



Reflective Practice

International and Multidisciplinary Perspectives

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/crep20

Are teachers metacognitively aware while teaching? A cross-cultural analysis of Greek and Romanian teachers

Maria Koulianou, Cristina Dumitru, Konstantinos Mastrothanas, Maria Magdalena Stan & Stavroula Samartzi

To cite this article: Maria Koulianou, Cristina Dumitru, Konstantinos Mastrothanas, Maria Magdalena Stan & Stavroula Samartzi (23 Apr 2025): Are teachers metacognitively aware while teaching? A cross-cultural analysis of Greek and Romanian teachers, Reflective Practice, DOI: [10.1080/14623943.2025.2494323](https://doi.org/10.1080/14623943.2025.2494323)

To link to this article: <https://doi.org/10.1080/14623943.2025.2494323>



© 2025 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



Published online: 23 Apr 2025.



Submit your article to this journal [↗](#)








View related articles [↗](#)



View Crossmark data [↗](#)

Are teachers metacognitively aware while teaching? A cross-cultural analysis of Greek and Romanian teachers

Maria Koulianou ^a, Cristina Dumitru ^b, Konstantinos Mastrothanasis ^c, Maria Magdalena Stan ^b and Stavroula Samartzi ^a

^aDepartment of Psychology, Panteion University, Athens, Greece; ^bDepartment of Education, The National University of Science and Technology POLITEHNICA Bucharest, Pitești University Centre, Pitesti, Arges, Romania; ^cSchool of Medicine, National and Kapodistrian University of Athens, Goudi, Greece

ABSTRACT

The present research aimed to delve into the metacognitive awareness among teachers within the diverse cultural and educational backdrops of Greece and Romania. Drawing from the rich educational traditions and practices unique to each nation, this study sought to discern potential variations in how teachers perceive, understand, and regulate their cognitive processes before, during and after they teach. Using the Metacognitive Awareness Inventory for Teachers (MAIT), a comparative analysis was conducted on data from 856 educators, comprising 630 Greek and 226 Romanian teachers. Descriptive statistics revealed Greek teachers to exhibit a slightly higher metacognitive awareness score than their Romanian counterparts. Further, analyses of different dimensions of metacognitive awareness, such as Declarative Knowledge, Procedural Knowledge, and Conditional Knowledge, among others, showcased various effect sizes and variances between the two groups. The current study underscores the importance of considering cultural and educational contexts when exploring metacognitive strategies in teaching and offers avenues for future research in understanding their broader implications in pedagogical settings.

ARTICLE HISTORY

Received 27 August 2024
Accepted 27 March 2025



KEYWORDS

metacognition;
metacognitive awareness;
self-regulated learning;
metacognitive teaching
strategies; teacher cognition;
professional development

Introduction

Learning in school should be directed toward providing learners with tools that will enable them to study and progress independently. Metacognition plays an important role in making the learning process more effective. This can be achieved by creating specific learning conditions, with appropriate challenging learning tasks in the Zone of Proximal Development (Vygotsky, 1980), shaping independent learning behaviors, encouraging independent and autonomous learning, providing constructive feedback, and modeling monitoring, reflective, and self-evaluative strategies (Paris & Paris, 2001).

Successful self-regulated learners have successful self-regulated teachers (Branigan & Donaldson, 2020; Karlen et al., 2023; Paris & Winograd, 2003). Teachers are mainly responsible for the development of the metacognitive skills of their students (Karlen et al., 2023; Pintrich, 2002). Nonetheless, studies report poor knowledge and skills of teachers in facilitating the development of learners' metacognitive skills (Karlen et al., 2023; Zohar & Ben-Ari, 2022). Even though there is a great body of research on metacognition and metacognitive skills modelling, little is known on why the process of transfer of metacognitive knowledge, awareness, and practices from teacher to learners is so challenging (Joseph, 2009). Karlen et al. (2023) collected several studies highlighting the impact teachers have on enhancing learners' awareness about their metacognitive skills and the crucially important aspect of teachers' availability to develop their own metacognitive experience and the responsibility to promote it in the learning space. Hence, a renewed interest in teachers training and self-assessment of their metacognitive skills generated a great number of studies (Ohtani & Hisasaka, 2018). Research on how teachers understand their own learning and teaching behaviors, how they reflect on them and how they use their knowledge and skills to improve their teaching

CONTACT Cristina Dumitru  cristina.dumitru81@upb.ro  Department of Educational Sciences, The National University of Science and Technology POLITEHNICA Bucharest, Pitești University Centre, 1 Targul din Vale, Pitesti, 110040, Romania

© 2025 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

practice is a promising path in understanding better how teaching happens (Hashweh, 1996). Most of the studies explore learner's metacognition, being connected with the learning condition, while the issue of assessing teachers' position in metacognitive development, however, is an overlooked question. Understanding teachers' perceptions of their metacognitive ability remains a need for studies that carefully explore and describe how specific and well-conceptualized their own metacognitive profile is. The important contribution is the belief that cultivating explicit metacognitive skills in teachers will have a positive impact on teaching practice.

Given this research gap, in this study cross-cultural metacognitive awareness is compared between Greek and Romanian teachers, two groups with different educational traditions and teaching philosophies. The Greek educational system emphasizes classical humanities and self-directed inquiry, while the Romanian system has undergone significant reforms influenced by socio-political transitions. These differences may influence teachers' perceptions and implementation of metacognitive strategies, rendering this comparison particularly valuable.

Theoretical background

For the purpose of this study, we considered a general definition of metacognition, accepted by a great body of experts in the field. Metacognition represents the knowledge about cognition (Brown, 1987). A great number of attempts to conceptualize metacognition and metacognitive skills was noted in the last decades (Baker & Brown, 1984; Balcikanli, 2011; Flavell, 1976; Schraw & Dennison, 1994). However, measuring metacognition is a highly challenging issue (Efklides, 2006). Metacognition refers to higher-order skills that facilitate teaching and learning processes by helping learners and teachers acknowledge their strengths and limits while teaching and/or learning and monitoring and regulating their actions along the process. Since the work of Flavell (1976), metacognition has been the focus of many researchers. Metacognition covers specific knowledge of strategies to be used for the accomplishment of a specific goal and the ability to appropriately select and self-regulate one's person metacognitive strategies, such as planning, self-reflecting, self-guiding, monitoring, and evaluating (Karlen et al., 2023; Mavrogianni et al., 2020).

Metacognition can be practiced and enhanced through targeted, individualized and personalized training (Donker et al., 2014). In studies on metacognition, researchers differentiate between declarative metacognition, or knowledge of cognition (Craig et al., 2020), which implies the understanding of learning strategies (metacognitive knowledge) and procedural metacognition, referring to actively monitoring and regulating the learning process (metacognitive skills) (Flavell, 1976; Wacker & Roebbers, 2023).

Metacognitive knowledge is distinguished in several components as declarative knowledge about the self and the others (Flavell, 1979; Kuhn & Dean, 2004; Paris & Winograd, 1990; Schraw & Dennison, 1994; Schraw & Moshman, 1995), as awareness and management of cognitive processes including knowledge about strategies, as procedural knowledge (Cross & Paris, 1988; Flavell, 1979; Kuhn & Dean, 2004; Schraw & Dennison, 1994), as conditional knowledge or knowledge about the framework of why and when to use strategy (Schraw & Dennison, 1994). Also, includes beliefs and theories stored in memory in relation to (a) oneself and others as learning beings (ways of acquiring or prevent knowledge, performance conditions), (b) tasks (content, characteristics, requirements), (c) strategies and conditions for applying strategies (Vasiou et al., 2024; Barzilai & Zohar, 2014; Efklides, 2011), simplistic theories for cognitive functions (Efklides, 2011).

