



AN EXPERIENTIAL LEARNING MODEL TO ENHANCE THE METACOGNITIVE ABILITIES OF PRE-SERVICE TEACHERS

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Abstract. Social education programs often face challenges in effectively developing metacognitive skills in pre-service teachers, which are crucial for enhancing problem-solving and decision-making abilities in the classroom. Metacognition allows teachers to monitor and regulate their thinking, yet many teacher education programs lack structured frameworks to support this development. This study aims to address this gap by developing an Experiential Learning (EL) model designed to enhance the metacognitive skills of pre-service social education teachers. Based on Meijer et al.'s (2013) framework, the model integrates three core components: metacognitive knowledge, metacognitive regulation, and metacognitive responsiveness. A qualitative research design was employed, using expert validation through the Item-Objective Congruence (IOC) method and a Likert-scale suitability assessment. Five education experts evaluated the model's alignment with metacognitive competencies, yielding a high suitability score of 4.56 out of 5. The model follows a learning cycle that incorporates concrete experience, reflective observation, abstract conceptualization, and active experimentation. The results indicate that integrating metacognitive strategies into learning activities, with clearly defined instructor roles, significantly enhances pre-service teachers' metacognitive abilities. This research emphasizes the importance of incorporating reflective, contextual learning designs to foster higher-order thinking skills within teacher education, particularly in the underdeveloped field of social education.

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INTRODUCTION

In the context of modern education, developments in educational psychology have increasingly emphasized the importance of higher-order thinking skills. Among various forms of thinking abilities, metacognition holds a central position, having gained substantial attention in educational settings due to its authenticity in addressing students' learning processes, actual performance, and potential (Cihanoglu, 2012). According to Flavell (1979), who first introduced the term, metacognition comprises two main components: metacognitive knowledge (knowledge about cognitive processes) and metacognitive regulation (the regulation of cognitive processes through planning, monitoring, and evaluation). With strong metacognitive skills, learners are better able to determine effective learning strategies, evaluate their learning outcomes, and adjust their learning approaches based on the context and tasks at hand.

Metacognition is also linked to academic success. Research has shown that students with strong metacognitive abilities tend to be more successful in solving complex problems, managing their study time, and making informed decisions during the learning process (Akbarilakeh & Shariri Fard, 2021; Sawhney & Bansal, 2015). Moreover, these skills are crucial in both independent and collaborative learning, as they enable students to consciously assess what they know, what they do not know, and how to improve (Serda et al., 2013; Özçakmak et al., 2021).

However, the development of metacognitive skills does not occur naturally. It requires a deliberately designed learning environment that stimulates reflection, self-analysis, and regulation of the learning process. Research suggests that metacognitive abilities develop more effectively in learning settings that support gradual and explicit self-regulation (Kayasima &

Inaba, 2003), as well as through instructional designs that integrate metacognitive strategies (Sánchez-Alonso & Vovides, 2007). Traditional education systems, which often emphasize rote memorization and the delivery of information, frequently fail to optimally cultivate these skills (Kozulin, 2021). As a result, many students struggle to manage their own learning processes and rely heavily on external instruction, lacking the capacity for critical reflection on how they learn (McCormick et al., 2012).

Developing metacognitive skills—including planning, self-monitoring, evaluation, and reflection—is therefore essential in teacher education programs at the university level. These skills enable pre-service teachers to design learning experiences independently and effectively, directly influencing both their teaching behaviors and student learning outcomes. Research has shown that the systematic application of metacognitive strategies can enhance reflective awareness and professional growth among pre-service teachers, enabling them to better identify strengths and weaknesses in their teaching practices (Muñoz & Ramírez, 2017). Pre-service teachers with higher metacognitive awareness also tend to achieve better academically and demonstrate greater confidence in the teaching-learning process, making them adaptive lifelong learners (Özçakmak et al., 2021). Conversely, a lack of metacognitive training can lead to misconceptions and long-term learning barriers, especially among inexperienced pre-service teachers who have not yet mastered effective learning strategies (Kozulin, 2021). Therefore, these skills must be systematically nurtured in teacher education programs—especially in the field of social education—since teachers who can effectively apply and express metacognitive skills are more likely to inspire students to develop their own learning awareness (Azizah & Nasrudin, 2018; Komarudin & Alam, 2024).

