

# Metacognition in Teacher Education: Pedagogical Strategies for Professional Growth

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## ABSTRACT

Rapid technological and societal changes demand an education system that prepares learners for uncertainty, adaptability, and lifelong learning. In alignment with the vision of the National Education Policy (NEP) 2020, this paper emphasizes the role of teachers in fostering holistic learner development through metacognitive awareness. Adopting a qualitative, conceptual methodology based on systematic analysis of theoretical literature, empirical studies, and national policy documents, the study examines the relevance of metacognition in in-service teacher education. The paper highlights how metacognitive awareness enhances reflective practice, instructional decision-making, professional competencies, and ethical dispositions among teachers. It further proposes pedagogical strategies, including mindfulness-based and reflective practices, for integrating metacognition into teacher education programs. The study contributes a conceptual framework linking metacognitive processes with Bloom's Taxonomy and professional values, and offers policy-relevant recommendations for embedding metacognitive training within teacher education curricula to improve the quality of the teaching-learning process.

**Key words:** NEP 2020, Holistic, Metacognition

## Introduction

Metacognition is a state of being aware of one's own thought. Metacognitive awareness is not only being aware of how we think but also to know about the strategies involved in the process of thinking, monitoring and regulating the same. It is the capacity to know the cognitive process of thoughts and its regulation. "Too often, we teach students what to think but not how to think." - OECD Insights (2014). Empirical studies consistently demonstrate that teachers with higher metacognitive awareness exhibit stronger reflective practices, adaptive instructional strategies, and improved classroom environments (Wilson & Bai, 2010; Ozturk, 2018; Nordin & Yunus, 2020). Moreover, sufficient training, instructions through different pedagogical practices can lead to lasting improvement in metacognition. A child starting school today may enter a career that does not yet exist and may use technology which has not been invented yet. Hence, the aim of education is not just acquisition of knowledge but to prepare children for life to face the challenge in a competent manner. NEP 2020 is emphasizing on

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development of holistic learners to face the challenges of 21<sup>st</sup> century world which is globally active, creatively progressing and digitally transforming. Presently, the global society is seeking competent human resources who can quickly adapt to changes and creatively move forward. Hence the purpose of education is to nurture the child to become good human beings with compassion, empathy, courage, resilient and capable of a rationale thought and actions. Moreover, teachers have a major role in developing holistic development and are concerned with the overall development of children as autonomous learners considering their physical, mental, emotional, intellectual and spiritual growth. Metacognition is a state of being aware of one's own thought. For the development of holistic learners, it is very important to have competent teachers with metacognitive awareness. As a foundation to all these positive mindsets is very much essential in teachers to initiate and accelerate metacognitive awareness. In the present scenario teachers with metacognition is one of the most neglected areas in practice. Despite growing international research on metacognition and learning, limited attention has been paid to the systematic development of metacognitive awareness among in-service teachers, particularly within the context of teacher education reforms such as NEP 2020. Existing studies largely focus on student metacognition, while teachers' own metacognitive practices and their professional implications remain underexplored. Addressing this gap, the present paper examines the relevance of metacognitive awareness in in-service teacher education and proposes pedagogical practices to strengthen reflective and quality teaching.

### **Review of Literature**

Metacognition has been widely acknowledged as a crucial component of effective learning and teaching. Brown (1987) conceptualized metacognition as a higher-order cognitive process involving executive control, monitoring, and self-regulation, laying the foundation for subsequent educational research. Building on this framework, Efklides (2008) elaborated the multidimensional nature of metacognition by linking its cognitive, motivational, and affective components to self-regulated and co-regulated learning. Empirical research has consistently shown that teachers with higher metacognitive awareness demonstrate stronger reflective practices, more adaptive instructional strategies, and improved classroom learning environments (Wilson & Bai, 2010; Ozturk, 2018). Studies examining teachers' perceptions further indicate that metacognitive awareness enhances instructional sensitivity, decision-making, and responsiveness to learners' needs (Mai, 2015; Nordin & Yunus, 2020). Recent findings also highlight a positive relationship between teachers' metacognitive abilities and the creation of supportive and learner-centered classroom climates (Ashiq et al., 2023).

