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The Mediating Role of Metacognitive Awareness in the Relationship Between Teaching Practice and Early Teacher Identity

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Abstract

Teacher professional identity plays a crucial role in supporting the realization of quality learning. Furthermore, the early teacher identity formed during pre-service teacher education and early career tends to persist throughout a teacher's career. However, the identification of factors shaping teacher identity and the direction of their correlations has not been extensively conducted in Indonesia, particularly concerning pre-service teacher education. Among the factors theoretically influential are metacognitive awareness and teaching practice experience. This study aims to determine the role of the mediating variable, metacognitive awareness, in influencing the relationship between students' experiences from teaching practice activities in schools and the formation of their early identity as teachers. This research is quantitative and employs a relational screening model. The instruments used are questionnaires for related variables adapted from relevant research, then translated and validated by various experts. Subsequently, correlation analysis will be conducted on the data from the three variables to determine the significance and direction of the correlation, with metacognitive awareness as the mediating variable. The results show an indirect effect of 0.344, which is greater than the direct effect of 0.131, meaning that metacognitive awareness has a significant mediating role in the relationship between teaching practice experience and early teacher identity. The implication of this research is the need for teaching practice activity designs that can facilitate pre-service teachers in developing their metacognitive awareness to achieve quality learning processes.

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INTRODUCTION

A teacher's professional identity is a multifaceted framework that molds their core values, beliefs, skill sets, and classroom teaching style (Bülbül & Özelçi, 2025). Cardelle-Elawar et al. (2007) state that studying teacher "identity" means understanding the factors that influence teachers' goals, self-efficacy, motivation, commitment, job satisfaction, and effectiveness in learning. Additionally, the formation of teacher identity is also associated with possible selves, which are the images a person holds about themselves in the future, whether hoped for, expected, or feared (Erdem, 2020; Lutovac, 2020; Markus & Nurius, 1986). Although teacher professional identity is unstable and undergoes changes across various phases of the teaching profession (Berbegal Vázquez et al., 2024), Beijaard (2019) emphasizes that pre-service teachers' practical teaching experiences are key elements in

shaping teacher identity: whether they will become active and motivated teachers or merely become part of the existing system.

Kavrayıcı (2020) states that exploring teacher identity is crucial in the teacher education process. The real experiences gained by students through teaching practice are among the factors contributing to the formation of pre-service teachers' early identity (Bülbül & Özelçi, 2025). These experiences will have a strong impact on teacher identity formation, either strengthening or weakening it (van Lankveld et al., 2017). Izadinia (2016) adds that the relationship with mentors during teaching practice will have a positive or negative effect on pre-service teachers' self-confidence when starting their professional careers. In the context of higher education in Indonesia, pre-service teachers must undertake teaching practice for one semester in elementary or secondary schools.

Students participating in teaching practice activities are confronted with a new perspective within the context of their school experiences. Whereas at previous educational levels they acted as students, they now assume the role of (pre-service) teachers. In this condition, one's skill to self-regulate plays an important role when he faces a complex, unfamiliar, and non-routine situation or problem (Nichols et al., 2017; Yuan et al., 2019). Self-regulation itself consists of three components to consider: cognition, metacognition, and motivation (Mevarech & Kramarski, 2014).

Metacognition is the learner's ability to consciously complete a task, monitor it, identify its shortcomings, and then improve it by developing new cognitive abilities (EEF, 2025; Mevarech et al., 2017). Meanwhile, a person's knowledge of their metacognitive ability is called metacognitive awareness (Flavell, 1979). This awareness will greatly assist pre-service teachers in planning, implementing, evaluating, and improving learning during their teaching practice program.

Technically, teaching practice is a long process of problem-solving. Pre-service teachers routinely face various problems in learning, sometimes even the same problems occurring repeatedly. Through these experiences, pre-service teachers will be able to critique emerging problems and conduct various trials and errors to overcome them, thereby gaining meaningful new understanding from these experiments (Schon, 1983). This goal can only be achieved through deep reflective practice, whether conducted independently or collaboratively (Boud et al., 2013; Kamali & Javahery, 2025; Mulryan-Kyne, 2021).