Metacognitive knowledge enables teachers and students with the necessary information to select and use a specific meta-strategy. Therefore, the ability to know when, how or for how long, where and why to use a meta-strategy is a prerequisite to become a self-regulated learner. Procedural knowledge refers to an individual's knowledge of how strategies are implemented. Is related to knowledge about performing procedural skills. Individuals with a high degree of procedural knowledge are likely to implement strategies in a more effective way (Geladari & Mastrothanasis, 2010; Pressley et al., 1987) and use qualitatively different strategies to solve problems (Mastrothanasis et al., 2018). Attempting to increase procedural knowledge decreases feeling of uncertainty and improves problem-solving performance (Michou et al., 2023; Metallidou, 2009). Procedural knowledge is teachable however more research needs to be done to show how teachers use procedural knowledge in relation to themselves (teach with metacognition) and when they teach metacognition to children (teach for metacognition) (Surif et al., 2012).

Metacognitive regulation contains cognitive functions and executive strategies that regulate thinking and control learning. It involves cognitive experiences (Flavell, 1979) processes such as planning (Cross & Paris, 1988), information management strategies (Paris & Winograd, 1990), comprehension monitoring (Schraw & Moshman, 1995), error detection strategies, and evaluation of a cognitive task (Cross & Paris, 1988; Paris & Winograd, 1990; Schraw & Moshman, 1995; Whitebread et al., 2009). Three key skills are included in all the literature: planning, monitoring and evaluation (Jacobs & Paris, 1987; Kluwe, 1987; Stephanou & Mpiontini, 2017).

Metacognitive skills are highly beneficial in learning as they regulate cognitive, emotional and motivational behaviors that guide and enhance learning outcomes (Veenman et al., 2006). According to Barzilai and Zohar (2014), metacognition can be studied as a set of knowledge, a set of skills and as an experience. Metacognitive skills are 'universal' competency-based skills that can be transferred to various learning situations (Karlen et al., 2023).

Metacognitive experience represents a vital aspect of metacognition, playing a crucial role in guiding self-regulated learning (Ching-En, 2018). The metacognitive experience is an active process, encompassing several stages (a) pre-task reflection, occurring prior to task engagement; (b) in-task activities, taking place during task execution; and (c) monitoring, reflection, and feedback, after the completion of the task (Efklides, 2006; Flavell, 1976). It consists of conscious feelings, judgments/estimates, and thoughts learners have while engaged in task execution (Efklides, 2006; Flavell, 1976). However, the same task can be perceived differently based on the experience.

For instance, it might be seen as objectively challenging for some learners, but subjectively effortless if the learner possesses the necessary knowledge and previous experience with similar tasks. Additionally, a teacher could assess a task as straightforward in terms of its objective complexity or processing demands, yet students might find it difficult due to their lack of familiarity with the task (Efklides, 2006).

Teachers' knowledge on metacognition

The pedagogical comprehension of metacognition pertains to teachers' grasp of key elements required for teaching and training metacognition skills (Wilson & Bai, 2010). To date, scholars have predominantly concentrated on one aspect of the two-fold competency framework: teachers as facilitators of self-directed learning and teachers as self-regulated learners (Doo & Zhu, 2023; Karlen et al., 2023; Wilson & Bai, 2010). The reality is, however, that no one can teach what they don't know. Therefore, teacher metacognition is an important area that requires exploration (Prytula, 2012).

Teacher awareness on their metacognitive competencies and self-regulated learning are crucial to foster metacognition, encompassing various dimensions of teacher competence, with impact on improving teaching practice (Mastrothanasis & Kladaki, 2023; Mavrogianni et al., 2025; van Sickle & Kubinec, 2003) and students learning process (Zimmerman et al., 2002). Teachers' responsibility is actively engaging students in knowledge construction, by guiding and scaffolding learning process for selection, planning, and execution of future-oriented behavior (Barzilai & Zohar, 2014). Teachers should employ cognitive-level epistemic strategies and procedures, utilize diverse criteria to strategize, oversee, and assess the certainty, dependability, sufficiency, and coherence of their epistemic methods and outcomes (Barzilai & Zohar, 2014).

Considering teachers' metacognitive awareness recent research revealed that metacognitive awareness is connected to and positively influenced teachers' perceived teaching competence (Achor et al., 2022; Ford et al., 2023; Sahoo et al., 2021; Vosniadou et al., 2020). The explicit metacognitive teaching on preservice teachers' metacognitive awareness and strategies investigated and it was found a positive impact (Ford et al., 2023; Iwai, 2016). The researchers found that explicit metacognitive teaching improved preservice teachers' metacognitive awareness and accuracy in facilitating group discussions (Ford et al., 2023) and increased awareness of metacognitive reading strategies (Koulianou & Samartzi 2018; Iwai, 2016, Karlen et al., 2003).

Interestingly, the emphasis on metacognitive skills is not only beneficial for students but critically essential for teachers. Teachers who possess a high level of metacognitive awareness tend to be more effective in their instructional strategies and better equipped to foster an environment conducive to self-regulated learning. This dual role – both as self-regulated learners and facilitators of self-regulation – underscores the complexity and multifaceted nature of metacognitive instruction.

In essence, teachers' deep understanding of metacognitive processes enables them to create more reflective, adaptive, and supportive learning environments. Such environments promote students' ability to think about their thinking, regulate their learning strategies, and ultimately, become autonomous learners.

Reflective sources as reflective journals increase prospective teachers' metacognitive awareness (Siddiqui et al., 2020). Once teachers learn how to use this metacognitive knowledge for themselves then it's easier to apply in the classroom reflective thinking activities to improve students' metacognitive awareness in learning (Siddiqui et al., 2020). Research on primary teachers' metacognitive awareness of reading strategies revealed a significant correlation between regulation of cognition and metacognitive reading strategies (Mastrothanasis et al. 2018, Koulianou & Samartzi, 2018) and implicit use of teachers' metacognitive reading strategies (Koulianou & Samartzi, 2018; Iwai, 2016) and positive relation to explicit teaching practices (Hossu & Roman, 2019).

Study purpose and research questions

In the present study, we aimed to investigate similarities and differences in metacognitive awareness considering teaching between teachers in two different cultural and educational backgrounds: Greece and Romania. Drawing from a rich history of educational traditions and practices unique to each country, this research taps into the potential variations in how teachers perceive, understand, and regulate their cognitive processes within their teaching environments. Given this significance, it becomes imperative to understand how such awareness manifests across varied cultural contexts. Both Greece and Romania have distinctive educational landscapes shaped by historical, social, and political factors. While Greece's education system is rooted in a classical tradition with a strong emphasis on humanities, Romania has experienced significant educational reforms influenced by its socio-political transitions. These nuances could potentially influence the way teachers in these countries approach, internalize, and utilize metacognitive strategies. The research questions are the following:

RQ 1. Are there significant differences in metacognitive awareness between teachers in Greece and Romania?

RQ 2. Do teachers in Greece and Romania differ significantly in their metacognitive knowledge of cognition and regulation of cognition?

RQ 3. Which specific areas of knowledge about cognition and regulation of cognition (Declarative Knowledge, Procedural knowledge, Conditional knowledge, Planning, Monitoring, and Evaluation) show the most significant differences between teachers in Greece and Romania?

