of this publishing house. The aims and scope of this journal includes developmental issues, teaching the components of metacognition in the learning process, and the role of the teacher in metacognition instruction, so we focused only on these.

Articles were selected for this review according to the criteria below.

The main criterion was the (1) topic: the fundamental factor for us was that the article should touch upon the aspects of metacognition or self-regulation development. The inclusion of studies on self-regulation is justified by its similarities and intersections with the concept of metacognition (Malik & Abdykhalykova, 2022). (2) First of all, we paid attention to articles with titles or keywords indicated coaching, developing, development, enhancement, enrichment, fostering, instruction, intervention, promotion, scaffolding, scaffolds, support, supporting, training. This is one of the signs of identification of articles that provide external influences for metacognition. (3) Studies on development and interventions of all kinds were reviewed regardless of which educational setting was being considered. Nevertheless, the majority of metacognitive research is conducted in formal educational settings, which automatically predetermines certain characteristics of the participants. The articles are mainly empirical, but the main condition for inclusion was whether the study was an intervention study, regardless of the methods used in the article.

Exclusion criteria were: (1) studies unrelated to research training or skill development, (2) articles in languages other than English. We did not consider articles that aimed to identify correlations between indicators, to detect any characteristics of learning environments in which there are no interventions, instructions and influences of any kind.

Process of selection. Articles were screened for relevance. The process of selecting articles was done manually as it was not a time-consuming task: primarily, one core journal specializing in metacognition was selected, supplemented by several additional sources. The process of identification and selection involved a thorough familiarization with the articles and their abstracts. Selected papers were organized thematically. Thematic analysis was the main method used in working on the articles.

Each article was assigned to a specific direction based on its relevance, forming a structured working draft. This step ensured a systematic approach to organizing the collected literature. Following this, the synthesis of information was undertaken, allowing for a critical evaluation and refinement of the direction of the selected articles. This phase involved

revising and aligning the chosen studies with the overarching objectives of the review, ensuring coherence and consistency in the analysis. After rigorous evaluation studies were selected for inclusion in the final review. These studies met the necessary criteria and provided valuable insights relevant to the research focus. During the selection process, certain articles were excluded based on specific reasons. Some articles were removed from consideration due to the fact that they did not incorporate any interventions, rendering them unsuitable for the scope of the review. This exclusion ensured that only studies with relevant interventions were included, maintaining the integrity and applicability of the final selection.

Results

Based on articles focusing specifically on the development of metacognition, we have organized knowledge about directions in this field. The development of metacognition is close to tutoring, coaching, metacognition in learning has an auxiliary, supporting character, facilitating the learning process. The development of metacognitive skills is a process that occurs naturally but can also be intentionally cultivated through structured learning activities. Purposeful development of metacognitive skills in students is a teaching process enriched with metacognitive practices, training, based on certain methods, carried out to form and develop certain metacognitive skills, qualities necessary for the student. Development of metacognition through one or another kind of intervention is a frequent practice. Metacognitive knowledge and skills, which are closely related to learning, start to develop in early childhood, but the beginning of formal education lays its foundations more firmly.

We carried out the analysis by categorizing the articles according to the thematic areas that we identified.

Comprehensive interventions. The most effective in our understanding are complex methods of influence for the development of metacognition. By them we mean a combination of different principles, techniques, or methods, which together lead to qualitative growth of metacognitive qualities of students. Based on this kind of models or programmes it is possible both to apply them immediately in one's classes and to develop one's own interpretations of their application. It should be noted that metacognition programmes or systemic models are not always 'purely metacognitive', but may include cognitive strategies, psychological components such as motivation, which contribute to successful learning.

In this direction we include the article by Frazier et al. (2021), presenting a model that is based on three interrelated learning factors that facilitate effective self-regulation: '(a) an articulated concept of one's possible selves, (b) metacognitive knowledge and effective strategies, and (c) a sense of one's own agency'. Thus, the result of this article is a model that develops self-regulatory learning and provides the basis for life-long learning.

The second source we have categorised in this direction combines models of tasks, cognition, metacognition and motivation (Winne, 2022).

The next article by Swanson et al. (2024) we included in this category developed a metacognition-based intervention that was structured to provide four weeks of reflective opportunities for students following a metacognitive learning strategies workshop. The results were reflected in higher semester GPA, regardless of student identity, prior academic performance, and strategy choice or outcome description.

A key advantage of these models is their integration of cognitive and motivational aspects of learning. Future research seems promising in integrating other approaches, developing models that simultaneously consider cognitive strategies, motivation, and learners' perceptions of their own development, as well as incorporating empirical testing of effectiveness in various educational settings.

Comprehensive work on students' metacognitive qualities is most beneficial; in addition, we recommend comprehensive interventions within dissertation work that systematically approach the achievement of the dissertation's goals.

Learning Strategies. The area we have labelled as learning strategies combines metacognitive and cognitive strategies to a greater or lesser extent. This combination is generally accepted as effective and logical. By working with a cognitive strategy, its metacognitive meaning can be uncovered in parallel, they are transient and flexibly intertwined with each other. Overall, for learning strategies, both cognitive and metacognitive strategies are essential (Carns & Carns, 1991). Even early empirical research argues for the importance of metacognitive strategies in the context of a particular subject as discipline-relevant strategies (Volet, 1991). Metacognitive strategies are enlivened and complemented by cognitive strategies, bringing practicality and a real-world basis for application to the development programmes being implemented. This cognitive-metacognitive

approach may be referred to in sources as hybrid training. Researchers in turn conclude that there are some advantages of hybrid training (Schuster et al., 2020). In general, a number of studies can be attributed to this area, which have a 'cognitive context' in the form of a specific discipline or type of educational activity.