Analytical reflection activities are closely related to metacognitive awareness. Schraw & Moshman (1995) define one component of metacognition, namely, conditional knowledge, as "knowing why and when to do things." Answers to the questions of why and when are obtained, among other sources, from the understanding that emerges from reflecting on a learner's concrete experiences. Through reflection, learners connect the final outcome achieved with the initial goal and how each action contributed to that outcome. Thus, they can conclude when and based on what considerations (why) a particular method or approach should be used to achieve optimal results. The relationship between reflection and metacognitive awareness is also emphasized in the metacognitive awareness questionnaire, which includes teaching reflection within the aspects of monitoring and evaluation (Balcikanli et al., 2011; Kallio et al., 2017).

Walkington et al. (2001) state that critical reflection supported by adequate metacognitive abilities will shape the capacity to understand how learning occurs from a holistic perspective. This reflective practice will always remain relevant to teachers' professional development, regardless of any prevailing policies. This is because reflection encourages individuals to continuously develop their understanding of the 'best way' to teach (Meierdirk, 2016). This will certainly support the enhancement of professionalism and the strengthening of teacher identity (Graham et al., 2003; Hendriwanto, 2021). Thus, the role of metacognitive awareness, gained through reflection in teaching practice, will influence the formation of novice teacher identity.

However, despite efforts to provide adequate education for pre-service teachers, most teacher education graduates feel incompetent in teaching, partly because they believe teacher education has not sufficiently trained teaching skills (Sarıçoban, 2014) or due to a lack of real experience, making them feel afraid and nervous in the classroom (Yorulmaz et al., 2021). On the other hand, Hidayanto et al. (2022) also found that some pre-service teachers do not have adequate skills in designing mathematical literacy questions. This aligns with research by Linda (2017) that the professional competence of mathematics pre-service teachers is still in the low category. Additionally, due to the low welfare of honorary teachers, some education graduates hope to pursue other professions. However, due to limited options, they eventually, under conditions of 'compulsion' and without pure motivation, still choose the teaching profession (Alifia et al., 2022). This problem will become a time bomb for education, as educators with 'unstable' identities can lead to low-quality educational processes.

Sari (2022) states that although teacher identity has the potential to describe teacher professional development, research on this topic is still rarely conducted in Indonesia. Furthermore, Rushton et al. (2023), through a systematic literature review, found that research on teacher identity is still very scarce from Global South countries, including Indonesia. Moreover, exploring it will help pre-service teachers acquire effective competencies in their profession and in designing teacher education curricula (Kavrayıcı, 2020). Teaching practice for pre-service teachers in Indonesia consists of two forms, namely micro-teaching conducted on campus and internship activities in schools. This study focuses on the internship model, as its extended duration and direct engagement with fellow teachers and students offer a richer environment for identity development than micro-teaching settings. Although such curriculum design is not unique to Indonesia, this study examines the role of metacognitive awareness as a mediating variable that has never been associated with the formation of early teacher identity. These results will hopefully contribute to policies for pre-service teacher education programs by recommending the systematic integration of metacognitive development and structured reflective practice into teaching practicum programs.

This study offers several novelties compared to previous research. First, this study focuses on the mediating role of metacognitive awareness, whereas previous studies directly linked metacognitive awareness to teacher identity (Cengelci & Egmir, 2022; Hughes, 2017). Second, this study was conducted in the context of teaching practice in the form of an internship carried out over one semester. This adds to the contribution of other studies that have been conducted in different contexts, namely, the micro-teaching context (Mbato & Triprihatmini, 2022). Third, although the mediating role of metacognitive awareness has been studied previously, its connection to early teacher identity complements previous research that focused on self-efficacy (Makunye & Jagals, 2025; Salari & Farahian, 2023).