Materials and methods

Participants

The study encompassed a diverse group of teachers hailing from Greece and Romania, representing both primary and secondary education sectors. In total, 856 teachers participated, with 630 educators from Greece and 226 from Romania. From the Greek cohort, the gender distribution comprised 194 male teachers and 436 female teachers. These educators reported an average teaching experience of 13.81 years, with a standard deviation of 8.42 years. The Romanian sample includes 204 female teachers participating and 22 male teachers. These Romanian educators, on average, had 8.38 years of teaching experience.

The selection procedure for participants in both countries was rooted in simple random sampling. This method ensured an unbiased representation, allowing for a comprehensive insight into the metacognitive awareness of teachers within the distinct cultural and educational landscapes of Greece and Romania.

Additionally, a power analysis was conducted to assess the adequacy of our sample size. The results indicate that for a medium effect size (Cohen's $d = 0.5$) and an alpha level of 0.05, a minimum total sample of

approximately 120 participants would be required to achieve a power of 0.80. With 856 participants, the study has a large enough sample to identify significant differences in metacognitive awareness between Greek and Romanian teachers. This not only reinforces the robustness and validity of the findings, but also underscores the reliability of our cross-cultural comparisons.

Measure

Metacognitive awareness inventory for teachers (MAIT)

The MAIT scale belongs to the category of tools that measure metacognitive awareness, that is, the declarative knowledge that is stored in one's memory about one's own cognitive processes, as well as the strategies one uses. The construction of the MAIT scale was based on the theoretical framework of Brown (1978) and includes the two dimensions of metacognition: 'knowledge of cognition' and 'regulation of cognition'. The MAIT (Balcikanli, 2011) is derived from the Metacognitive Awareness Inventory for Adults (MAI) (Schraw & Dennison, 1994). Balcikanli (2011) mentions teachers' knowledge of their teaching as a starting point for the study of metacognition. Without this knowledge, change in teacher development cannot occur. The MAIT is seen as a resource to help teachers become aware of their own metacognitive levels of teaching (Balcikanli, 2011). The MAIT scale consists of 24 statements, with responses based on a five-point Likert-type scale, accompanied by a verbal graded rating of responses (1 = Strongly Disagree to 5 = Strongly Agree). The MAIT 'knowledge dimension' evaluates a teacher's declarative, procedural, and conditional knowledge. Meanwhile, the regulation dimension gauges aspects such as planning, monitoring, and evaluation through twelve questions in each category.

To enhance cross-cultural validity of the MAIT scale, the adaptation process incorporated several key strategies. In addition to the forward and back-translation methods, focus groups comprised of educators from both cultural backgrounds were convened to provide insights and feedback on the scale's relevance. Cultural nuances were carefully considered, leading to the adaptation of some elements to better suit the specific educational practices and learning styles in Greece and Romania. In addition, during the pilot study, factor analysis was used to verify the factor structure and internal consistency of the scale in each cultural context. To further validate its effectiveness, comparative analyses with existing measurement tools in both languages were conducted. This integrated approach not only enhanced the reliability of the MAIT scale but also promoted a deeper understanding of metacognitive awareness in different educational contexts.

Data collection

To conduct this study, data were gathered from teachers, most of the participants teachers from preschool and primary school education, from Pitești county, Romania. Data collection took place during November – December 2022. The survey instruments were distributed to the participants using Google Forms, accompanied by a comprehensive outline of the study's purpose and a consent form. Once participants had given their informed consent, they proceeded to individually fill out the questionnaires. To ensure confidentiality, participants' responses were kept anonymous. The research protocol received approval from the Ethics Committee of the Centre for Scientific Research in Applied Psycho-Pedagogy (PRO-ED-EXPERT) at the University of Pitești, and it was assigned the protocol number 30.101/3 November 2022.

The Greek version of the MAIT scale was administered electronically to the teachers selected to participate in this study from October 2017 to April 2018 and from October 2022 to June 2023. There was permission from the Ministry of Education as the research was conducted as part of postdoctoral research funded by the State Scholarship Foundation 2016-050-0503–7537 and it was assigned the protocol number 149.375/8 September 2017.

Participants were informed about the purpose of the survey, the content of the questionnaire and how they would answer it. They were asked to read the questions carefully and respond to each of them by selecting the verbal classification that represented them, without anyone considering any answer as right or wrong. Throughout the survey, anonymity was maintained, and participants were informed of the confidentiality of their personal data. Participation in the survey was not compulsory. Participants' responses to the scale were based on a five-point Likert-type measurement scale, as in the original scale, which was

accompanied by a verbal rating of the responses: (a) Strongly disagree, (b) Disagree, (c) Neither agree nor disagree, (d) Agree, and (e) Strongly agree. A 5-point scale (1–5) was used to process the data, corresponding to the above verbal ratings.

Statistical analysis

After data collection, the responses were entered into the Jamovi 2.3.17 statistical software for further analysis. All variables were reviewed for accuracy of data entry, missing values, and assumptions of the statistical analyses to be conducted. The first stage of the analysis involved reviewing the descriptive statistics for each variable and creating a latent variable.

Subsequently, the Welch's t-test was employed to ascertain the differences in metacognitive awareness between the Greek and Romanian teachers. To explore into the metacognitive awareness dimensions, a Welch's ANOVA was utilized, specifically for both 'Knowledge about Cognition' (KC) and 'Regulation of Cognition' (RC) scores. Detailed analyses were also conducted on the specific facets of metacognitive knowledge and regulation, such as Declarative Knowledge, Procedural Knowledge, Conditional Knowledge, Planning, Monitoring, and Evaluation. Finally, effect sizes were calculated using Cohen's *d* for each significant result to indicate the practical significance of the findings. Throughout the analysis, a *p*-value of less than 0.05 was considered statistically significant.

Results

The Welch's t-test was employed to determine if there was a significant difference in metacognitive awareness between teachers from Greece and teachers from Romania. Descriptive statistics revealed that the mean metacognitive awareness score for Greek teachers was $M = 4.33$ ($SD = 0.47$), while for Romanian teachers it was $M = 4.10$ ($SD = 0.40$). The analysis indicated a statistically significant difference between the two groups, $t(460.09) = 7.07$, $p < .001$, with Greek teachers showing a somewhat higher metacognitive awareness score than their Romanian counterparts, with a 95% confidence interval for the mean difference ranging from 0.17 to 0.30. The effect size for this difference, measured using Cohen's *d*, was 0.53, suggesting a medium effect. Based on this finding, Greek teachers report a stronger overall awareness of metacognitive processes in their teaching practice compared to their Romanian colleagues.

To explore the differences in metacognitive awareness dimensions between Greek and Romanian teachers, a Welch's ANOVA was conducted for both 'Knowledge about Cognition' (KC) and 'Regulation of Cognition' (RC) scores. For KC, there was a statistically significant difference between the two countries, $F(1, 431.94) = 77.11$, $p < .001$. Greek teachers reported a higher mean score ($M = 4.36$, $SD = 0.48$) in comparison to their Romanian counterparts ($M = 4.05$, $SD = 0.44$). The 95% confidence interval (CI) for the mean difference was [0.24, 0.38]. The effect size, quantified by Cohen's *d*, was -0.66 , suggesting a large difference in favor of Greek teachers. This suggests that Greek teachers are more confident in their declarative knowledge about metacognitive processes compared to Romanian teachers.