At the policy level, the National Curriculum Framework for Teacher Education (2009) and the National Education Policy (2020) emphasize reflective practice, holistic development, and lifelong learning as core teacher competencies. However, despite increasing scholarly attention to metacognition, the literature remains largely centered on student learning, with limited focus on the systematic development of metacognitive awareness among in-service teachers. Furthermore, there is a lack of integrated pedagogical frameworks that explicitly connect metacognitive processes with professional competencies, values, and mindfulness-based practices within teacher education programs. Empirical validation of such frameworks,

particularly in the context of recent educational reforms, remains insufficient. Addressing these gaps, the present study examines the relevance of metacognitive awareness in in-service teacher education and proposes pedagogical practices aligned with contemporary policy and professional demands.

### **Objectives**

1. To investigate the role of metacognitive awareness in enhancing reflective teaching and professional decision-making among in-service teachers.
2. To examine how metacognitive processes support the development of professional competencies, values, and dispositions aligned with holistic teacher development.
3. To identify effective pedagogical strategies for fostering metacognition in teacher education programs.
4. To propose evidence-based recommendations for integrating metacognitive practices into in-service teacher education curricula in line with NEP 2020.

### **Methodology**

The present study adopts a qualitative, conceptual, and descriptive research design to examine the role of metacognitive awareness in in-service teacher education. The paper is theoretical in nature and is grounded in a systematic analysis and synthesis of existing literature rather than the collection of primary empirical data. This approach is appropriate for exploring conceptual relationships, pedagogical implications, and policy-oriented perspectives related to metacognition in teaching. The study is based on secondary sources of data, including peer-reviewed journal articles, seminal theoretical works, research reports, and national policy documents such as the National Education Policy (NEP) 2020 and the National Curriculum Framework for Teacher Education. Relevant national and international literature on metacognition, mindfulness, reflective practice, professional competencies, and self-regulated learning was reviewed to ensure both theoretical depth and contemporary relevance. A thematic analytical method was employed to analyze the selected literature. Key themes related to metacognitive processes, professional skills and values, pedagogical practices, and higher-order thinking were identified, examined, and synthesized. The analysis focused on establishing conceptual linkages between metacognitive awareness, mindfulness, teacher professionalism, and quality teaching–learning processes. Additionally, the study aligns metacognitive processes with Bloom’s Taxonomy.

### **Mindfulness as a metacognitive practice**

Mindfulness involves paying deliberate, non-judgmental attention to the present moment. When viewed as a metacognitive practice, it goes beyond simple awareness of sensations or thoughts—it involves observing one’s own thinking processes. Practitioners notice how thoughts, emotions, and reactions arise and pass, creating a space to reflect on, regulate, and respond to mental events rather than reacting automatically. This metacognitive awareness can improve self-regulation, emotional resilience, and cognitive flexibility, making mindfulness a powerful tool for both mental health and learning. Metacognition need to be consciously practiced by watching one’s own thoughts, questioning and analyzing the same. Watching and observing your own thoughts will help in understanding the situation of the

problem in a better way as well as the situation of the person whom you are dealing with. It makes us more empathetic. Questioning your thoughts makes us more sensible to the problem and addresses it with relevant solutions, It improves the quality of your decision-making capacity. It increases self confidence in facing challenges. Metacognition needs to be consciously practiced because it is not an automatic process; it requires deliberate attention to one's own thinking. At its core, metacognition involves watching, questioning, and analyzing one's thoughts (**Fig 1**). By observing our mental processes, we gain a clearer understanding of both the problem at hand and the perspectives of others involved. This reflective awareness allows us to see situations more objectively, recognize potential biases, and respond thoughtfully rather than react impulsively.