We refer to the article by Eshuis, E. H., ter Vrugte, J., de Jong, T. (2022), where the application of concept maps is accompanied by both cognitive and metacognitive contexts. The result indicates the superiority of the classroom discussion condition over the other experimental conditions. The study showed in practice how to organise activities with concept maps in an improved way. In the study we reviewed, several methods were used, including supporting knowledge integration by providing students with an example, reflection prompts to overcome suboptimal processing, and classroom discussion to motivate students. It should be noted that the results of this study are limited to a sample of vocational students and may not be fully generalizable to other student populations.

The following article (Iordanou, 2022), which we considered in this direction, addresses the impact of reflection on metacognition during argumentation. The aim of the article was to find out the role of reflection for the learner's argumentation skills. The main form of development in this experiment was reflection. The results of the article support the hypothesis that engaging in reflection during argumentation work contributes to the development of metacognition. Engaging in tasks that involve goal-directed strategies also promoted the development of metacognition during argumentation work.

The next study we reviewed is also an intervention study and focuses on the development of writing strategies. The experimental work was carried out within the framework of a cognitive self-regulation instruction (CSRI) programme. The components of the conducted instruction were direct teaching, modelling, and peer practice. The study achieved positive results and the article presents samples of the texts used (Rodriguez-Malaga et al., 2021).

We also have included in this category the article by Chen et al. (2022) where they prove the effectiveness of a proposed self-regulated strategy development model aimed at effective revision in the context of learning English as a foreign language.

Summarizing the above articles, it can be noted that the greatest impact comes from interventions that are better structured and involve a more organized teacher presence. Even the few articles reviewed demonstrate that the chosen area or strategy can be quite variable, from working with argumentation to concept maps. Furthermore, such studies are more productively conducted across a variety of subjects and disciplines, which impacts the quality of the study. On the downside, longitudinal studies are less common.

The development and application of specific learning strategies in the course of teaching is more likely to find a response among the student audience. For novice researchers, this is one of the promising areas, especially if we consider learning strategies in the context of disciplines, or online| blended learning contexts. At the junction with other areas, we find learning strategies the most important for instructors of metacognition.

Activation of metacognition in online and related environments. It is reasonable enough to designate the development of metacognition in online, blended, virtual, and electronic learning environments as a separate direction. Researchers identify a wide range of such environments, including 'distributed online or hybrid courses, open online repositories of educational materials, hypermedia environments, games, simulations, virtual worlds, intelligent tutoring systems (ITSs), tutorial dialogue systems, electronic portfolios, and peer review systems' (Azevedo & Aleven, 2013). It is worth noting that the relationship between metacognition and learning technologies has been addressed since the last century, both in practical and theoretical terms (Gordon, 1996). This field, which has significantly expanded in recent years, emerged due to the fact that online and related learning environments demand greater self-regulation from students. The need for a metacognitive component is often justified for computer-based environments that require more self-regulation of the learning process to help students learn in a non-traditional learning conditions. Due to the prevalence of articles on the intersection of metacognition and electronic environments, even more detailed classification within this direction is appropriate, but this, in turn, is a topic that requires a separate consideration.

In this category we include an article that tested a cyclical self-regulated learning simulation model in a cyber learning environment (Zimmerman's cyclical SRL model) in mathematics lessons based on the interaction between grit, emotion, and performance and consisting of the forethought phase, the performance phase, and the self-reflection phase (Kooken et al., 2021). The study involved 305 middle school students (6th-7th grade) in public schools in Massa-

chusetts and 153 middle school students (6th graders) in three schools in Argentina.

Karagianni's (2024) article emphasizes that developing metacognition in open and distance learning environments contributes to improved academic performance, increased independence, and the development of lifelong learning skills. The author identifies key elements of a metacognitively oriented online course: a clear structure, transparent instructions, active interaction, and timely feedback. The work demonstrates that metacognitive support is a central factor in the effectiveness of digital learning.

The next article we reviewed examines the impact of metacognitive scaffolding (MS) on the development of metacognitive skills and self-regulation in students in mobile technology-enhanced interactive classrooms. The study expands understanding of which forms of metacognitive support are most effective in digital and interactive learning environments (Pan et al., 2025).

Collectively, the studies expand the understanding that the effectiveness of metacognitive interventions increases when the tools, learning context, and level of support are well aligned. Metacognition in online/blended learning is a fairly independent and extensive field of research. These environments are part of the learning systems in the world. In particular, research and projects involving not only educational psychologists, but also information technology and artificial intelligence specialists are beneficial here. It should also be noted that there is a group of metacognitive skills that are relevant specifically to online and blended learning environments.

The development of a separate category of metacognition. Veenman et al. (2006) in the first issue of the journal 'Metacognition and learning' analysing the authors mention that more knowledge is needed about which components of metacognition develop when and under what conditions. Obviously, there have been positive developments in this issue since then. Metacognition is a rather complex construct, different models of metacognition, categories consisting 'inside' metacognition are known, so the development of its separate categories is one of the actual directions of development. The taxonomy of definitions related to metacognition is not clear enough, ambiguous, sometimes vague. Nevertheless, the constructs within it are often the subjects of separate research. According to the most widely used and basic classification in scholarly articles, the construct of metacognition consists of metacognitive knowledge (declarative, procedural, and conditional) and metacognitive skills, the fundamental components of which are planning, monitoring, and evaluation.