In terms of the RC dimension, a significant difference was also observed, $F(1, 499.56) = 18.43$, $p < .001$. Greek teachers scored higher ($M = 4.30$, $SD = 0.54$) than the Romanian teachers ($M = 4.15$, $SD = 0.43$). The 95% confidence interval (CI) for the mean difference was [0.08, 0.22]. The effect size for this was Cohen's *d* = -0.292 , indicating a small to medium effect size. Although this difference is statistically significant, it suggests a relatively modest variation in how teachers from the two countries regulate their metacognitive processes while teaching.

Declarative knowledge

For the dimension of Declarative Knowledge (F1), a Welch's ANOVA revealed a statistically significant difference between Greek and Romanian teachers, $F(1, 438.85) = 148.27$, $p < .001$. Teachers from Greece reported a higher mean score ($M = 4.39$, $SD = 0.54$) compared to teachers from

Romania ($M = 3.92$, $SD = 0.49$) (see, Graph 1). The 95% confidence interval (CI) for Greek teachers ranged from 4.35 to 4.43, while for Romanian teachers it ranged from 3.86 to 3.98. The effect size, Cohen's d , was a robust -0.891 , indicating a very large effect. This suggests that Greek teachers have a significantly stronger grasp of their own cognitive processes and knowledge structures related to metacognition.

Procedural knowledge

In the dimension of Procedural Knowledge (F2), there was a statistically significant difference between the two countries, $F(1, 449.80) = 20.74$, $p < .001$. Greek teachers had a mean score of $M = 4.29$ ($SD = 0.59$), while Romanian teachers reported $M = 4.10$ ($SD = 0.52$). The 95% confidence interval (CI) for Greek teachers ranged from 4.24 to 4.34, while for Romanian teachers it ranged from 4.03 to 4.17. The effect size for this difference was -0.332 , suggesting a small to medium effect. This difference, though present, is smaller compared to declarative knowledge, suggesting that both groups apply metacognitive strategies with relatively similar levels of competence.

Conditional knowledge

For Conditional Knowledge (F3), the analysis indicated a significant difference, $F(1, 409.75) = 41.44$, $p < .001$. Greek teachers averaged $M = 4.39$ ($SD = 0.54$), compared to Romanian teachers who averaged $M = 4.13$ ($SD = 0.52$). The 95% confidence interval (CI) for Greek teachers ranged from 4.35 to 4.43, while for Romanian teachers it ranged from 4.06 to 4.20. The effect size for this dimension was -0.486 , indicating a medium effect.

Planning

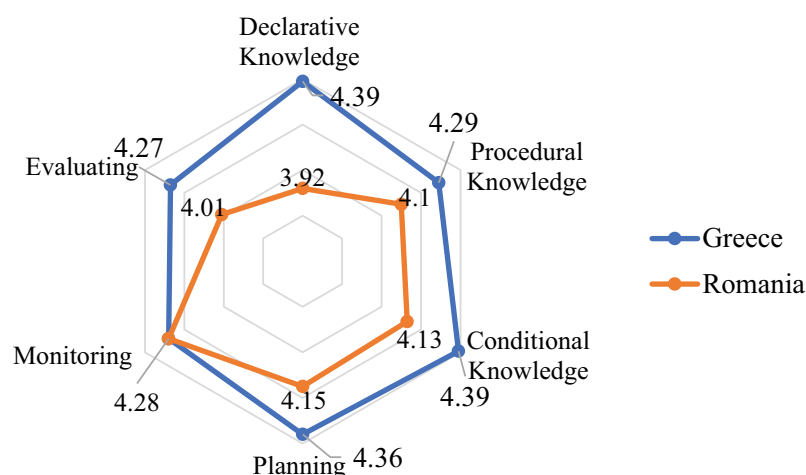
Regarding the Planning (F4) dimension, there was a significant difference between Greek and Romanian teachers, $F(1, 488.20) = 27.85$, $p < .001$. Teachers in Greece had a mean score of $M = 4.36$ ($SD = 0.60$) while those in Romania had $M = 4.15$ ($SD = 0.48$). The 95% confidence interval (CI) for Greek teachers ranged from 4.31 to 4.41, while for Romanian teachers it ranged from 4.09 to 4.21. The effect size was -0.368 , suggesting a small to medium effect.

Monitoring

For Monitoring (F5), no significant difference was observed between the two groups, $F(1, 541.88) = 0.02$, $p = 0.897$. Both Greek and Romanian teachers reported similar mean scores ($M = 4.28$, $SD = 0.63$ for Greece and $M = 4.28$, $SD = 0.46$ for Romania). The 95% confidence interval (CI) for Greek teachers ranged from 4.23 to 4.33, while for Romanian teachers it ranged from 4.22 to 4.34. This suggests that in terms of monitoring their own cognitive strategies, teachers from both groups exhibit comparable levels of awareness and reflection.

Evaluating

Finally, in the sub-factor of Evaluating (F6), a significant difference was found, $F(1, 592.96) = 30.38$, $p < .001$. Greek teachers reported a mean score of $M = 4.27$ ($SD = 0.76$), while Romanian teachers had $M = 4.01$ ($SD = 0.51$). The 95% confidence interval (CI) for Greek teachers ranged from 4.21 to 4.33, while for Romanian teachers it ranged from 3.94 to 4.08. The effect size was -0.37 , indicating a small to medium effect.



Graph 1. Greek and Romanian teachers' scores on six sub-factors of MAIT.

Discussion

The present study examined metacognitive awareness between teachers in two different cultural and educational backgrounds: Greece and Romania. Metacognition, the awareness and understanding of one's own cognitive processes, has garnered significant attention in educational research due to its influence on learning outcomes and instructional practices (Georghiades, 2004; McCrindle & Christensen, 1995; Wilson & Bai, 2010).

The essence of the present study was rooted in the exploration of metacognitive awareness disparities between teachers in Greece and Romania, two countries with distinct historical, social, and educational underpinnings. The findings bring to light intriguing facets of metacognition in the realm of teaching, its cultural implications, and, more broadly, the intricacies of cognition in educational settings.

In response to first research question, our analysis reveals that Greek teachers consistently demonstrate a higher level of perceived metacognitive awareness compared to their Romanian peers. This finding, highlighted by a medium effect size, is significant and suggests that Greek teachers have a slightly more profound understanding and insight into their own cognitive processes in the context of their teaching practices.

One possible explanation is that the Greek educational system, which has historically emphasized classical studies as well as philosophical research, works favourably in emphasizing a reflective approach among teachers. However, the absence of empirical research regarding the relationship between classical education and metacognitive awareness needs future investigation.

Moreover, the feasibility of the role of professional development programs in Romania and Greece could add valuable insights. For example, examining the extent to which Greek teachers have greater accessibility or participation in laboratory exercises focusing on metacognitive strategies could highlight differences regarding their dynamics.

Similarly, it could be compared with similar opportunities that exist in Romania regarding the identification of potential gaps. Moreover, the professional perspectives of graduates from training programs in both cultures could highlight fundamental practices established during training that could contribute decisively to the process of acquiring metacognitive strategies.

An additional axis could include the curriculum as well as the assessment practices implemented in each country, as these practices can either highlight or undermine the teachers' reflective process on their cognitive processes.

In addition, the sociocultural context contributes to the formation of teachers' identity, their system of perceptions of teaching as well as their self-efficacy could also account for the differences identified between the two cultures of educators (Lawson et al. 2019; Vosniadou et al. 2021).