Based on the explanation above, identifying the formation of early teacher identity in Indonesia is needed. Measuring the correlation between metacognitive awareness, teaching practice experience, and early teacher identity is a step towards contributing to the formulation of pre-service teacher education curricula in Indonesia. The aim of this study is to determine the role of the mediating variable, metacognitive awareness, in influencing the relationship between students' experiences from teaching practice activities in schools and the formation of their early identity as teachers.

METHODS

This research is quantitative and uses a relational screening model. This model aims to determine the presence or absence of a relationship between two or more variables or the extent of that relationship (Cohen et al., 2018). This model aims to explore the relational and interactional relationships between variables in depth using a non-experimental

approach (Özdemir et al., 2021; Üredi, 2017). This research approach can provide a better understanding of the direct and indirect effects between variables (Bülbül & Özelçi, 2025). The subjects in this study were 71 students from a public university in Banjarmasin who had completed a teaching practice internship program for approximately 5 months in 2025. The procedures carried out consist of:

Research Instrument Adaptation

The instruments used in this study were adapted from instruments that have been developed and validated in relevant research. The adapted instruments are:

1) The Metacognitive Awareness Inventory for Teachers (MAIT) questionnaire was developed by Balcikanli et al. (2011) and later refined by Kallio et al. (2017) to be usable across various learning cultures. This questionnaire consists of the following aspects: declarative knowledge, procedural knowledge, conditional knowledge, planning, and monitoring.
2) The questionnaire on pre-service teachers' teaching practice experiences and perceptions was developed by Karsli & Yağiz (2022) consists of the following aspects: pedagogical knowledge, learning and professional development, socio-emotional aspects, and professional and institutional socialization.
3) The Early Teacher Identity questionnaire from Koca (2016), consisting of aspects of self-categorization, confidence in becoming a teacher, and participation as a teacher, is used to identify the pre-service teacher identity already possessed by students.

The translated instruments were validated by an English language expert, an Indonesian language expert, a learning psychology expert, and a mathematics education expert.

Data Collection

Student response data were collected using a 5-point Likert scale questionnaire regarding teaching practice experiences and perceptions; metacognitive awareness; and teacher identity. The questionnaires used were digital questionnaires as an application of technology to facilitate the data collection and analysis process.

Data Analysis

The converted data obtained from the questionnaires were then analyzed quantitatively using correlation tests and path analysis. According to Ghozali (2017), path analysis is a method for analyzing causal relationships between predetermined variables based on theory and is used to measure the magnitude of the direct and indirect effects of those variables. This analysis was conducted to determine the direct and indirect correlations of the variables metacognitive awareness and teaching practice experience with students' identity as early teachers. Due to the modest sample size, we employed bootstrapping procedures to obtain bias-corrected and accelerated (BCa) confidence intervals. Data analysis was performed using SPSS software to test the hypothesis "The existence of an indirect influence of metacognitive awareness (M) in the relationship between teaching practice experience (X) and early teacher identity (Y)." To interpret the correlation coefficient, classification in Table 1 will be used as a reference.

Table 1 Correlation coefficient interpretation

Interval	Correlation interpretation
0.00 – 1.99	Very weak
2.00 – 3.99	Weak
4.00 – 5.99	Moderate
6.00 – 7.99	Strong
8.00 – 1.00	Very strong

Source: Sugiyono (2017)

RESULTS AND DISCUSSION

The following presents the research results based on data obtained from questionnaires completed by 71 research subjects. The data had been converted from ordinal to interval data using the method of successive intervals (MSI). The relationships between each variable are presented in Table 2.

Table 2 Correlation test result

	Pearson Correlation (r)	Sig.	95% CI	
			Lower	Upper
TPE and MA	0.666	0.00	0.525	0.766
MA and ETI	0.604	0.00	0.414	0.736
TPE and ETI	0.475	0.00	0.304	0.621

Table 2 presents data based on correlation analysis, namely the relationship between Teaching Practice Experience (TPE), Metacognitive Awareness (MA), and Early Teacher Identity (ETI). All correlation coefficients found, namely 0.666, 0.475, and 0.604, fall into the moderate category with a positive direction. Furthermore, the influence of TPE on MA is presented in Table 3.