For example, a study by Krebs, R., Rothstein, B., Roelle, J. (2022) focused on supporting the metacognitive skill of assessment, more specifically self-assessment of one's performance by school students (15-18 years old) through the introduction of rubrics (task evaluation criteria) for self-assessment. The research design with control and experimental groups revealed that the presence of rubrics facilitated an easier process of self-assessment formation and improved self-assessment accuracy. The rubrics also relieved the cognitive load of self-assessment.

Many studies are related to metacognitive monitoring. The article by Nederhand et al. (2020) (longitudinal quasi-experimental study, secondary education) focuses on improving the skill of calibration accuracy. The study demonstrated that secondary school students can learn to calibrate their performance in examinations more accurately by assessing their own performance and providing feedback in the form of their results.

The following authors' study deals with the development of monitoring and control skills when learning from texts in elementary school children's (second (N = 138) and fourth (N = 164) graders). The results of the experiment showed positive results, the skills in question were improved. One of the practical conclusions of the researchers is that, in order to improve children's monitoring and control skills through self-tests, teachers should favour open-ended questions rather than true-false tasks (Steiner et al., 2020).

A three-week monitoring intervention was conducted with Chinese middle school students to enhance their monitoring skills. The study's results were thoroughly analysed: for instance, paper-and-pencil tasks did not lead to significant improvements in monitoring among pupils. Moreover, no substantial changes in mathematics achievement were observed. However, in terms of monitoring accuracy, there was a positive trend: students demonstrated increased confidence in the post-test (Wang & Sperling, 2021).

As we can see from the articles presented, the context of the studies varies greatly. The effectiveness of interventions depends significantly on the age group, cultural context, duration of the intervention, and form of presentation of the material. Of course, these articles are not enough to study the structure of metacognition and the theory of metacognition, these are just examples of interventional articles. It is recommended that novice researchers

choose high-quality sources for studying the theory of metacognition, where together they can see what its structure is from the point of view of various scientists. The points of view vary, the theory is unstable, however, there are certain well-established concepts and definitions within which most scientists work.

Instructor development for teaching metacognitive strategies. Metacognition instructor development is undoubtedly a subject of scholarly interest and requires careful design to ensure the effectiveness among students (Dignath & Mevarech, 2021). The emergence of quite disparate questions about how to develop metacognition for teachers and educators and whether they are prepared to do so, what basic skills and competencies they should possess, what actions to take, what to consider and how to achieve results, has spurred the research direction identified in the subtitle. It shows that careful specialization and training in the development and instruction of metacognition is needed. Many theoretical questions and practical challenges arise in this direction: designing teacher education programmes, identifying the constituent competencies that are necessary for instruction; determining which teacher characteristics influence the development of students' metacognitive skills. The results of the 2022 review study indicate that teachers probably lack knowledge, skills and abilities to develop metacognition in learners of different categories (according to the results, metacognition is rarely used satisfactorily in teaching higher order thinking and metacognitive strategy knowledge is neglected in teacher training) (Zohar & Ben-Ari, 2022). For teachers' ability to develop students' metacognition, preparation is important. Some authors recommend the inclusion of learning strategies and metacognitive courses in the content of future teacher education programmes, which would undoubtedly be fruitful (García-Jiménez et al., 2024).

The article by Dignath C. (2021) highlights a number of legitimate aspects about metacognition teacher development that can be taken on board by researchers moving in this direction: teacher competence to facilitate self-regulated learning, teacher knowledge of promoting self-regulated learning, teacher beliefs about promoting self-regulated learning, teacher self-efficacy to promote self-regulated learning, interplay between these aspects of teacher competence and with teaching practice and student outcomes. The study consists of two parts, intervention part of this paper is the second one, with a training session for teachers. The participants of the experiment were teachers from schools in Germany. The researchers found that the training had an impact on the teachers, but not on the learners' level, in general, the training had a better impact on the teachers who were initially more competent in the topic. The training helped teachers' self-efficacy, as well as self-reported cognitive approaches for SRL. Key findings of this study also suggest that teacher profiles did not differ in teachers' preferences for cognitive and situational approaches to SRL development.

Dignath (2021) provides a macro-level view of teacher competence, but a key limitation of the study remains the lack of transfer of the effects obtained to students, as the increase in teacher competence did not lead to an increase in their self-regulation.

The following study, based on a quasi-experimental design, extends the knowledge of how future teachers can develop meta-strategic knowledge in learners through their analysis of video recordings. The study involved a pre-training of teachers, in particular one of its components was a 'teaching and learning methods academic course', followed by direct practice. Watching or analysing one's own videos in our view is quite an effective way to enhance learning, including reflecting on metacognitive development, the authors of this study empirically confirm that it helps to explore and adjust to the needs of learners (Michalsky, 2021).

Next study, which examined faculty use of a guided metacognitive journal, demonstrates that the intervention positively influenced instructors' metacognitive instructional practices and students' perceptions of instructional responsiveness, while also revealing structural limitations–including reliance on self-reported data, ambiguity in measurement wording, uneven journal use, and the persistence of time-related and habitual constraints–that collectively underscore the need for refined assessment tools, clearer prompt design, and more controlled research conditions to determine the robustness, depth, and sustainability of metacognitive instructional change (Scharf et al., 2021).

Instructor development for teaching metacognitive strategies is a rather interesting and relatively unexplored field for research. Most often, the role of the one who is still engaged in the development of metacognition remains shadowy in research. Most often, these are teachers and lecturers of completely different specialties, both practitioners and scientists. Organized knowledge in this field is necessary in various contexts. It should also be noted that there are well-known centers of learning and study at universities abroad.