Nevertheless, most studies on metacognition in social education teachers have predominantly focused on individual learning regulation strategies (Aydin, 2011), the formation of more complex cognition (Hajar et al., 2023), individual academic achievement (Zulfiqar et al., 2022), or differences in metacognitive skills (Baris, 2015). Although these topics are discussed in the context of learning, each emphasizes different aspects and components, and thus do not directly address the development of metacognitive skills through specific instructional approaches. Furthermore, research that explicitly investigates the use of instructional models to enhance pre-service teachers' metacognitive skills in social education remains limited. Most existing studies tend to focus on the fields of science or STEM (Daher et al., 2018; Saribas et al., 2013), while the development of metacognition in social education contexts has yet to be widely explored. This indicates a significant research gap that must be addressed in order to expand the application of metacognitive strategies across various academic disciplines, including social education.

On the other hand, educational innovation in higher education currently faces complex challenges. One major issue concerns the implementation of Project-Based Learning (PBL) and Problem-Based Learning (PBL) approaches as mandated by the 2020 Higher Education Curriculum Guidebook. Although both approaches are known for promoting active and contextual learning, their repetitive and unvaried application across different courses risks causing student fatigue and diminishing motivation. This situation can hinder active engagement and negatively affect the achievement of higher-order learning outcomes, including metacognitive skills. Therefore, there is a need to explore and develop alternative instructional models that are innovative, contextual, and capable of increasing motivation and active participation among pre-service social education teachers—particularly in efforts to develop strong and sustainable metacognitive skills. In line with the demand for developing higher-order thinking skills, experiential learning (EL) emerges as a promising alternative approach for enhancing students' metacognitive abilities. Several studies indicate that the learning cycle in EL contributes significantly to the development of learners' metacognitive skills by helping them plan, monitor, and evaluate their learning processes independently (Dessie et al., 2023; Medina et al., 2017; Tanaka et al., 2016).

The concept of EL was developed by David Kolb (1984), who described learning as a process of transforming direct experience into knowledge through a four-stage cycle: concrete



experience, reflective observation, abstract conceptualization, and active experimentation (Figure 1). Within this framework, students are not passive recipients of information but are actively engaged in the learning process through real-world experiences, critical reflection, and the application of concepts in new situations.

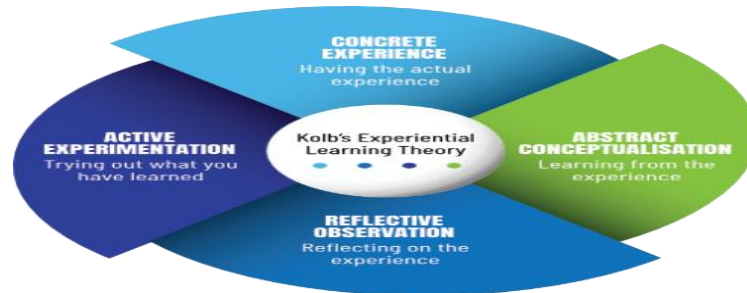


Figure 1. Kolb's Experiential Learning Cycle (Source: <https://brightpathway.co.uk>)

One of the main strengths of Experiential Learning lies in its ability to encourage students to deeply reflect on their learning experiences. This reflection serves as a critical gateway to developing metacognition, as it allows students to understand how they process information, why they choose certain learning strategies, and how to improve those strategies moving forward. Through reflective processes, students begin to recognize their strengths and weaknesses in learning, while actively seeking solutions to improve outcomes. Reflection not only increases self-awareness but also deepens students' understanding of their own learning processes (Burnett & Taylor, 2025). Research also shows that reflective practices significantly enhance metacognitive awareness and self-regulation, enabling students to adjust their learning strategies for more effective results (Ho & Lau, 2025).

The connection between experiential learning and metacognition lies in their shared emphasis on active learning and critical reflection. In the experiential learning approach, students are not only involved in completing tasks but are also encouraged to reflect on and evaluate their learning experiences. This reflective process forms the foundation of metacognitive development, as it helps students understand their thinking processes and regulate their learning strategies more effectively. Core concepts in experiential learning, such as learning identity, the learning spiral, and learning styles, play a crucial role in guiding metacognitive monitoring and control (Kolb & Kolb, 2012). Compared to direct instruction, experiential learning is considered more effective in teaching metacognitive theory because it allows students to connect new information with personal experiences, promotes higher-level information processing, and builds self-efficacy in the subject matter (Richmond et al., 2017). Furthermore, experiential learning influences metacognitive development indirectly through reflective practice, which strengthens self-awareness and the ability to regulate one's thought processes (Ho & Lau, 2025).