Teachers who consciously engage in cross-cultural dialogue or peer observation can be trained to identify how factors in the collaborative context affect their metacognitive practices. The creation and cultivation of

fruitful collaborative contexts and the sharing of experiences between teachers from both countries could potentially lead to mutual internal growth, conceptual change and better understanding of metacognitive strategies (Vosniadou et al., 2020). In any case, this tacit metacognitive knowledge and experience needs to be further explored in terms of its impact on pedagogical understanding of how to teach metacognitive strategies (Wilson & Bai, 2010).

The second research question delved deeper into the nuances of metacognition by examining two pivotal dimensions: 'Knowledge about Cognition' and 'Regulation of Cognition'. Greek teachers exhibited a pronounced edge in both dimensions, more so in the former, denoting that they not only have a superior grasp of their cognitive operations but also exhibit enhanced skills to regulate them.

While Greece and Romania share some similarities in their educational practices, they also take different approaches to helping teachers enhance their metacognitive abilities. When it comes to similarities both Greece and Romania provide teacher training programs at university level and in-service professional development (which often include workshops, seminars, and courses that may address metacognitive strategies as part of broader pedagogical content) (European Commission, 2019). However, some differences are identified such as curricular emphasis. Greek curriculum is a more student-centered and based on inquiry-based learning, which often involves metacognitive reflection, while Romania has a more traditional curriculum with less focus on metacognition (Anastasiadou, 2015; Kaldi et al., 2014; Mara, 2022).

The pronounced difference in the 'Knowledge of Cognition' could be attributed to the emphasis the Greek education system places on introspection and reflection, integral to humanities disciplines. Teachers' metacognitive personal theories are likely to influence their perceived professional competence in social studies and vice-versa.

Our third research question sought to pinpoint specific areas within metacognitive awareness that displayed the most pronounced disparities. Declarative Knowledge emerged as the dimension with the most significant difference, favoring Greek teachers with a very large effect size. This could suggest that Greek educators have a more explicit understanding of facts, concepts, and relationships – a possible outcome of their curriculum's classical roots. Given the substantial difference observed, future studies could explore whether Greek teachers' higher declarative knowledge translates into more effective instructional practices or whether it primarily reflects a theoretical understanding of metacognition.

In contrast, the ability to utilize information management strategies called Monitoring was the only dimension where no significant difference was found, implying a universal emphasis on continuous self-assessment and adjustment during teaching, regardless of cultural background. Also, it suggests that the function of monitoring as an aspect of metacognitive regulation is closer to metacognitive representational structures and less imbued with different cultural and educational understandings and practices.

The findings from the other dimensions further highlight the complex mosaic of metacognitive awareness, emphasizing the complex interplay between different aspects of knowledge and knowledge regulation. Even more so, it seems that planning and evaluation may be more influenced by teachers' belief systems (Vosniadou et al., 2020; Vosniadou et al., 2021) and different cultural contexts.

These findings lead us to ponder on the broader implications for teacher training and professional development. Given the pivotal role of metacognition in effective teaching, understanding these cultural nuances becomes paramount. A practical implication of these results is the potential for cross-cultural professional development initiatives. Greek teacher training programs, which emphasize reflective teaching practices, could serve as a model for Romanian educators seeking to integrate metacognitive strategies more systematically into their instruction. Conversely, Romanian teachers, who operate within a more structured curriculum, may offer insights into systematic instructional design that could benefit their Greek counterparts. Establishing collaborative learning communities between educators from both countries may provide an avenue for knowledge exchange and professional growth (Geladari & Mastrothanasis, 2021).

For Romania, there might be a need to intensify training in areas of metacognitive deficit, possibly through targeted interventions or curriculum modifications. Conversely, for Greece, the findings could serve as a validation of existing practices while also highlighting areas for further refinement.

Metacognition has a significant impact on students' achievement both in school and in their future endeavours (de Boer et al., 2018; Ohtani & Hisasaka, 2018). Teachers play a pivotal role in guiding students to develop metacognitive skills and become effective self-regulated learners. In the context of metacognition, several researchers have emphasized the impact of teachers' competence in being 'metacognitive' learners

themselves and in facilitating metacognition among their students (Branigan & Donaldson, 2020; Karlen et al., 2023; Paris & Winograd, 1990). However, there is a wide range of variability among teachers when it comes to developing and enhancing metacognition (Karlen et al., 2023). These differences in classroom activities are mostly explained by the level of professional competence among teachers (Kunter et al., 2013).

As the educational environment becomes increasingly diverse, it becomes essential to investigate how cultural and educational backgrounds might impact metacognitive awareness (Craig et al., 2020; Zohar & Barzilai, 2013). Research has indicated that teachers' metacognitive awareness can impact their instructional decisions, classroom management, and student engagement. Moreover, educational and cultural factors have been suggested to influence how individuals perceive and use metacognition (Craig et al., 2020; de Boer et al., 2018). Teachers in Greece and Romania have differences that affect educational practices and teaching. Professional development experiences, adequacy of training and perception of the teaching profession are key areas where differences are observed (Folostina et al., 2022; OECD, 2020; Samaras & Fox, 2013; Xafakos et al., 2020). Hierarchical structures and community learning may have an impact on educational procedures in Greece, where collectivism and a strong emphasis on tradition are prevalent. In contrast, Romania's educational system may reflect a blend of Eastern and Western influences due to its geographical location and historical evolution. These cultural and educational differences could potentially lead to variations in how teachers from these two countries perceive and apply metacognition.

The findings revealed distinct cultural influences on how teachers conceptualise metacognition and its role in education. Collectivist tendencies in Greece might lead to a greater emphasis on collaborative metacognitive practices, while Romania's more diversified cultural influences could contribute to a broader array of metacognitive strategies.

Beyond the cultural differences between Greece and Romania, it is desirable that the field of education presupposes professional educational environments governed by Social Constructivist theory (Driscoll, 1994) that foster collaboration between teachers, the exchange of experiences and knowledge to create new cognitive personal theories and new approaches to solve problems when something seems not to work (van Sickle & Kubinec, 2003). Professional learning communities take on such a character when they constitute an environment of collaboration and inquiry that involves an active, reflective, collaborative, learning-oriented approach and promotion of growth in teaching and learning. In such an environment, through describing their own metacognition, teachers can, to varying degrees, develop their own metacognitive theories, revealing their initial understandings of how each teacher gains control of their learning and uses it to assist in the learning of others (Prytula, 2012).

Limitations and future research suggestions

This study is not without its limitations. Firstly, the research primarily relied on Welch's ANOVA to discern differences in metacognitive awareness between teachers in Greece and Romania. While Welch's ANOVA is advantageous when dealing with unequal sample sizes or variances, it may lack the multifaceted insights that can be gleaned from a MANOVA, especially when examining interrelations between multiple dependent variables simultaneously. However, Welch's ANOVA remains a robust statistical method when sample sizes and variances are unequal, as was the case in our study. Consequently, the decision to utilize Welch's ANOVA might have limited our ability to assess the combined effects and interactions of the different facets of metacognitive awareness.

The cultural and educational backgrounds, while rich and diverse in both countries, were distilled into quantitative measures for the purposes of this study. This quantification, although methodologically necessary, could oversimplify the complex tapestry of cultural nuances, educational traditions, and pedagogical philosophies unique to each country.