Preschool age metacognition. While the development of metacognitive skills in educational settings such as kindergarten, school or university is somewhat interrelated and overlapping, as traditional links of formal education, the development of metacognition in preschool age is more specific, at least because the key role here is no longer played by teachers but by relatives (parental scaffolding; sibling interactions). Relatively little is known about the development of metacognitive skills in infancy and preschool age (Erdmann & Hertel, 2019). It is precisely early childhood that serves as the period when the foundational aspects of metacognition are established. Designs in the development of children's self-regulation at home, in daycare centres, and in schools using embedded tasks for this purpose are needed. Within the context of 2019, 'we do not have good examples of how to support parents and other caregivers to promote self-regulation in children before they enter school' (Perry, 2019). A review in this direction revealed many conceptual theses and questions based on other research: the proximity of the concepts of 'autonomy support' and 'scaffolding', the delay of gratification as a paradigm and its potential to develop self-regulation skills in children, and as a generalisation of the whole the shift from the concept of 'playing safe' to 'playing to learn' (Hughes, 2019).

We have referred Neale and Whitebread's (2019) article to this line of enquiry. The study is partly an intervention study based on observation and assessment of maternal scaffolding. The aim of the article was to test a coding system assessing the consistency of maternal scaffolding across toys and the impact of the latter directly on child effortful control. Overall, the study evaluated developmental methods, noting that these same methods (delay of gratification, grasping task) are also utilised for testing purposes. The authors conclude that maternal contingency during play in infancy (foundations for the strategic regulation of cognition, attention and behaviour) and directive utterances at 12 months old (skills in behaviour control) may be beneficial.

The next study presents and validates the Metacognitive Knowledge Intervention for Thinking (MKIT), demonstrating that this framework is a feasible and scalable tool for assessing and developing domain-general metacognitive knowledge in children aged 5 to 9. Despite its strong empirical grounding, the study's generalizability remains limited by its single-country sample and relatively short follow-up period, and the depth of qualitative insights is constrained by the small number of analyzed cases. Additionally, the reliance on verbally mediated scaffolding highlights the need to examine how MKIT functions across linguistically diverse populations and varied developmental profiles (Oana & Flavia, 2025).

The following study included in the review, which evaluates the Circling Curriculum for Metacognition Training (CCMT) as a school-based intervention for 5–6-year-old Chinese children, provides empirical evidence that structured teacher-guided practices rooted in Anji Play can enhance both knowledge- and regulation-of-cognition, while simultaneously highlighting theoretical ambiguities around the role of adult involvement, measurement limitations such as potential ceiling effects, and the need for broader validation to determine whether the observed gains generalize across different developmental, linguistic, and educational contexts (Chen et al., 2022).

As follows from the sources we reviewed, preschool age metacognition is also one of the underdeveloped promising areas for beginner researchers.

Alternative studies. It can be stated that there are studies related to the development of metacognition and metacognitive skills, which are not widespread, we considered it appropriate to single out and refer to the item alternative studies.

We refer here to the article by Vangsness, L., Young, M. E. (2021) who reflect on the reverse side of metacognition, which indicates a possible non-positive effect of frequent overt prompts. It should be noted, however, that these are specifically overt prompts. The hypothesis was confirmed that frequent explicit judgements reduced metacognitive accuracy by drawing attention to incorrect cues, induced reactivity, hindering exam success. Frequent explicit judgements reduced metacognitive accuracy in the first experiment and reduced performance in the second experiment in these authors. In general, metacognition theorists and practitioners often mention that metacognition should not be too much in the learning process and a moderate and purposeful use of it is welcome. Furthermore, there is even the term metacognitive loop, meaning the highest level of metacognitive skills at which it may well be harmful. An excess of metacognition in learning is akin to hypercontrol in life.

The existence of alternative studies proves genuine interest in the topic, allows one to look at the problem from an unusual angle, and opens the horizons of a novice researcher. But at the same time, in our view, a massive increase in the number of articles in this area is not expected. The main insights are provided in a synthesized and systematic format (Table 1 – Summary of research directions, selected studies, and research gaps).