When we watch and observe our own thoughts, we are essentially stepping back from the immediate experience and examining it from a distance. This helps in understanding not only the context and nature of a problem but also the emotions, motivations, and perspectives of the people involved. Such observation cultivates empathy, because it allows us to recognize and appreciate others' experiences and feelings. In the classroom, for instance, a teacher practicing this form of metacognition may better understand a student's frustration or confusion and respond in a supportive and constructive manner. Questioning one's thoughts is the next crucial step in metacognition. By critically examining why we think in a certain way or why we reacted to a situation in a particular manner, we develop sensibility and insight. Questioning challenges assumptions, exposes gaps in understanding, and highlights alternative perspectives. This critical engagement with one's own thinking enhances the ability to generate relevant, well-considered solutions rather than relying on habitual or superficial responses.



**Fig 1. Flow chart of metacognitive process**

Metacognition is not an automatic cognitive function; rather, it is a higher-order mental process that requires conscious and deliberate practice. It involves the active monitoring, regulation, and evaluation of one's own thinking processes. At its core, metacognition encompasses observing, questioning, and analyzing one's thoughts, which enables individuals to gain deeper insight into their cognitive functioning. By consciously observing one's thoughts, individuals can develop a clearer understanding of the nature and context of a problem, as well as their own emotional and cognitive responses to it. This reflective stance allows individuals to distance themselves from immediate reactions and examine situations more objectively.

### **Development of professional competencies. values and dispositions**

Metacognition enhances teachers' professional competencies by promoting reflective practice, strategic planning, and self-regulation. It enables educators to critically analyze lesson outcomes, identify strengths and weaknesses, and adapt instructional strategies for improved student learning. Metacognitive awareness also strengthens problem-solving, decision-making, and classroom management, fostering goal-setting, continuous monitoring, and lifelong

professional growth. Simultaneously, metacognition nurtures essential professional values, including responsibility, accountability, empathy, resilience, and openness. Reflective teachers develop a growth mindset, embrace innovative strategies, and cultivate an inclusive, student-centered classroom. By consciously observing and evaluating their thinking, teachers make informed decisions, respond thoughtfully to challenges, and build confidence, adaptability, and ethical professionalism.

S. No.	Metacognitive Process (Self-Regulation of Thought)	Corresponding Level of Bloom's Taxonomy	Cognitive and Professional Skills Developed	Professional Values and Dispositions Fostered
1.	Watching, Observing, Questioning	Remembering, Understanding	Self-reflection, attention control, awareness of prior knowledge, questioning ability	Self-confidence, empathy, care, sensitivity to learners
2.	Identifying, Comprehending, Analyzing	Applying, Analyzing	Critical thinking, creativity, interpretation, logical reasoning	Honesty, openness, unconditional and non-judgmental attitude
3.	Monitoring, Evaluating, Regulating	Evaluating, Creating	Problem-solving, decision-making, strategic planning, adaptive thinking	Self-awareness, resilience, responsibility, ethical judgment

**Table 1. Metacognitive Processes with Bloom's Taxonomy, Professional Skills, and Values**

Identifying, comprehending and analyzing thoughts help in developing increasing creative imagination to come up with better planning, critically analyzing the situations with integrity. It also helps in developing unconditional and non-judgmental while approaching a situation. Monitoring, evaluating and regulation help in understanding the thinking strategies and becomes more aware of the consequences. These thought processing strategies not only helps in evaluation but also to regulate the plan in a skillful way.

**Alignment with bloom's taxonomy (cognitive domain)**

Metacognition is closely aligned with the higher levels of Bloom's Taxonomy, as it enables learners to actively engage with and regulate their cognitive processes across all stages of learning. At the levels of remembering and understanding, learners develop awareness of what they know, recognize gaps in their knowledge, and activate prior understanding. During

the application stage, metacognitive awareness supports the selection and use of appropriate strategies to solve problems effectively. At the level of analysis, learners critically examine their own thinking, identify errors, recognize patterns, and evaluate underlying assumptions. The evaluative stage involves judging the effectiveness of chosen strategies and decisions, allowing learners to refine their approaches based on outcomes. Finally, at the level of creation, metacognition facilitates reflective thinking that enables learners to modify existing strategies or design new and innovative approaches (Table 1.). Thus, metacognition functions as a unifying process that supports higher-order thinking, self-regulated learning, and purposeful knowledge construction.