Additionally, the sample's representativeness should be considered. While the study encompassed a diverse array of teachers, it remains unclear whether the sample truly captures the broader populations of educators in both Greece and Romania. Factors such as teaching experience, level of education, and specific subject expertise might introduce biases in the reported metacognitive awareness scores.

It's also important to mention the cross-sectional nature of our study. A longitudinal design might provide insights into how metacognitive awareness evolves over time, potentially influenced by ongoing training, changing educational policies, or broader societal shifts.

An extension to this research could involve a qualitative exploration, delving deeper into the experiences of educators in both countries too. Future studies could incorporate semi-structured interviews with teachers to explore their metacognitive beliefs, instructional strategies, and reflections on their professional development. Additionally, thematic analysis could be used to identify patterns in how teachers conceptualize and apply metacognition in different cultural contexts. This would paint a richer picture, potentially revealing the underlying reasons for the observed differences in metacognitive awareness. Additionally, employing MANOVAs in future studies could help uncover intricate interplays between the various dimensions of metacognition, offering a more holistic understanding of the phenomenon. Furthermore, cross-cultural studies involving countries beyond Greece and Romania can shed light on the universality or specificity of our findings, thus positioning them within a broader global context.

Conclusion

Understanding the nuances of metacognitive awareness within various cultural and educational contexts has significant implications for teacher training, curriculum development, and educational policies. By recognizing the strengths and potential gaps in metacognitive awareness among teachers, educators can tailor professional development programs to address specific needs. Moreover, fostering a cross-cultural dialogue about metacognition could lead to the sharing of explicit and reflective teaching strategies, effective practices and the enrichment of pedagogical approaches. Stakeholders, including policymakers and teacher training institutions, should actively integrate metacognitive strategies into curricula and professional development initiatives to enhance instructional effectiveness and student learning outcomes. This study ultimately contributes to the growing body of research on metacognition in education by examining its manifestation in the teaching practices of two diverse countries, Greece and Romania.

Statements and declarations

The Greek teachers as participants in the present research are part of the postdoctoral research programme of the State Scholarship Foundation (IKY) funded by the Action 'Strengthening Postdoctoral Research' from the resources of the OP 'Human Resources Development Programme, Education and Lifelong Learning in Priority Axes 6, 8, 9 and co-funded by the European Social Fund – EKT and the Greek Government'.

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributors

Maria Koulianou, Dr. in Cognitive Science at the National and Kapodistrian University of Athens has conducted postdoctoral research in Metacognition and special learning difficulties in the Department of Psychology at Panteion University with a scholarship from the Hellenic National Foundation for State Scholarships. She works in special education and lectures on Cognitive and Educational Psychology, as well as Applications of Cognitive Psychology in Education.

Maria Magdalena is assoc. prof. at the Department of Education Sciences from the National University of Science and Technology POLITEHNICA Bucharest, Pitești University Centre, Romania, where she is the titular of the Personality Psychology and Education Psychology courses. The professional competences acquired in the domain of the Education Psychology, Educational Management, Developmental Psychology, Continuous Formation of teachers in primary/pre-school education system enable her to be a Bachelor's degree paper coordinator; Master's degree paper coordinator, and 1st didactic degree paper coordinator. The scientific fields of interest belong to the domain of Education Psychology, Developmental Psychology, Applied Experimental Psychology and Cognitive Psychology. She published as an author and co-author 6 books and over 30 specialty studies. Current interests of research include social and emotional competences at early ages, learning and learning difficulties, language, memory and attention at early ages.

Cristina Dumitru, Dr., is an Associate Professor in the Department of Educational Sciences at the National University of Science and Technology POLITEHNICA Bucharest, Pitești University Centre, and coordinator of several Erasmus projects on Education and Specific Learning Disorders. With 20 years of teaching and research experience, Cristina Dumitru is active in inclusive education practice. Additionally, she has written several manuscripts on education topics.

Konstantinos Mastrothanasis holds a PhD from the Department of Primary Education at the University of the Aegean and is currently a postdoctoral researcher at the Medical School of the National and Kapodistrian University of Athens. He teaches at the Open University of Cyprus, the University of the Aegean, and ASPETE.

Stavroula Samartzi is a Professor in the Department of Psychology at Panteion University of Social and Political Sciences, Athens, Greece. Her research interests focus on the study of human cognition and cognitive development, especially concerning comprehension, acquisition, mental representation and cognitive strategies employed by problem solvers of mathematical and physical notions, i.e. number and time.

ORCID

Maria Koulianou  <http://orcid.org/0000-0002-2019-7184>
 Cristina Dumitru  <http://orcid.org/0000-0003-2970-4549>
 Konstantinos Mastrothanasis  <http://orcid.org/0000-0002-8703-9607>
 Maria Magdalena Stan  <http://orcid.org/0000-0002-9944-6832>
 Stavroula Samartzi  <http://orcid.org/0000-0003-0838-4224>

References

- Achor, E. E., Yusufu, A. A., & Joseph, E. (2022). Teachers' attitude and metacognitive awareness as determinants of their perceived professional competence in social studies. *Research in Social Sciences*, 5(2), 65–77. <https://doi.org/10.53935/26415305.v5i2.239>
- Anastasiadou, A. (2015). EFL curriculum design: The case of the greek state school reality in the last two decades (1997–2014). *International Journal of Applied Linguistics and English Literature*, 4(2). <https://doi.org/10.7575/aiac.ijalel.v.4n.2p.112>
- Baker, L., & Brown, A. L. (1984). Metacognitive skills and reading. In P. D. Pearson, R. Barr, M. L. Kamil, & P. Mosenthal (Eds.), *Handbook of reading research* (pp. 353–394). Longman.
- Balcikanli, C. (2011). Metacognitive awareness inventory for teachers (MAIT). *Electronic Journal of Research in Educational Psychology*, 9(3), 1309–1332. <https://doi.org/10.25115/ejrep.v9i25.1620>
- Barzilai, S., & Zohar, A. (2014). Reconsidering personal epistemology as Metacognition: A multifaceted approach to the analysis of epistemic thinking. *Educational Psychologist*, 49(1), 13–35. <https://doi.org/10.1080/00461520.2013.863265>
- Branigan, H. E., & Donaldson, D. I. (2020). Teachers matter for metacognition: Facilitating metacognition in the primary school through teacher-pupil interactions. *Thinking Skills and Creativity*, 38, 100718. <https://doi.org/10.1016/j.tsc.2020.100718>
- Brown, A. L. (1978). Knowing when, where, and how to remember: A problem of metacognition. *Advances in Instructional Psychology*, 1, 77–165.
- Brown, A. L. (1987). Metacognition, executive control, self-regulation, and other more mysterious mechanisms. In F. E. Weinert & R. Kluwe (Eds.), *Metacognition, Motivation, and Understanding* (pp. 65–116). L. Erlbaum Associates.
- Ching-En, C. (2018). Metacognitive experience modelling using eye-tracking. *Artificial Intelligence in Education*, 503–507. https://doi.org/10.1007/978-3-319-93846-2_94
- Craig, K., Hale, D., Grainger, C., & Stewart, M. E. (2020). Evaluating metacognitive self-reports: Systematic reviews of the value of self-report in metacognitive research. *Metacognition and Learning*, 15(2), 155–213. <https://doi.org/10.1007/s11409-020-09222-y>
- 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 Boer, H., Donker, A. S., Kostons, D. D. N. M., & van der Werf, G. P. C. (2018). Long-term effects of metacognitive strategy instruction on student academic performance: A meta-analysis. *Educational Research Review*, 24, 98–115. <https://doi.org/10.1016/j.edurev.2018.03.002>
- Donker, A. S., de Boer, H., Kostons, D., Dignath van Ewijk, C. C., & van der Werf, M. P. C. (2014). Effectiveness of learning strategy instruction on academic performance: A meta-analysis. *Educational Research Review*, 11, 1–26. <https://doi.org/10.1016/J.EDUREV.2013.11.002>
- Doo, M. Y., & Zhu, M. (2023). A meta-analysis of effects of self-directed learning in online learning environments. *Journal of Computer Assisted Learning*, 40(1), 1–20. <https://doi.org/10.1111/jcal.12865>
- Driscoll, M. P. (1994). *Psychology of learning for instruction*. Allyn & Bacon.
- Efklides, A. (2006). Metacognitive experiences: The missing link in the self-regulated learning process: A rejoinder to Ainley and Patrick. *Educational Psychology Review*, 18(3), 287–291. <https://doi.org/10.1007/s10648-006-9021-4>