Table 1
Summary of research directions, selected studies, and research gaps

Research Direction & Selected Studies	Future Directions
Comprehensive interventions Frazier et al. 2021 Winne, 2022 Swanson et al. 2024	Future publications by authors, in which the individual vision of the author, including that of a novice researcher, will be revealed: how combining certain areas of development of metacognition and metacognitive skills will be comprehensive in certain educational contexts will constitute new knowledge. Comprehensive interventions are suitable for dissertations, which most often emphasise systematicity and comprehensiveness. *In addition to a significant increase in the volume, diversity, and speed of data feeding into the science of learning, learning scientists now also have a flexible channel for mobilising results as learning analytics. Winne, 2022*
Learning Strategies Eshuis, E. H., ter Vrugte, J., de Jong, T. (2022) Iordanou, 2022 Rodriguez-Malaga et al., 2021 Chen et al. 2022	Scholars studying metacognition are not isolated from the wider field of cognitive science. Knowledge of the basics of cognitive science and theory is essential for researchers specialising in metacognition. This will also make intervention studies more in-depth and practical, without unnecessary abstraction. It is promising to expand the repertoire of methods used for development, in addition to those that are quite popular in scientific literature, such as concept mapping. *A precise understanding of how various discussions proceed can provide valuable information about possible cognitive processes, for example, the extent to which students concretise their knowledge. Further research should contribute to our understanding of how classroom discussions should be structured and organised. Eshuis, E. H., ter Vrugte, J., de Jong, T. (2022)* *Future studies should specifically assess writing strategies, metacognitive strategies, and self-regulated learning. Rodriguez-Malaga et al., 2021*
Activation of metacognition in online and related environments Kooken et al., 2021 Karagianni 2024 Pan et al., 2025	In our view, in this area, it is more relevant for domestic science to create and develop real, high-quality online, blended and distance learning environments. *Future research needs to examine change patterns in student cognitive and metacognitive attributes in the Intelligent tutoring system. Kooken et al., 2021*
The development of a separate category of metacognition Krebs, R., Rothstein, B., Roelle, J. (2022) Nederhand et al. (2020) Steiner et al., 2020 Wang & Sperling, 2021	The development of a separate category of metacognition is a promising direction for both articles and more extensive works, given that the definitions included in the concept have not been fully developed and authors focusing on a separate category need to conduct thorough preliminary work with the selected category. *To adequately address the question whether task performance and/or difficulty would moderate the benefits of rubrics on judgment accuracy and cognitive load in forming self-assessments, future studies would need to experimentally manipulate task performance and/or difficulty (e.g., by implementing support measures while learners perform the task). Krebs, R., Rothstein, B., Roelle, J. (2022)* *In further research on exam grades to improve calibration it would not only be interesting to apply intervention in different domains, but also investigate the mediating role of both learner anxiety and self-efficacy. Nederhand et al. (2020)* *Future research should further explore potential cultural differences in middle school students' justification factors when making performance judgments in mathematics. Future research should continue to examine the rationales students use to inform their performance judgment to both inform future research but also to inform instructional practice. Wang & Sperling, 2021*
Instructor development for teaching metacognitive strategies Dignath C. 2021 Michalsky, 2021 Scharf et al., 2021	This promising but insufficiently developed area of research will also be relevant in the context of theses. *Future research should ask how teachers' competence on promoting SRL differs across educational levels, and whether primary and secondary school teachers benefit differently from PD training on SRL. Dignath C. (2021)* *Further investigation of the role of MSK in open-ended learning environments is necessary to understand how the teaching and learning of MSK can be incorporated most effectively in these environments. Michalsky, 2021* *Rich areas for future research include investigating ways of lowering barriers to journal use, using the journal as a tool to facilitate faculty development, and exploring additional techniques for developing metacognitive instruction.* Scharf et al., 2021

Continuation of the table

Research Direction & Selected Studies	Future Directions
Preschool age metacognition Neale and Whitebread (2019) Oana, O., & Flavia, P. (2025). Chen et al., 2022	This promising but insufficiently developed area of research will also be relevant in the context of theses. *Future research should explore scaffolding with more diverse toy types to see if the identified consistency in scaffolding variables holds. Also, consistency in scaffolding across toys at different ages needs to be explored. Neale and Whitebread (2019)*

Source / Note: This table was compiled by the authors based on the analysis of materials.

Discussion

According to some researchers, there is a gap between the theory and practice of metacognition in favour of theory (Dennis & Somerville, 2023). This raises the need to introduce metacognition into the learning process and to develop it in a comprehensive way, which is the reason for this article. The multiplicity of such articles will undoubtedly create a scientific dialogue and discussion between different studies.

Recommendations. We would recommend that researchers who seek to develop metacognitive or related qualities avoid formalism and the desire to describe only the positive results of the experiment.

To support and develop students' metacognition we recommend using not only scientific but also media sources of information. There are a lot of ready-made materials available open access, social networks: checklists, templates and various ideas for different categories of students. Media sources are more abundant in terms of handouts than scientific sources. Check whether they are suitable and reliable, whether they correspond to the methods of metacognition development and use them safely.

The development of metacognitive skills and assistance in organising the learning process is especially necessary for newly admitted students. Metacognitive instruction can help them quickly adapt to a learning environment.

Also note that the methods for developing metacognition are simple. At the beginning of our work on the topic of metacognition, when we read articles about metacognitive strategies, we were looking for something complex, detailed, and completely new. In fact, metacognitive is more about what the learner already has, his own skills in organising learning. If you are a teacher, you are probably already developing the metacognition of your learners, perhaps without knowing it. By articulating own metacognitive and cognitive processes (for instance, telling students how you write papers), advising them on how to pass an exam, monitoring their learning goals, through error-analysis sessions, simply talking about learning, encouraging students to analyse the learning process, asking them to help their peers, you are already developing students' metacognition. And as we recall from previous experiments, students have noted that there are no wrong answers in metacognition.

Experiment as you practice developing metacognition. For example, activating prior knowledge can be used as a formalised method, as a technique. Embedding metacognition into the curriculum can be implemented as a longitudinal, short-term, systematic, or one-off initiative. Although the concept is already established, innovation is not excluded.

Limitations. The main limitation of this study is that we mainly analysed the materials of single journal. Nevertheless, we would like to point out that this is one of the highest quality journals specialising in metacognition in education. Another limitation of this article, as a narrative review, is its reliance on the author's perspective and interpretations, which may introduce certain biases. In addition to the above, it should be noted that the purpose of the article was to look broadly at metacognition in a developmental context, however, narrowing the research question would have made the article more specifically focused.

Future research could address this issue through publications in different databases. It can also be considered in other types of reviews.

The theoretical recommendations given in the review can be used to determine the most relevant topics for articles and dissertations within the direction. This can help novice researchers. In addition, the practical recommendations we have given are based on our own experience of conducting experi-

ments; some details we have noted will help to conduct the pedagogical experiment more efficiently. Reading the article will be useful for teaching in practice in general to form ideas about the concept as a whole and the prospects for its use in the educational process.