Thus, metacognition supports higher-order thinking skills by helping learners plan, monitor, and evaluate their learning. Metacognition is the core component of self-regulated learning because it enables learners and teachers to take responsibility for learning, adjust strategies, and improve performance.

### **Pedagogical practices for in-Service teacher education**

Metacognitive awareness is very important among teachers since it has an important and effective role in developing their own self as better thinkers with unconditional approach and can there by become quality teachers. For the effective development of met cognition among the teachers' certain pedagogical practices like self talk, reflective thinking, reciprocal teaching, etc. that should be an integral part of the teacher education curriculum and need to be practiced during the in-service classroom transactions. Metacognitive awareness is critically important among teachers because it enables them to become more effective, reflective, and thoughtful professionals. When teachers develop metacognitive skills, they gain the ability to think about their own thinking processes, recognize their biases, and adopt an unconditional and open-minded approach to teaching and learning. This self-awareness allows teachers to analyze their decisions, reflect on their instructional strategies, and adjust their methods to meet the diverse needs of their students. In doing so, teachers not only enhance their own professional growth but also set a standard of quality and ethical practice in education, which directly impacts student learning outcomes. For the effective development of metacognition among teachers, it is essential to incorporate specific pedagogical practices into both pre-service and in-service teacher education programs. Practices such as self-talk, where teachers consciously verbalize their thought processes, help them clarify reasoning and decision-making in the classroom. Reflective thinking encourages teachers to critically examine their lessons, interactions, and outcomes, identifying strengths and areas for improvement. Similarly, reciprocal teaching, which involves collaborative dialogue, questioning, and feedback among teachers or between teachers and students, nurtures critical thinking, problem-solving, and a habit of continuous reflection.

To maximize the benefits of metacognitive development, these strategies should not remain theoretical but must be actively practiced during classroom transactions, especially during in-service training. When teachers routinely engage in these reflective and collaborative practices, they internalize metacognitive habits that enhance their self-regulation, adaptability, empathy, and decision-making. Over time, this leads to the cultivation of quality teachers—professionals who are capable of thoughtful instruction, responsive classroom management, and fostering

meaningful learning experiences for all students. In essence, embedding metacognitive practices into teacher education ensures that teachers evolve not just as content deliverers but as reflective thinkers, ethical practitioners, and lifelong learners, which is fundamental for achieving excellence in education.

The study identifies ten pedagogical practices designed to enhance metacognitive awareness among in-service teachers. Self-talk exercises promote awareness of thought processes and clarify reasoning, while self-assessment tasks such as SWOT analysis help teachers identify strengths and weaknesses and set goals. Open-ended questions and sharing of experiences facilitate reflection on personal and professional experiences and encourage collaborative perspective-taking. Situational discussions and reflective/reflexive thinking allow for the application of metacognition to real-life scenarios and deep analysis of decisions and actions. Problem-solving skills are further developed through problem-based learning, while reciprocal teaching fosters co-regulation and peer reflection. Inquiry-based teaching supports independent questioning and exploration, and inductive teaching strengthens the ability to derive principles from examples and recognize patterns. Collectively, these strategies enhance self-regulation, critical thinking, empathy, and professional growth, aligning teacher practice with reflective and adaptive learning (Table 2).