- Efklides, A. (2011). Interactions of metacognition with motivation and affect in self-regulated learning: The MASRL model. *Educational Psychologist*, 46(1), 6–25. <https://doi.org/10.1080/00461520.2011.538645>
- European Commission. (2019). *Education and training monitor 2019 - Romania*. *Education and training Monitor*, 2. Available on https://education.ec.europa.eu/sites/default/files/document-library-docs/et-monitor-report-2019-romania_en.pdf
- Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L. B. Resnick (Ed.), *The nature of intelligence* (pp. 231–235). Lawrence Erlbaum.
- Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. *The American Psychologist*, 34(10), 906–911. <https://doi.org/10.1037/0003-066X.34.10.906>
- Folostina, R., Dumitru, C., Iacob, C. I., & Syriopoulou-Delli, C. K. (2022). Mapping knowledge and training needs in teachers working with students with autism spectrum disorder: A comparative cross-sectional investigation. *Sustainability*, 14(5), 2986. <https://doi.org/10.3390/su14052986>
- Ford, D. J., Luke, S. E., Vaughn, S. M., & Fulchini-Scruggs, A. (2023). Virtual simulations to practice whole group discussions: Preservice teachers' metacognitive awareness. *Journal of Educational Technology Systems*, 52(1), 73–95. <https://doi.org/10.1177/00472395231184566>
- Geladari, A., & Mastrothanasis, K. (2021). Peer learning in online communities of practice: Insights and challenges. In T. Abdullayev & R. Imamguluyev (Eds. 2nd International Baku Scientific Research Conference (Vol. 1. pp. 222–229). Odar Yurdu University.
- Geladari, A., & Mastrothanasis, K. (2010). A Record of Poor Bilingual Readers' Approaches to Narrative Texts and Strategy Use in L2. *The International Journal of Learning: Annual Review*, 17(7), 151–164. <https://doi.org/10.18848/1447-9494/CGP/v17i07/47153>
- Georgiades, P. (2004). From the general to the situated: Three decades of metacognition. *International Journal of Science Education*, 26(3), 365–383. <https://doi.org/10.1080/0950069032000119401>
- Hashweh, M. Z. (1996). Effects of science teachers' epistemological beliefs in teaching. *Journal of Research in Science Teaching*, 33(1), 47–63. [https://doi.org/10.1002/\(SICI\)1098-2736\(199601\)33:1<47:AID-TEA3>3.0.CO;2-P](https://doi.org/10.1002/(SICI)1098-2736(199601)33:1<47:AID-TEA3>3.0.CO;2-P)
- Hossu, R., & Roman, A. F. (2019). Primary Teachers' metacognitive awareness of reading strategies. In E. Soare & C. Langa (Eds.), *Education facing contemporary world issues* (pp. 1862–1869). Future Academy. <https://doi.org/10.15405/epsbs.2019.08.03.229>
- Iwai, Y. (2016). The effect of explicit instruction on strategic reading in a literacy methods course. *International Journal of Teaching and Learning in Higher Education*, 28(1), 110–118.
- Jacobs, J. E., & Paris, S. G. (1987). Children's metacognition about reading: Issues in definition, measurement, and instruction. *Educational Psychologist*, 22(3–4), 225–278. <https://doi.org/10.1080/00461520.1987.9653052>
- Joseph, N. (2009). Metacognition needed: Teaching middle and high school students to develop strategic learning skills. *Preventing School Failure: Alternative Education for Children & Youth*, 54(2), 99–103. <https://doi.org/10.1080/10459880903217770>
- Kaldi, S., Filippatou, D., & Anthopoulou, B. (2014). The effectiveness of structured co-operative teaching and learning in Greek primary school classrooms. *Education*, 42(6), 621–636. <https://doi.org/10.1080/03004279.2012.752023>
- Karlen, Y., Hirt, C. N., Jud, J., Rosenthal, A., & Eberli, T. D. (2023). Teachers as learners and agents of self-regulated learning: The importance of different teachers' competence aspects for promoting metacognition. *Teaching & Teacher Education*, 125, 104055. <https://doi.org/10.1016/j.tate.2023.104055>
- Kluwe, R. H. (1987). Executive decisions and regulation of problem-solving behavior. In F. E. Weinert & R. H. Kluwe (Eds.), *Metacognition, motivation, and understanding* (pp. 31–64). Lawrence Erlbaum Associates, Inc.
- Koulaniou, M., & Samartzi, S. (2018). Greek teachers' metacognitive awareness on reading strategies. *New Trends and Issues Proceedings on Humanities and Social Sciences* (Vol. 5. pp. 68–74. Available from: www.prosoc.eu
- Kuhn, D., & Dean, D. (2004). Metacognition: A bridge between cognitive psychology and educational practice. *Theory into Practice*, 43(4), 268–273. <https://doi.org/10.1353/tip.2004.0047>
- Kunter, M., Klusmann, U., Baumert, J., Richter, D., Voss, T., & Hachfeld, A. (2013). Professional competence of teachers: Effects on instructional quality and student development. *Journal of Educational Psychology*, 105(3), 805–820. <https://doi.org/10.1037/a0032583>
- Mara, D. (2022). Metacognitive strategies - opportunity in curriculum development. *Edu Learn 22 Proceedings* (Vol. 1, pp. 9613–9616). <https://doi.org/10.21125/edulearn.2022.2316>
- Mavrogianni, A., Vasilaki, E., Linardakis, M., Vasiou, A., & Mastrothanasis, K. (2025). Interactive Multimedia Environment Intervention with Learning Anxiety and Metacognition as Achievement Predictors. *Psychology International*, 7(1). <https://doi.org/10.3390/psycholint701000>
- Mastrothanasis, K., & Kladaki, M. (2023). The impact of reading teaching through drama-based pedagogy on the self-efficacy of teachers. *Education Science*, 2023(2), 123–145. <https://doi.org/10.26248/edusci.v2023i2.1697>
- Mastrothanasis, K., Koulaniou, M., Katsifi, S., & Zouganeli, A. (2018). The use of Metacognitive knowledge and regulation strategies' of students with and without special learning difficulties. *International Journal of Special Education*, 33(1), 191–207.
- Mavrogianni, A., Vassilaki, E., Spantidakis, G., Sarris, A., Papadaki-Michailidi, E., & Yachnakis, E. (2020). An alternative factorization of the metacognitive awareness of reading strategies inventory associated with the Greek national curriculum and its psychometric properties. *Creative Education*, 11(8), 1299–1323. <https://doi.org/10.4236/ce.2020.118096>