Conclusion

In our view, the prospects of metacognition lie in its application not only as a tool for effective learning, but also in other important contexts, which is happening. This is a huge space for activity and reflection. In particular, the application of metacognition in decision making regarding financial planning, judging if an email is phishing or legitimate, eyewitness memory (Kleitman & Narciss, 2019) has already been explored. Even Flavell (1979) reasoned that the boundaries of metacognition may well 'stretch'. New research has engaged metacognition in quite unusual contexts such as 'eyewitness testimony, phishing attacks, and increasing perceived competence in technical tasks' analysed by Stankov, L. (2019). Metacognition can be applied even more actively for children who have learning difficulties or learning disabilities.

We hope that this article will indeed be useful for researchers and practitioners of metacognition development.

Funding

This research received no external funding.

Acknowledgements

The authors would like to thank reviewers for their valuable comments and suggestions that helped improve this manuscript.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Malik Umit: formulation and evolution of overarching research goals and aims; preparation, execution, and presentation of the study; data visualization and presentation.

Shvetsova Maya: responsibility for managing and coordinating the planning and implementation of the research activities; critical review and commenting.

References

Azevedo, R. (2020). Reflections on the field of metacognition: Issues, challenges, and opportunities. Metacognition and Learning, 15(2), 91–98. https://doi.org/10.1007/s11409-020-09231-x

Azevedo, R., & Hadwin, A. F. (2005). Scaffolding self-regulated learning and metacognition – Implications for the design of computer-based scaffolds. Instructional Science, 33(5–6), 367–379. https://doi.org/10.1007/s11251-005-1272-9

Azevedo, R., & Aleven, V. (2013). Metacognition and learning technologies: An overview of current interdisciplinary research. International Handbook of Metacognition and Learning Technologies, 1–16. https://doi.org/10.1007/978-1-4419-5546-3_1

Blakey, E., & Spence, S. (1990). Developing metacognition. In Clearinghouse on Information Resources (ERIC Document Reproduction Service No. ED327218). https://eric.ed.gov/?id=ED327218

Carns, A. W., & Carns, M. R. (1991). Teaching study skills, cognitive strategies, and metacognitive skills through self-diagnosed learning styles. The School Counselor, 38(5), 341–346. https://psycnet.apa.org/record/1991-31763-001

Channa, M. A., Nordin, Z. S., Siming, I. A., Chandio, A. A., & Koondher, M. A. (2015). Developing reading comprehension through metacognitive strategies: A review of previous studies. English Language Teaching, 8(8), 181–186. https://doi.org/10.5539/elt.v8n8p181

Chen, C., Wu, J., Wu, Y., Shangguan, X., & Li, H. (2022). Developing metacognition of 5- to 6-year-old children: Evaluating the effect of a circling curriculum based on Anji Play. International Journal of Environmental Research and Public Health, 19(18), 11803.

Chen, J., Zhang, L. J., & Parr, J. M. (2022). Improving EFL students' text revision with the Self-Regulated Strategy Development (SRSD) model. Metacognition and Learning, 17(1), 191–211. https://doi.org/10.1007/s11409-021-09280-w\

Cross, D. R., & Paris, S. G. (1988). Developmental and instructional analyses of children's metacognition and reading comprehension. Journal of Educational Psychology, 80(2), 131–142. https://doi.org/10.1037/0022-0663.80.2.131

de Bruijn-Smolders, M., Timmers, C. F., Gawke, J. C., Schoonman, W., & Born, M. P. (2016). Effective self-regulatory processes in higher education: Research findings and future directions. A systematic review. Studies in Higher Education, 41(1), 139–158.

Dennis, J. L., & Somerville, M. P. (2023). Supporting thinking about thinking: Examining the metacognition theory-practice gap in higher education. Higher Education, 86(1), 99–117. https://doi.org/10.1007/s10734-022-00904-x

Devine, J. (1993). The role of metacognition in second language reading and writing. In J. Carson & I. Leki (Eds.), Reading in the composition classroom: Second language perspectives (pp. 105–127). Heinle & Heinle.

Dignath, C. (2021). For unto every one that hath shall be given: Teachers' competence profiles regarding the promotion of self-regulated learning moderate the effectiveness of short-term teacher training. Metacognition and Learning, 16(3), 555–594. https://doi.org/10.1007/s11409-021-09271-x

Dignath, C., & Mevarech, Z. (2021). Introduction to special issue: Mind the gap between research and practice in the area of teachers' support of metacognition and SRL. Metacognition and Learning, 16(3), 517–521. https://doi.org/10.1007/s11409-021-09285-5

Ellis, A. K., Denton, D. W., & Bond, J. B. (2014). An analysis of research on metacognitive teaching strategies. Procedia – Social and Behavioral Sciences, 116, 4015–4024. https://doi.org/10.1016/j.sbspro.2014.01.883

Erdmann, K. A., & Hertel, S. (2019). Self-regulation and co-regulation in early childhood – Development, assessment and supporting factors. Metacognition and Learning, 14(1), 229–238. https://doi.org/10.1007/s11409-019-09211-w

Eshuis, E. H., ter Vrugte, J., & de Jong, T. (2022). Supporting reflection to improve learning from self-generated concept maps. Metacognition and Learning, 17(3), 691–713. https://doi.org/10.1007/s11409-022-09299-7

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. American Psychologist, 34(10), 906–911. https://doi.org/10.1037/0003-066X.34.10.906