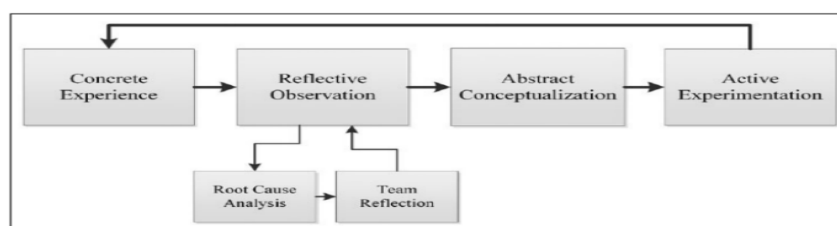


Figure 2. Experiential Learning Cycle

The purpose of this study is to develop an experiential learning model for pre-service social education teachers based on the conceptual framework proposed by Miller & Maellaro (2016), as illustrated in Figure 2. This model portrays the learning process as a cycle consisting of four main stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. In the reflective observation phase, two additional components—root cause analysis and team reflection—are incorporated to deepen learners' understanding of their experiences. Compared to the original model, this adaptation is specifically designed for the context of social education, aiming to strengthen pre-service teachers' metacognitive skills and

increase the relevance of the learning process to real-world teaching practice. The cycle promotes continuous and reflective learning, aligning with the demands of professional teacher development.

Meanwhile, metacognition refers to a set of abilities that reflect an individual's awareness of their own thinking processes. Referring to the indicators proposed by [Meijer et al. \(2013\)](#), metacognitive ability consists of three main components: metacognitive knowledge, metacognitive regulation, and metacognitive responsiveness. Metacognitive knowledge includes understanding of strategies, tasks, and oneself as a learner. Metacognitive regulation involves planning, monitoring, and evaluating one's thinking and learning processes. Metacognitive responsiveness refers to the ability to flexibly adjust learning strategies in response to task demands or situational conditions.

Therefore, the goal of this study is to develop an experiential learning model specifically designed to enhance the metacognitive skills of pre-service social education teachers, based on the metacognitive indicators outlined by [\(Meijer et al., 2013\)](#), namely metacognitive knowledge, metacognitive regulation, and metacognitive responsiveness. This model is expected to facilitate reflective and adaptive learning experiences, encouraging pre-service teachers to be more aware, deliberate, and responsive in their learning processes, particularly within the context of social education practice.

RESEARCH METHODS

a. Research Design

This study employs a qualitative research design aimed at developing and evaluating an Experiential Learning (EL) model to enhance the metacognitive skills of pre-service teachers. A qualitative approach was chosen because it allows for an in-depth exploration of expert perspectives, facilitating a comprehensive understanding of the alignment between the components of the EL model and the development of metacognitive skills. This design is particularly suited for exploring complex phenomena, such as the development of metacognitive abilities, where quantitative methods might fall short in capturing the nuances of the process [\(Creswell & Creswell, 2018\)](#).

Qualitative research provides flexibility in data collection, enabling the researchers to adapt as new insights emerge during the study. This is particularly valuable in this context, where expert feedback is crucial to refining the EL model. Experts' evaluations help assess the alignment of the model's components—Metacognitive Knowledge, Metacognitive Regulation, and Metacognitive Responsiveness—with the specific goals of enhancing metacognitive skills in teacher education. The iterative nature of qualitative research also allows for continual refinement of the model based on expert feedback, ensuring that the final version effectively supports metacognitive development [\(Patton, 2002\)](#).

Furthermore, a qualitative design emphasizes the importance of understanding the underlying processes and interactions that contribute to the success of the EL model. By focusing on expert opinions, the study is able to capture insights on how learning activities and instructor roles within the EL model contribute to the development of metacognitive skills in pre-service teachers. This approach ultimately helps clarify the key elements of the model that are most effective in fostering metacognitive abilities in teacher education.

b. Research Instruments

This study is a qualitative research project that employs two types of instruments: the Item-Objective Congruence (IOC) index and the Experiential Learning Model Suitability Assessment Form, as described below:

(1) Item-Objective Congruence (IOC) Index

The Item-Objective Congruence (IOC) index is a method used to evaluate the content validity of an instrument. In this method, subject matter experts are asked to assess the extent to which each item in the instrument effectively measures the objectives defined by the instrument developers. The evaluation is conducted using a three-point scale: a score of 1 is given if the item clearly measures the intended objective, 0 if it is unclear or uncertain whether the item measures



the objective, and -1 if the item clearly does not measure the objective. The results of these assessments are then analyzed to determine the degree of congruence between each item and the intended objectives.