Table 3 Analysis of the influence of TPE on MA

	Standardized Coefficients Beta	t	Sig.	R^2	BCa* 95% CI	
					Lower	Upper
TPE → MA	0.666	7.419	0.000	0.444	0.800	1.394

*Bias-Corrected and accelerated

Table 3 shows that TPE has a significant influence on MA (t=7.419; p=0.000). The influence of TPE on MA is 44.4%, while the remaining 55.6% is influenced by other factors. The analysis of the influence of both TPE and MA on ETI is presented in Table 4.

Table 4 Analysis of the influence of TPE and MA on ETI

	Standardized Coefficients Beta	t	Sig.	BCa 95% CI		R^2	ANOVA
				Lower	Upper		
MA → ETI	0.516	4.015	0.000	0.376	1.053	0.374	F=20.337; p=0.000
TPE → ETI	0.131	1.022	0.311	-1.16	0.635		

Table 3 shows that MA has a significant influence on ETI (t=4.015; p=0.000) and TPE does not have a significant influence on ETI (t=1.022; p=0.311). However, together, TPE and MA have a significant influence on ETI (F=20.337; p=0.000). The combined influence of TPE and MA on ETI is 37.4%, while the remaining 62.6% is influenced by other factors. Based on the data in Table 3 and Table 4, a path analysis diagram of the influence relationship between TPE, MA, and ETI was obtained, as presented in Figure 1.

The diagram in Figure 1 illustrates the direct influence of TPE on ETI and the indirect influence via mediator MA. The variables e_1 and e_2 denote the error terms or residual variances for the endogenous variables (MA & ETI), accounting for the variance not explained by the predictors in the model. The direct influence of TPE on ETI has a value of β_2=0.131. Meanwhile, the indirect influence mediated by MA yields a value of 0.344 (β_1 x β_3 = 0.666 x 0.516 = 0.344). Thus, these results indicate that indirectly, TPE through MA has a significant influence on ETI. In other words, metacognitive awareness mediates teaching practice experience and initial teacher identity formation.

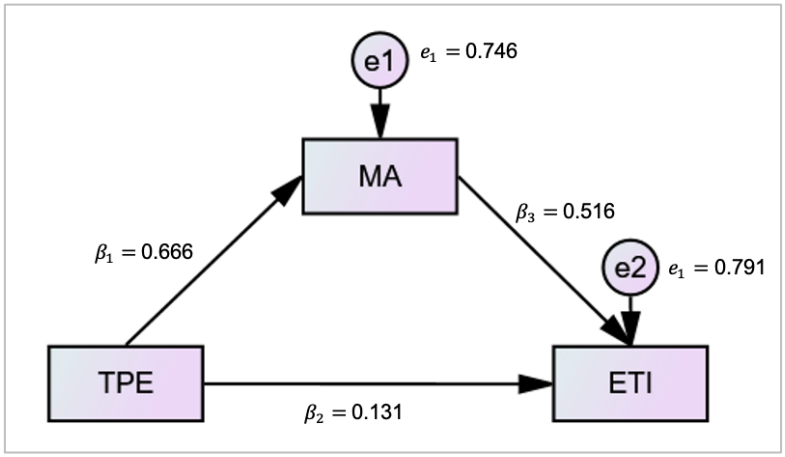

Figure 1 Path analysis diagram between TPE, MA, and ETI

The research results presented indicate that metacognitive awareness (MA) is an influential mediating variable in the formation of early teacher identity (ETI). This is shown by the indirect correlation coefficient (0.344) being greater than the direct correlation coefficient (0.131). The direct correlation represents the relationship between TPE and ETI. Meanwhile, the indirect correlation indicates that TPE influences students' MA, and then this awareness influences the formation of ETI. Although correlation generally does not imply the direction of variable relationships, in path analysis, this relationship has a cause-and-effect direction.