- McCrindle, A. R., & Christensen, C. A. (1995). The impact of learning journals on metacognitive and cognitive processes and learning performance. *Learning & Instruction*, 5(2), 167–185. [https://doi.org/10.1016/0959-4752\(95\)00010-Z](https://doi.org/10.1016/0959-4752(95)00010-Z)
- Metallidou, P. (2009). Pre-service and in-service teachers' metacognitive knowledge about problem-solving strategies. *Teaching & Teacher Education*, 25(1), 76–82. <https://doi.org/10.1016/j.tate.2008.07.002>
- Michou, A., Mouratidis, A., Vassiou, A., Stavropoulos, V., Tzika, V., & Kokolakis, D. (2023). Taking their perspective: Students' reasons and aims of achievement striving in their own words. *Social Psychology of Education*, 26(5), 1391–1416. <https://doi.org/10.1007/s11218-023-09797-9>
- OECD. (2020). Improving the teaching profession in Romania. In *OECD education policy perspectives*, No. 1. OECD Publishing. <https://doi.org/10.1787/3b23e2c9-en>
- Ohtani, K., & Hisasaka, T. (2018). Beyond intelligence: A meta-analytic review of the relationship among metacognition, intelligence, and academic performance. *Metacognition and Learning*, 13(2), 179–212. <https://doi.org/10.1007/s11409-018-9183-8>
- Paris, S. G., & Paris, A. H. (2001). Classroom applications of research on self-regulated learning. *Educational Psychologist*, 36(2), 89–101. https://doi.org/10.1207/S15326985EP3602_4
- Paris, S. G., & Winograd, P. (1990). How metacognition can promote academic learning and instruction. In B. F. Jones & L. Idol (Eds.), *Dimensions of thinking and cognitive instruction* (pp. 15–51). Lawrence Erlbaum Associates, Inc.
- Paris, S. G., & Winograd, P. (2003). *The role of self-regulated learning in contextual teaching: Principles for teacher preparation*. A Commissioned Paper for the U.S. Department of Education project, "Preparing Teachers to Use Contextual Teaching and Learning Strategies to Improve Student Success in and beyond School, Washington, DC.
- Pintrich, P. R. (2002). The role of metacognitive knowledge in learning, teaching, and assessing. *Theory into Practice*, 41(4), 219–225. https://doi.org/10.1207/s15430421tip4104_3
- Pressley, M., Borkowski, J. G., & Schneider, W. (1987). Cognitive strategies: Good strategy users coordinate metacognition and knowledge. *Annals of Child Development*, 4, 89–129.
- Prytula, M. P. (2012). Teacher metacognition within the professional learning community. *International Education Studies*, 5(4), 112–121. <https://doi.org/10.5539/ies.v5n4p112>
- Sahoo, S., Prasad Behera, M., & Sahu, S. (2021). Metacognitive awareness on teaching and teaching competence of secondary prospective teachers. *Shanlax International Journal of Arts, Science & Humanities*, 8(3), 77–85. <https://doi.org/10.34293/sijash.v8i3.3466>
- Samaras, A. P., & Fox, R. K. (2013). Capturing the process of critical reflective teaching practices through e-portfolios. *Professional Development in Education*, 39(1), 23–41. <https://doi.org/10.1080/19415257.2012.682318>
- Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology*, 19(4), 460–475. <https://doi.org/10.1006/ceps.1994.1033>
- Schraw, G., & Moshman, D. (1995). Metacognitive theories. *Educational Psychology Review*, 7(4), 351–371. <https://doi.org/10.1007/BF02212307>
- Siddiqui, G. K., Lodhi, H., & Ghazanfar, K. (2020). Can we boost the meta-cognitive awareness of prospective teachers through reflective journals? *Global Social Sciences Review*, V(II), 190–201. [https://doi.org/10.31703/gssr.2020\(v-ii\).18](https://doi.org/10.31703/gssr.2020(v-ii).18)
- Stephanou, G., & Mpiontini, M.-H. (2017). Metacognitive knowledge and metacognitive regulation in self-regulatory learning style, and in its effects on performance expectation and subsequent performance across diverse school subjects. *Psychology*, 08(12), 1941–1975. <https://doi.org/10.4236/psych.2017.81215>
- Surif, J., Ibrahim, N. H., & Mokhtar, M. (2012). Conceptual and procedural knowledge in problem solving. *Procedia - Social & Behavioral Sciences*, 56, 416–425. <https://doi.org/10.1016/J.SBSPRO.2012.09.671>
- van Sickle, M., & Kubinec, W. (2003). Transformation teaching: A physics professor's thoughts. *Journal of College Science Teaching*, 32(4), 258–263.
- Veenman, M. V. J., van Hout-Wolters, B. H. A. M., & Afflerbach, P. (2006). Metacognition and learning: Conceptual and methodological considerations. *Metacognition and Learning*, 1(1), 3–14. <https://doi.org/10.1007/s11409-006-6893-0>
- Vosniadou, S. (2020). Bridging secondary and higher education. The importance of self-regulated learning. *European Review*, 28(S1), S94–S103.
- Vosniadou, S., Darmawan, I., Lawson, M.J., Deur, P. V., Jeffries, D. & Wyra, M. (2021). Beliefs about the self-regulation of learning predict cognitive and metacognitive strategies and academic performance in pre-service teachers. *Metacognition Learning* 16, 523–554 <https://doi.org/10.1007/s11409-020-09258-0>
- Vasiou, A., Vasilaki, E., Mastrothanasis, K., & Galanaki, E. (2024). Emotional Intelligence and University Students' Happiness: The Mediating Role of Basic Psychological Needs' Satisfaction. *Psychology International*, 6(4), 855–867. <https://doi.org/10.3390/psycholint6040055>
- Vygotsky, L. S. (1980). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- Wacker, S., & Roebbers, C. M. (2023). Motivating children to (pre)monitor: Positive effects on monitoring accuracy? *Metacognition and Learning*, 19(1), 1–19. <https://doi.org/10.1007/s11409-023-09351-0>
- Whitebread, D., Coltman, P., Pasternak, D. P., Sangster, C., Grau, V., Bingham, S., Almqed, Q., & Demetriou, D. (2009). The development of two observational tools for assessing metacognition and self-regulated learning in young children. *Metacognition and Learning*, 4(1), 63–85. <https://doi.org/10.1007/s11409-008-9033-1>
- Wilson, N. S., & Bai, H. (2010). The relationships and impact of teachers' metacognitive knowledge and pedagogical understandings of metacognition. *Metacognition and Learning*, 5(3), 269–288. <https://doi.org/10.1007/s11409-010-9062-4>

- Xafakos, E., Kaldi, S., Vassiou, A., Stavropoulos, V., Papadimas, L., Maratos, A., Stavrianoudaki, A., Tzika, V., & Mastrothanas, K. (2020). The effect of teachers' collaborative networks on innovative school climate and their individual innovativeness. *European Journal of Education Studies*, 7(11), 203–221. <https://doi.org/10.46827/EJES.V7I11.3347>
- Zimmerman, B., Erlbaum, L., Taylor, A., & Group, F. (2002). Becoming learner: Self-regulated overview. *Theory into Practice*, 41(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2
- Zohar, A., & Barzilai, S. (2013). A review of research on metacognition in science education: Current and future directions. *Studies in Science Education*, 49(2), 121–169. <https://doi.org/10.1080/03057267.2013.847261>
- 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>