(2) Experiential Learning Model Suitability Assessment Form

This form is designed to assess the degree of alignment between the Experiential Learning model and the targeted aspects of learning. The assessment uses a five-point Likert scale, which reflects the perceived degree of suitability from the experts' perspectives. A score of 5 indicates that a component is "highly appropriate," 4 indicates "appropriate," 3 indicates "neutral," 2 indicates "inappropriate," and 1 indicates "highly inappropriate." This scale enables evaluators to provide quantitative feedback, which can be further analyzed to assess the quality and relevance of the developed model.

c. Research Procedures

The steps of the research were carried out as follows:

1. Conducting a literature review, analysis, and synthesis of the theoretical framework on metacognitive skills.
2. Applying the theoretical framework to formulate instructional strategies that promote the development of metacognitive skills, outlining the steps of the Experiential Learning model, designing learning activities aligned with lesson plans, and defining the roles and responsibilities of the instructors.
3. Drafting and reviewing the initial version of the Experiential Learning model.
4. Inviting five experts with backgrounds in science education, educational evaluation and measurement, educational guidance, and educational psychology to assess the alignment between the model components and the elements of metacognitive skills.
5. Revising the Experiential Learning model based on the feedback from these experts to produce a second version of the model. The same five experts then re-evaluated the alignment between the redesigned Experiential Learning model and the development of metacognitive skills.

d. Data Analysis

The validity of the Experiential Learning model was evaluated through the involvement of a panel consisting of five experts with expertise in science education, educational measurement and evaluation, educational guidance, and educational psychology. The evaluation was conducted using the Item-Objective Congruence (IOC) method, focusing on the following four main aspects:

1. The congruence between the steps of the Experiential Learning model and the components of metacognitive skills.
2. The alignment between metacognitive skills and the activities outlined in the lesson plan.
3. The coherence between the strategies designed to promote the achievement of metacognitive skills and the planned learning activities.
4. The compatibility between the strategies for developing metacognitive skills and the roles and responsibilities of the instructors.

The IOC-based validation process was conducted in two stages. The first stage aimed to ensure the content validity of the model, while the second stage was intended to clarify the quality of the developed model. In addition to the IOC method, the degree of suitability of the Experiential Learning model was also assessed by the experts using the Likert-scale-based assessment form. The results of this evaluation were then converted into mean scores to obtain a quantitative overview of the overall suitability of the model.

RESULTS AND DISCUSSION

1. Evaluation of the Alignment of the Experiential Learning Model with Metacognitive Skills

This study employed two primary instruments to evaluate the alignment and effectiveness of the Experiential Learning (EL) model in enhancing the metacognitive skills of pre-service teachers: the Item-Objective Congruence (IOC) Index and the Experiential Learning Model



Suitability Assessment Form. The evaluation was conducted by five experts with backgrounds in science education, educational evaluation and measurement, educational guidance, and educational psychology.

a. Results of the IOC Index Evaluation

Table 1 presents the results of the IOC evaluation, which assesses the alignment between the steps in the EL model and the components of metacognitive skills.

Table 1. Results of the Item-Objective Congruence (IOC) Evaluation of the Experiential Learning Model's Alignment with Metacognitive Skills

EL Model Steps / Metacognitive Components	Congruence with Metacognitive Skills (IOC)	Description
Step 1: Initial Reflective Activity	1 (Congruent)	This activity provides participants with an opportunity to reflect on prior knowledge and become aware of the learning strategies they use.
Step 2: Use of Experience-based Learning Strategies	0 (Uncertain)	This strategy requires further refinement to align more closely with the metacognitive regulation component.
Step 3: Group Discussion with a Focus on Metacognition	1 (Congruent)	Group discussions focused on learning experiences effectively enhance metacognitive awareness and regulation strategies.
Step 4: Self-assessment and Feedback	1 (Congruent)	Provides an opportunity for self-evaluation and identification of areas for improvement in metacognitive regulation.

The IOC evaluation revealed that the majority of the EL model's steps align well with the development of metacognitive skills, particularly in fostering metacognitive knowledge and metacognitive regulation. The use of reflective activities, group discussions, and self-assessment were particularly effective in supporting metacognitive development. However, further refinement is needed to enhance the alignment of experience-based learning strategies with metacognitive regulation. Research indicates that experiential learning, when combined with reflective practice, significantly enhances metacognitive awareness and self-regulation among students (Ho & Lau, 2025).

b. Results of the Experiential Learning Model Suitability Assessment Form

This assessment used a five-point Likert scale to evaluate the alignment of the EL model components with the goal of enhancing metacognitive skills. Table 2 shows the results of the evaluation by the five experts.