Frazier, L. D., Schwartz, B. L., & Metcalfe, J. (2021). The MAPS model of self-regulation: Integrating metacognition, agency, and possible selves. Metacognition and Learning, 16(2), 297–318. https://doi.org/10.1007/s11409-020-09255-3

García-Jiménez, M., Fernández Cabezas, M., & Pérez-García, P. (2024). Learning strategies in initial teacher training: A systematic review. London Review of Education, 22(1), 3. https://journals.uclpress.co.uk/lre/article/id/3145/download/pdf/

Gordon, J. (1996). Tracks for learning: Metacognition and learning technologies. Australian Journal of Educational Technology, 12(1), 46–55. https://doi.org/10.14742/ajet.2035

Hartman, H. J. (2001). Developing students' metacognitive knowledge and skills. In H. J. Hartman (Ed.), Metacognition in learning and instruction: Neuropsychology and cognition (pp. 33–68). Springer. https://doi.org/10.1007/978-94-017-2243-8_3

Hattie, J. A., & Donoghue, G. M. (2016). Learning strategies: A synthesis and conceptual model. npj Science of Learning, 1(1), 1–13. https://doi.org/10.1038/npjscilearn.2016.13

Henk, V., & de Graaff, E. (2004). Developing metacognition: A basis for active learning. European Journal of Engineering Education, 29(4), 543–548. https://doi.org/10.1080/03043790410001716257

Hoyle, R. H., & Dent, A. L. (2018). Developmental trajectories of skills and abilities relevant for self-regulation of learning and performance. In D. H. Schunk & J. A. Greene (Eds.), Handbook of self-regulation of learning and performance (2nd ed., pp. 49–63). Routledge. https://doi.org/10.4324/9781315697048-4

Hughes, C. (2019). How do parents guide children towards "playing to learn"? Reflections on four studies in a special issue on self- and co-regulation in early childhood. Metacognition and Learning, 14(3), 315–326. https://doi.org/10.1007/s11409-019-09215-6

Iordanou, K. (2022). Supporting strategic and meta-strategic development of argument skill: the role of reflection. Metacognition and Learning, 17(2), 399–425. https://doi.org/10.1007/s11409-021-09289-1

Karagianni, G. K. (2024). Metacognition as a catalyst for improved learning outcomes in open & distance education. European Journal of Open Education and E-Learning Studies, 9(1).

Kleitman, S., & Narciss, S. (2019). Introduction to the special issue "Applied metacognition: Real-world applications beyond learning". Metacognition and Learning, 14(3), 335–342. https://doi.org/10.1007/s11409-019-09214-7

Kooken, J. W., Zaini, R., & Arroyo, I. (2021). Simulating the dynamics of self-regulation, emotion, grit, and student performance in cyber-learning environments. Metacognition and Learning, 16(2), 367–405. https://doi.org/10.1007/s11409-020-09252-6

Krebs, R., Rothstein, B., & Roelle, J. (2022). Rubrics enhance accuracy and reduce cognitive load in self-assessment. Metacognition and Learning, 17(2), 627–650. https://doi.org/10.1007/s11409-022-09302-1

Lin, X. (2001). Designing metacognitive activities. Educational Technology Research and Development, 49(2), 23–40. https://doi.org/10.1007/bf02504926

Malik, U. B., & Abdykhalykova, Zh. E. (2022). Assessment of metacognition and self-regulation of students in the context of online learning. Bulletin of L. N. Gumilyov Eurasian National University. Pedagogy. Psychology. Sociology Series, 1(138), 451–460. https://bulpedps.enu.kz/index.php/main/issue/view/5/4

Michalsky, T. (2021). Integrating video analysis of teacher and student behaviors to promote preservice teachers' teaching meta-strategic knowledge. Metacognition and Learning, 16(3), 595–622. https://doi.org/10.1007/s11409-020-09251-7

Millis, B. J. (2016). Using metacognition to promote learning. IDEA Paper #63. IDEA Center, Inc. https://www.ideaedu.org/idea_papers/using-metacognition-to-promote-learning/

Neale, D., & Whitebread, D. (2019). Maternal scaffolding during play with 12- to 24-month-old infants: Stability over time and relations with emerging effortful control. Metacognition and Learning, 14(3), 265–289. https://doi.org/10.1007/s11409-019-09196-6

Nederhand, M., Tabbers, H., Jongerling, J., & Rikers, R. (2020). Reflection on exam grades to improve calibration of secondary school students: A longitudinal study. Metacognition and Learning, 15(3), 291–317. https://doi.org/10.1007/s11409-020-09233-9

Oana, O., & Flavia, P. (2025). The Meta-Intelligent Child: Validating the MKIT as a Tool to Develop Metacognitive Knowledge in Early Childhood. Journal of Intelligence, 13(11), 149.

Pan, Y., Kim, H., Huang, Y., et al. (2025). Promoting students' metacognition and self-regulatory efficacy through metacognitive scaffolding in mobile technology-enhanced interactive classrooms: The moderating role of inner speech. Educational Information Technology, 30, 10811–10836. https://doi.org/10.1007/s10639-024-13284-9

Perry, J., Lundie, D., & Golder, G. (2019). Metacognition in schools: What does the literature suggest about the effectiveness of teaching metacognition in schools? Educational Review, 71(4), 483–500. https://doi.org/10.1080/00131911.2018.1441127

Perry, N. E. (2019). Recognizing early childhood as a critical time for developing and supporting self-regulation. Metacognition and Learning, 14(3), 327–334. https://doi.org/10.1007/s11409-019-09213-8

Rodriguez-Malaga, L., Cueli, M., & Rodriguez, C. (2021). Exploring the effects of strategy-focused instruction in writing skills of 4th grade students. Metacognition and Learning, 16(1), 179–205. https://doi.org/10.1007/s11409-020-09247-3