The findings of this study align with the findings of Cengelci & Egmir (2022) that in the educational process, pre-service teachers' metacognitive awareness contributes to the formation of positive professional identity. Although research directly linking metacognitive awareness and teacher identity is still rare, several studies examine the relationship between metacognitive awareness and teacher professional competence. Potgieter & Van Der Walt (2022) found that metacognitive awareness, consisting of metacognitive knowledge, self-regulation, and reflection, supports professional development through social interaction in activities using the teacher's zone of proximal development approach. Findings from various other studies have also shown that metacognitive awareness significantly influences educator professional development (Aldea, 2025; Fono & Zohar, 2024; Hughes, 2017).

Kallio et al. (2017) state that through metacognitive awareness, an educator will routinely reflect on their performance and support for student development. Metacognition is not only about focusing on the material being studied, but also about recognizing the strengths and weaknesses of one's cognition in determining learning strategies (Bars & Oral, 2017). Simply put, the core of this ability is a person's knowledge of 'what' and 'how' to learn something so that the learning process is optimal. Ashfaq et al. (2022) add that this awareness supports self-regulation in learners to utilize their knowledge in the future.

It is important to understand that metacognitive awareness will be higher in educators if they have the opportunity to apply various learning approach variations (Haddad et al., 2022). This opportunity is important for educators because it provides room for development in their pedagogical skills. Indeed, good metacognitive awareness in educators will also support improved student learning outcomes (Palantis et al., 2018). Therefore, it is important for educational institutions to give educators flexibility in teaching and opportunities for continuous self-development in order to improve the quality of education (Rahmawati et al., 2019; Tyagi & Misra, 2021). This is increasingly important considering that metacognitive awareness is still not widely understood or mastered by educators (Rajcoomar et al., 2024; Wass et al., 2023).

Nevertheless, the results show that the correlation coefficient between teaching practice and teacher identity is only 0.475. According to the correlation coefficient classification by Sugiyono (2017), this value falls into the moderate category. This can occur due to various factors considering the complexity of teaching internship program implementation, such as policy or program design factors (Bibi & Aziz, 2024), initial pedagogical competence (Zakaria et al., 2024), personal challenges of pre-service teachers (Haron et al., 2025), relationships with mentors (Izadinia, 2016; Mudra, 2018), and available facilities (Mudra, 2018). To identify problems experienced by students, continuous supervision processes from both the school and the university are needed.

Galana et al., (2023) mention that to optimize teaching practice, mentors and supervisors must provide feedback and follow-up recommendations to pre-service teachers. This activity can be carried out through a collaborative reflection process between the practitioner (student) and their mentors (teacher and lecturer). Reflective practice focuses on the process of reconstructing or reorganizing experiences to add meaning to those experiences and improve a person's ability to plan improvements for subsequent activities (Dewey, 1933; Olteanu, 2017). If done continuously and a habit of reflection is formed, the quality of the learning process will also improve. Furthermore, reflective practice will also positively influence pre-service teachers' metacognitive awareness (Mbato & Triprihatmini, 2022; Potgieter & Van Der Walt, 2022).

However, Okunola et al. (2025) found that there is no significant correlation between the level of metacognitive awareness and teaching competence. Furthermore, they explain that this possibly occurs because reflective practice is still less than optimal, so these students have not been able to make improvements in subsequent teaching opportunities. On the other hand, Ashfaq et al., (2022) found that metacognitive awareness correlates very strongly with pre-service teachers' academic achievement. These two research results indicate that there is a gap between academic ability and teaching competence. To bridge academic ability with teaching competence, students need to develop pedagogical content knowledge (PCK), especially in teaching practice activities (Berry et al., 2016; Njiku, 2025). PCK requires pre-service teachers to understand students' perspectives in approaching a subject so that learning strategies can be arranged effectively and efficiently. Nilsson & Cederqvist (2025) found a reflective practice to improve pre-service teachers' PCK. They also emphasized that merely providing reflection tools to students will not improve their competence, but it is necessary to integrate these reflection tools into the formal and binding framework of pre-service teacher education.