Table 2: Results of the experiential learning model suitability assessment form based on expert evaluation

No.	EL Model Components	Average Suitability Score (Likert Scale)	Description
1.	Alignment of model steps with metacognitive skills	4.2 (Appropriate)	Most experts rated the steps as very supportive of the development of metacognitive skills.
2.	Alignment of learning activities with metacognitive skills	4.0 (Appropriate)	The learning activities were deemed appropriate for enhancing metacognitive knowledge and regulation skills.
3.	Instructor role in supporting metacognitive skills	4.6 (Highly Appropriate)	Experts agreed that the role of the instructor was highly conducive to the development of metacognitive skills in learners.
4.	Alignment of self-assessment with the EL model	3.8 (Appropriate)	Some aspects of self-assessment needed further refinement to better support metacognitive regulation.

The assessment results indicate that the EL model is largely suitable for developing metacognitive skills, with particular strengths in the instructor's role and the alignment of model steps with metacognitive skills. However, while the learning activities were generally appropriate,

the experts suggested that more focused interventions might be needed to better foster metacognitive regulation and self-assessment (Zarestky et al., 2022).

2. Revision of the Experiential Learning Model

Based on the initial evaluation by the five experts, the EL model was revised to enhance the alignment between its components and the goals of developing metacognitive skills in pre-service teachers. The revisions included several key improvements as recommended by the experts, such as adjustments in the learning steps and more focused guidance on developing metacognitive skills. The key revisions included:

- a. Adjustment of Model Steps: The steps in the EL model were refined to provide more in-depth focus on metacognitive regulation. Reflective activities were made more structured, and instructions on how to regulate learning strategies were clarified.
- b. Improvement of Instructor Instructions: The instructions for instructors were updated to emphasize their role in guiding participants to develop the ability to regulate and evaluate their learning strategies.

Following these revisions, the updated EL model was reassessed by the same group of five experts. The results indicated an improvement in the overall suitability of the model, with the average suitability score increasing to 4.5 (Highly Appropriate), suggesting that the revised model more effectively supports the development of metacognitive skills in pre-service teachers. Table 3 shows a comparison between the original and revised versions of the EL model based on expert feedback.

Table3. Comparison of the Original and Revised Versions of the Experiential Learning Model

No.	EL Model Component	Original Model Score	Revised Model Score	Revisions Made
1.	Model steps (learning structure)	3.8 (Appropriate)	4.6 (Highly Appropriate)	Added more structured reflective activities and adjusted steps to better emphasize metacognitive regulation.
2.	Instructor instructions	4.0 (Appropriate)	4.7 (Highly Appropriate)	Emphasized the instructor's role in guiding participants to regulate and evaluate their learning strategies.
3.	Alignment of activities with metacognitive skills	4.2 (Appropriate)	4.5 (Highly Appropriate)	Adjusted activities to strengthen metacognitive development through reflection and self-assessment.
4.	Participant involvement in self-assessment	3.9 (Appropriate)	4.4 (Highly Appropriate)	Increased emphasis on self-assessment to better support metacognitive regulation.

The comparison between the original and revised versions of the EL model reveals significant improvements. The learning structure score increased from 3.8 to 4.6, with more structured reflective activities added to enhance metacognitive regulation. Instructor instructions improved from 4.0 to 4.7, emphasizing the role of instructors in guiding metacognitive development. The alignment of activities with metacognitive skills also strengthened, rising from 4.2 to 4.5, ensuring better support for reflection and self-assessment. These revisions align with findings that structured reflection and active instructor involvement are key to fostering metacognitive development (Ho & Lau, 2025).

3. Analysis of the Alignment of the EL Model with Metacognitive Skills

The metacognitive cycle developed using the metacognitive methodology proposed by Meijer et al. (2013) resulted in the design of an Experiential Learning model that encompasses three key components: metacognitive knowledge, metacognitive regulation, and metacognitive responsiveness. The primary key to enhancing the metacognitive skills of pre-service teachers lies in the integration of metacognitive tactics into the learning process (see Table 1). These metacognitive skills among PSTs are most likely the result of consistency between the instructor's roles and responsibilities and the learning activities designed. The Experiential Learning model received a suitability score of 4.56 out of a maximum of 5. A detailed summary of this assessment



is presented in Table 2.