Schuster, C., Stebner, F., Leutner, D., & Wirth, J. (2020). Transfer of metacognitive skills in self-regulated learning: An experimental training study. Metacognition and Learning, 15(3), 455–477. https://doi.org/10.1007/s11409-020-09237-5

Shaughnessy, A. E., & Slawson, D. C. (1997). Getting the most from review articles: A guide for readers and writers. American Family Physician, 55(6), 2155–2165. https://pubmed.ncbi.nlm.nih.gov/9149643/

Scharff, L., Draeger, J., Robinson, S., Pedro, L., & Peak, C. (2021). Developing metacognitive instructors through a guided journal. A systematic approach. Teaching & Learning Inquiry, 9(2), n2.

Siddaway, A. P., Wood, A. M., & Hedges, L. V. (2019). How to do a systematic review: A best practice guide for conducting and reporting narrative reviews, meta-analyses, and meta-syntheses. Annual Review of Psychology, 70(1), 747–770. https://doi.org/10.1146/annurev-psych-010418-102803

Stankov, L. (2019). Applied metacognition and separation of confidence and accuracy in correlational studies. Metacognition and Learning, 14(3), 509–516. https://doi.org/10.1007/s11409-019-09212-9

Steiner, M., van Loon, M. H., Bayard, N. S., & Roebers, C. M. (2020). Development of children's monitoring and control when learning from texts: Effects of age and test format. Metacognition and Learning, 15(3), 3–27. https://doi.org/10.1007/s11409-019-09208-5

Swanson, H. J., Ojutiku, A., & Dewsbury, B. (2024). The impacts of an academic intervention based in metacognition on academic performance. Teaching & Learning Inquiry, 12.

Vangsness, L., & Young, M. E. (2021). More isn't always better: When metacognitive prompts are misleading. Metacognition and Learning, 16(1), 135–154. https://doi.org/10.1007/s11409-020-09241-9

Veenman, M. V., Van Hout-Wolters, B. H., & Afflerbach, P. (2006). Metacognition and learning: Conceptual and methodological considerations. Metacognition and Learning, 1, 3–14. https://doi.org/10.1007/s11409-006-6893-0

Voorhees, D. H., LeMay, L. E., Nagy, E. A., & Perez, A. E. (2022). Successes with metacognition: Empowering faculty and transforming student learning. In E. M. D. Baer, K. M. Layou, & R. H. Macdonald (Eds.), Catalyzing change: STEM faculty as change agents. New Directions for Community Colleges (pp. 17–33). John Wiley & Sons, Inc. https://onlinelibrary.wiley.com/doi/pdf/10.1002/cc.20521

Volet, S. E. (1991). Modelling and coaching of relevant metacognitive strategies for enhancing university students' learning. Learning and Instruction, 1(4), 319–336. https://doi.org/10.1016/0959-4752(91)90012-w

Wang, Y., & Sperling, R. A. (2021). Understanding and supporting Chinese middle schoolers' monitoring accuracy in mathematics. Metacognition and Learning, 16, 57–88. https://doi.org/10.1007/s11409-020-09238-4

Winne, P. H. (2022). Modeling self-regulated learning as learners doing learning science: How trace data and learning analytics help develop skills for self-regulated learning. Metacognition and Learning, 17(3), 773–791. https://doi.org/10.1007/s11409-022-09305-y

Zhou, M., & Lam, K. K. L. (2019). Metacognitive scaffolding for online information search in K-12 and higher education settings: A systematic review. Educational Technology Research and Development, 67(6), 1353–1384. https://doi.org/10.1007/s11423-019-09646-7

Zohar, A., & Ben-Ari, G. (2022). Teachers' knowledge and professional development for metacognitive instruction in the context of higher order thinking. Metacognition and Learning, 17(3), 855–895. https://doi.org/10.1007/s11409-022-09310-1

Information about authors:

Malik Umit (corresponding author) – PhD, senior lecturer at the philology and humanities faculty of M.Kh. Dulaty Taraz University (Taraz, Kazakhstan, e-mail:malik.umit@mail.ru)

Shvetsova Maya – Candidate of Psychological Sciences, Professor at the Department of Educational Psychology, Moscow Pedagogical State University, Deputy Head of the Department of Educational Psychology, (Moscow, Russia, e-mail: mn.shvetsova@mpgu.su).

Авторлар туралы мәлімет:

Мәлік Үмітұ (корреспондент автор) – PhD, филология және гуманитарлық ғылымдар факультетінің аға оқытушысы, М.Х.Дулати Тараз университеті (Тараз, Қазақстан, e-mail: malik.umit@mail.ru)

Швецова Майя – психология ғылымдарының кандидаты, Мәскеу педагогикалық мемлекеттік университетінің білім беру психологиясы кафедрасының профессоры, кафедра меңгерушісінің орынбасары, (Мәскеу, РФ, e-mail: mn.shvetsova@mpgu.su).

Сведения об авторах:

Мәлік Үмітұ (автор корреспондент) – PhD, ст.преподаватель факультета филологии и гуманитарных наук Таразского университета М.Х.Дулати, (Тараз, Казахстан, e-mail: malik.umit@mail.ru)

Швецова Майя – кандидат психологических наук, профессор кафедры психологии образования Московского педагогического государственного университета, заместитель заведующего кафедры психологии образования, (Москва, РФ, e-mail: mn.shvetsova@mpgu.su).

Received 23.06.2025
Accepted 27.02.2026