Additionally, Bars & Oral (2017) found that metacognitive awareness is a significant predictor of pre-service teachers' self-efficacy. A person with high self-efficacy will have confidence in pursuing their field of work and resilience when facing various difficulties. This resilience aligns with one of the functions of reflection, namely, to plan improvements based on previous experiences (Olteanu, 2017). Thus, this reinforces the importance of implementing reflection in teaching practice as an effort to strengthen pre-service teacher identity.

The implication of this research is the need to design teaching practice programs that can facilitate pre-service teachers in developing their metacognitive awareness. Through the implementation of programs that support pre-service teachers' readiness to develop their metacognitive awareness, the quality of teacher education will also improve (Kallio et al., 2017). This awareness enables pre-service teachers to independently plan, monitor, and evaluate during teaching practice (Cengelci & Egmir, 2022). Mevarech & Kramarski (2014) mention that metacognition is one component of self-regulated learning (SRL) related to a learner's autonomy in developing their abilities. Kaasila et al. (2021) found that to optimize teaching practice in developing a more holistic and relational identity, activities such as development projects and reflectivity are highly necessary. Nevgi & Löfström

(2015) add that teacher identity can be developed through the dynamic relationship between reflection and deepening pedagogical theory in teaching practice programs.

CONCLUSION

This study concluded that the indirect effect of teaching practice experience (TPE) on early teaching identity (ETI) through metacognitive awareness (MA) is greater than the direct effect of TPE on ETI. This finding indicates that high metacognitive awareness among students will also strengthen their professional identity as early teachers and make their teaching practice experience more effective and efficient. Therefore, this study provides empirical support for the mediating role of metacognitive awareness in the relationship between teaching practice experience and teacher identity formation.

The findings of this research imply that teacher education institutions should not only view teaching practice merely as a venue for applying pedagogical knowledge but also as a strategic space for developing pre-service teachers' metacognitive abilities. Teaching practice programs should be designed with structured components that support metacognitive growth, such as mandatory collaborative reflection sessions between pre-service teachers and their mentors. Teacher education curricula should incorporate explicit instruction on metacognitive strategies (e.g., self-planning, monitoring, and evaluation) prior to teaching practice placement. When pre-service teachers are equipped with strong metacognitive awareness, they are better able to plan, monitor, and evaluate their own teaching practices independently, which in turn strengthens their professional identity. Furthermore, the development of metacognitive awareness contributes to the broader goal of improving the quality of teacher education, as it fosters self-regulated learning skills that are essential for lifelong professional growth.

This study demonstrates the application of path analysis to quantify the indirect effect of metacognitive awareness, offering a replicable analytical approach for future research on other mediating variables in exploring early teachers' identities. However, the subjects were limited to mathematics education students. Further research involving a broader demographic scope would provide a more general overview of the relationships among the variables studied.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS STATEMENT

RN served as the primary contributor and supervisor of the research. She was responsible for conceptualizing the research design, developing the conceptual framework, and curating the data. She also conducted the initial drafting of the manuscript, including writing the original draft, as well as handling editing, visualization, and overall supervision throughout the research process. Her role ensured the coherence and integrity of the study from inception to completion. TH contributed to refining the research methodology and performed formal analysis of the data. He was also involved in the review process, providing critical feedback and editing the manuscript to enhance its clarity and rigor. His contributions ensured the validity of the analytical approach and the robustness of the findings.

AI DISCLOSURE STATEMENT

The authors used Consensus AI during the preparation of this manuscript to assist in identifying relevant scholarly literature and summarizing research evidence. After using the tool/service, the authors thoroughly reviewed and edited the content as needed and take full responsibility for the content of the publication.

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