Table 4. Description of Metacognition Components (Meijer et al., 2013)

Category	Dimension	Strategies to Encourage Students to Achieve Metacognitive Skills	Description	Detailed Lecturer Activities
Metacognitive Knowledge	Knowledge about one's own and others' learning abilities	Encourage self-reflection on learning styles; Use learning journals; Conduct group discussions about learning experiences.	The lecturer provides understanding of one's own and others' learning strengths and weaknesses.	Facilitates structured reflection sessions for students to identify their learning styles; conducts group discussions about learning experiences and challenges.
Metacognitive Knowledge	Understanding learning strategies and when to apply them	Introduce various learning strategies (e.g., mind mapping, self-questioning); Provide practice in applying strategies in different contexts.	The lecturer provides knowledge about learning techniques and the appropriate time to apply them.	Provides modules on various learning strategies; conducts workshops on applying strategies such as concept mapping and self-questioning using real case studies.
Metacognitive Knowledge	Recognizing types and demands of specific learning tasks	Provide clear rubrics or task guidelines; Practice analyzing types of tasks and suitable learning approaches.	The lecturer helps students recognize the characteristics and specific requirements of academic tasks.	Gives examples of tasks with thorough explanations of objectives and requirements; organizes simulations to compare learning strategies based on task types (essays, presentations, projects).
Metacognitive Regulation	Planning and readiness before performing learning tasks	Encourage students to create study plans; Use task planning templates or to-do lists.	The lecturer guides students in designing strategies before starting the learning process.	Assists students in creating weekly study plans using templates; offers direct feedback on their plans before task implementation.
Metacognitive Regulation	Monitoring task execution during the learning process	Use progress checklists or learning journals; Practice self-monitoring with quizzes or self-assessments.	The lecturer monitors the ongoing learning process consciously and systematically.	Supplies daily or weekly checklists for students; conducts progress evaluation sessions mid-learning period using reflective quizzes.
Metacognitive Regulation	Reflection and evaluation of one's own performance after learning	Conduct reflective activities after assignments or exams; Discuss what worked and what needs improvement.	The lecturer provides evaluations on students' learning outcomes and processes.	Leads reflection sessions after major assignments or exams; facilitates forums to review effective strategies and areas for improvement.
Metacognitive Responsiveness	Sensitivity to internal experiences during learning (self-feedback)	Practice mindfulness in a learning context; Encourage students to recognize emotions or learning barriers.	The lecturer helps students become aware of their personal reactions and emotions during learning.	Implements brief mindfulness practices before lessons; encourages students to record emotions and reactions in weekly learning journals.
Metacognitive Responsiveness	Responsiveness to external	Facilitate peer review sessions or feedback	The lecturer facilitates	Provides consistent formative feedback



	feedback (from lecturers, peers, etc.)	discussions; Practice interpreting and acting on feedback.	opportunities and guidance to respond effectively to external feedback.	through comments and discussions; facilitates peer reviews and guides students to draft improvement plans.
Metacognitive Responsiveness	Curiosity about one's own thinking and learning processes	Discuss metacognition; Assign exploratory tasks about thinking and learning processes (e.g., 'how I learn').	The lecturer cultivates curiosity about personal thinking mechanisms and learning processes.	Assigns exploratory essays on students' thinking and learning processes; opens discussions on metacognition and personal learning experiences.

Table 4 outlines the key components of metacognition, as defined by Meijer et al. (2013), focusing on three main dimensions: Metacognitive Knowledge, Metacognitive Regulation, and Metacognitive Responsiveness. It describes various strategies to promote the development of metacognitive skills in students, such as encouraging self-reflection on learning styles, using learning journals, and conducting group discussions about learning experiences. The table also includes specific activities for instructors to guide students in developing these skills. For example, instructors facilitate structured reflection sessions to help students identify their learning strengths and weaknesses, introduce various learning strategies such as mind mapping and self-questioning, and encourage mindfulness practices to enhance emotional awareness during learning. This framework emphasizes the importance of integrating metacognitive practices throughout the learning process to enable students to become more aware of their cognitive processes and improve their overall learning effectiveness.

Tabel 5. Experiential Learning Design to Enhance the Metacognitive Skills of Pre-Service Teachers

Experiential Learning Stage	Metacognitive Dimension	Strategies to Encourage Metacognitive Skills	Activities According to the Learning Management Plan	Instructor Roles and Tasks
Concrete Experience	Metacognitive Knowledge	Encourage self-reflection on learning styles; use learning journals; conduct group discussions about learning experiences.	Students record personal learning experiences and reflect on preferred learning styles through journal entries and sharing sessions. Example task: Write a weekly learning journal reflecting on challenges and strategies used.	Facilitates reflection activities and moderates discussions on learning experiences and styles.
Root Cause Analysis	Metacognitive Knowledge	Introduce various learning strategies (e.g., mind mapping, self-questioning); provide practice in applying strategies in different contexts.	Students are introduced to multiple learning techniques and apply selected strategies in problem-solving exercises. Example task: Apply a mind map to solve a case study problem and submit a strategy explanation.	Delivers instructional materials on various strategies and oversees student practice through guided tasks.
Team Reflection	Metacognitive Knowledge	Provide clear rubrics or task guidelines; practice analyzing types of tasks and	Groups analyze task requirements and develop learning approaches aligned with provided rubrics or guidelines. Example task: Analyze a given assignment	Provides clear evaluation criteria and leads discussions to help students analyze

		suitable learning approaches.	rubric and propose a group learning strategy plan.	assignment expectations.
Abstract Conceptualization	Metacognitive Regulation	Encourage students to create study plans; use task planning templates or to-do lists.	Students develop weekly study plans detailing specific learning goals and timelines. Example task: Create and submit a personalized weekly study plan outlining goals, resources, and timelines.	Guides students in designing realistic and achievable study plans; reviews and offers feedback on drafts.
Abstract Conceptualization	Metacognitive Regulation	Use progress checklists or learning journals; practice self-monitoring with quizzes or self-assessments.	Students complete and review checklists to track their progress and understanding of ongoing tasks. Example task: Fill out a self-monitoring checklist while working on a group project and reflect on learning outcomes.	Monitors checklist completion and offers prompts to help students self-assess their progress.
Abstract Conceptualization	Metacognitive Regulation	Conduct reflective activities after assignments or exams; discuss what worked and what needs improvement.	Post-task reflection sessions are held to evaluate the effectiveness of strategies and identify areas for improvement. Example task: Write a reflection report after completing a presentation, including self-evaluation and peer feedback.	Leads structured reflection sessions and provides feedback to help students refine learning strategies.
Active Experimentation	Metacognitive Responsiveness	Practice mindfulness in a learning context encourage students to recognize emotions or learning barriers.	Students engage in mindfulness activities before learning sessions and document emotional responses in journals. Example task: Participate in a mindfulness session and submit a brief reflection on focus and emotional state.	Introduces mindfulness practices and encourages students to be aware of internal learning cues.
Active Experimentation	Metacognitive Responsiveness	Facilitate peer review sessions or feedback discussions; practice interpreting and acting on feedback.	Students give and receive feedback through peer-review activities and revise their work based on the input. Example task: Conduct a peer review on a draft report and revise your own based on received comments.	Organizes peer-review sessions, facilitates feedback sharing, and supports follow-up revisions.
Active Experimentation	Metacognitive Responsiveness	Discuss metacognition; assign exploratory tasks about thinking and learning processes (e.g., 'how I learn').	Students write reflective essays on how they think and learn, followed by class discussions on metacognitive development. Example task: Write an essay titled 'How I Learn Best' and present key points in a group discussion.	Leads discussions on metacognition and assesses reflective assignments to support cognitive awareness.

Table 5 presents an experiential learning design aimed at enhancing the metacognitive skills of pre-service teachers. It aligns each stage of the experiential learning cycle—concrete experience, root cause analysis, team reflection, abstract conceptualization, and active experimentation—with specific metacognitive dimensions: knowledge, regulation, and

responsiveness. For each stage, the table outlines strategies to encourage metacognitive skills, such as self-reflection on learning styles, using task planning templates, and engaging in mindfulness activities. The table also specifies related activities, such as writing learning journals, analyzing task requirements, creating study plans, and participating in peer review sessions. Additionally, it details the instructor's role at each stage, from facilitating reflection and moderating discussions to providing feedback on progress and guiding students through self-assessment. This design integrates both structured learning experiences and reflective activities, ensuring that students develop not only the theoretical knowledge of metacognition but also the practical skills to apply and reflect on these strategies in real-world contexts.

4. Metacognitive Knowledge

Metacognitive knowledge refers to an individual's awareness of their own and others' cognitive processes. This includes understanding personal learning preferences, knowing various learning strategies, and recognizing the nature and demands of specific tasks. This dimension plays a foundational role in metacognitive development, as it enables learners to reflect on what they know and how they learn (Mitsea & Drigas, 2019; Zhang & Zhang, 2019). To foster this knowledge, educators are encouraged to implement strategies such as self-reflection activities, the use of learning journals, and structured group discussions. For instance, students can be asked to maintain weekly journals that document their learning challenges, strengths, and strategies. These reflections not only build self-awareness but also promote peer learning when discussed in group settings (Hamzah et al., 2023). Lecturers facilitate these activities by guiding students through structured reflection sessions and moderating discussions that explore individual differences in learning styles (Fathima & Saravanakumar, 2012).

Additionally, metacognitive knowledge involves understanding when and how to apply specific learning strategies. This requires students to be introduced to a variety of techniques—such as mind mapping, self-questioning, or summarization—and then practice applying them in authentic contexts (Dunlosky et al., 2013). Instructors support this by offering targeted workshops using real-world scenarios or problem-solving tasks, thereby allowing students to evaluate the efficacy of different strategies. Lastly, this dimension includes recognizing the structure and expectations of academic tasks. Students need guidance in analyzing task rubrics, identifying the cognitive demands of assignments, and selecting appropriate strategies (Mondal, 2023). Educators provide this by supplying detailed task guidelines, leading task deconstructions, and facilitating simulations that compare the strategic approach required for different assignment formats (e.g., essays, presentations, or projects).

5. Metacognitive Regulation

Metacognitive regulation refers to the process of managing one's own learning through planning, monitoring, and evaluation. It involves actively controlling cognitive activities before, during, and after learning tasks to ensure that learners not only acquire knowledge but also apply it effectively and reflectively (Veenman et al., 2006; Winne & Hadwin, 2008). The planning phase is central to this regulation, where students design study routines or project timelines that align with their academic goals. Instructors play a crucial role by guiding students in crafting structured, personalized learning plans and offering feedback to refine them (Zimmerman, 2022). A common classroom application includes requiring students to submit weekly study schedules with clearly defined learning objectives and deadlines to foster proactive planning (Azevedo & Aleven, 2013).

During the learning process, regulation takes the form of self-monitoring, where students track their understanding and engagement with the material. Students are encouraged to use checklists, logs, or self-assessment tools to assess their progress and identify areas for improvement (Schunk, 2011). Instructors can support this by providing such tools and organizing mid-task progress check-ins or reflective quizzes. These methods promote accountability and adaptability, prompting learners to adjust their strategies as needed (Zimmerman, 2022).

After task completion, metacognitive regulation continues through reflection and evaluation. Students analyze the success of their learning strategies, identify obstacles, and plan improvements for future tasks. Educators can conduct structured debriefing sessions and assign reflective writing tasks, such as post-assignment reviews that incorporate both self-assessment



and peer feedback (Merkebu et al., 2023). These activities deepen students' understanding of their learning processes and allow them to refine strategies for future success.

6. Metacognitive Responsiveness

Metacognitive responsiveness refers to a learner's ability to respond thoughtfully to both internal and external cues during the learning process. This dimension encompasses emotional awareness, feedback responsiveness, and curiosity about one's own cognition (Schraw et al., 2006; Zimmerman, 2022). Emotional responsiveness, or internal self-feedback, allows learners to notice and manage emotional states that may influence their learning—such as anxiety, confusion, or motivation. Educators can foster this by introducing brief mindfulness practices at the beginning of class and encouraging students to reflect on their emotional states in learning journals. These activities help students regulate their emotions and understand how their feelings impact cognitive performance (Aluintany et al., 2025).

Responsiveness to external feedback involves a student's ability to receive, process, and act upon feedback from lecturers, peers, or other sources. This skill can be developed through structured peer-review activities and formative feedback sessions. Instructors facilitate these interactions by providing clear feedback criteria, moderating discussions, and guiding students through the revision process based on received feedback (Hattie & Timperley, 2007; Nicol & MacFarlane-Dick, 2006). These strategies help students enhance their capacity to respond to feedback constructively and improve their learning outcomes.

Finally, metacognitive responsiveness includes fostering curiosity about one's own thinking and learning processes. By engaging students in reflective assignments, such as essays exploring their preferred learning strategies, educators promote self-inquiry and encourage deeper cognitive engagement. Class discussions following these reflections can further enhance understanding by allowing learners to compare and contrast their metacognitive development with peers (Fahrni et al., 2025).

CONCLUSIONS AND SUGGESTIONS

In conclusion, this study successfully developed an Experiential Learning (EL) model designed to enhance the metacognitive skills of pre-service teachers in the field of social education. The model incorporates the three essential components of metacognition—Metacognitive Knowledge, Metacognitive Regulation, and Metacognitive Responsiveness—into a structured learning cycle based on experiential engagement. Expert evaluations confirmed that the model aligns well with metacognitive objectives, achieving a high suitability score of 4.56 out of 5. The consistent integration of metacognitive strategies within learning activities, supported by clearly defined instructor roles, appears to significantly contribute to the development of reflective, self-regulated learners. However, studying is not without limitations. It relies solely on qualitative data and expert validation, without implementing the model in actual classroom settings. Furthermore, the limited number of expert participants may affect the breadth of perspectives captured in the validation process. Future research should focus on applying this model in real teaching environments to empirically assess its effectiveness in improving metacognitive skills. It is also recommended that subsequent studies adopt quantitative or mixed method approaches to provide more comprehensive evidence and explore the model's applicability in other subject areas beyond social education to broaden its impact and relevance.

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