<b>S. No.</b>	<b>PEDAGOGICAL PRACTICES</b>	<b>Metacognitive Outcomes</b>
1.	Self-talk Exercise	Awareness of thought processes; clarifying reasoning
2.	Self assessment task: To reflect on the strength and weakness through SWOT analysis	Identification of strengths/weaknesses; goal setting
3.	Open end questions on own experience and thoughts	Reflection on personal and professional experiences
4.	Sharing of experiences	Collaborative reflection; perspective-taking
5.	Situational discussions	Application of metacognition to real-life scenarios
6.	Reflective and reflexive thinking	Deep analysis of actions, decisions, and outcomes
7.	Problem based learning	Active engagement with complex problems
8.	Reciprocal teaching	Co-regulation of learning; peer reflection
9.	Inquiry based teaching	Independent questioning and

		exploration
10.	Inductive teaching	Deriving principles from examples; pattern recognition

**Table 2. Pedagogical processes and corresponding metacognitive outcomes**

### **Effectiveness of metacognitive pedagogical practices**

Metacognition is particularly important in teacher education. Teachers are simultaneously learners and facilitators of learning, and those who cultivate strong metacognitive skills are better equipped to plan, implement, monitor, and assess both their instructional practices and their students' learning outcomes.

**1. Enhance reflective thinking and reflective teaching: Metacognition** enables teacher educators to reflect critically on their instructional decisions. By examining what teaching strategies worked, which ones did not, and why, educators can continuously improve their practice. This reflective ability helps teachers adapt lessons to diverse learners, identify gaps in understanding, and refine teaching methods based on evidence rather than habit.

**2. Improving Instructional strategies:** Teacher educators with metacognitive awareness can consciously select appropriate teaching strategies, instructional materials, and assessment methods. They monitor student engagement and understanding during lessons and make real-time adjustments when necessary. This leads to more effective teaching and better learning outcomes.

**3. Development of Self-Regulated Lifelong Learning Teachers:** Metacognition helps future teachers become self-regulated professionals who can independently assess their own strengths and weaknesses. Teacher education programs that emphasize metacognitive training prepare educators who can manage classroom challenges, experiment with new methods, and continue improving throughout their careers. Metacognitive strategies leads themselves to become a reflective practioner to adopt similar habits in their own classrooms and in their day to day life.

**4. Professional Growth and Self-Reflection:** Metacognitive awareness encourages teachers to continually reflect on their practices, identify areas for improvement, and adopt innovative teaching methods. This reflective practice fosters lifelong learning and professional development.

**5. Encouraging positive growing mindset in teaching practice:** Metacognition supports in reflecting on one's own mistakes and viewing challenges as learning opportunities, teachers become more resilient and open to innovation. This mindset fosters continuous professional growth and adaptability in changing educational environments.

**6. Mindfulness as a Metacognitive Practice:** Mindfulness involves paying deliberate, non-judgmental attention to the present moment. When viewed as a metacognitive practice, it goes beyond simple awareness of sensations or thoughts—it involves observing one's own thinking processes. Practitioners notice how thoughts, emotions, and reactions arise and pass, creating a space to reflect on, regulate, and respond to mental events rather than reacting automatically.

This metacognitive awareness can improve self-regulation, emotional resilience, and cognitive flexibility, making mindfulness a powerful tool for both mental health and learning.

## Conclusion

Metacognitive awareness is very important to ensure quality teaching- learning process. It helps in improving their instructional strategies and practice. Moreover, the teachers with metacognitive awareness will be in-depth learners, more flexible and adaptable with mindfulness and lifelong learners. Metacognition can impact physically, intellectually, emotionally and ethically and academicians are always unique, dynamic and always evolving. Consciously practicing metacognition transforms thinking into a powerful tool for understanding, empathy, problem-solving, decision-making, and self-confidence. It is not just a cognitive skill but a pathway to personal and professional growth, allowing us to act more thoughtfully, respond more effectively, and navigate complex situations with insight and balance. In the present scenario teachers with metacognition is one of the most neglected areas in practice. In essence, embedding metacognitive practices into teacher education ensures that teachers evolve not just as content deliverers but as reflective thinkers, ethical practitioners, and lifelong learners, which is fundamental for achieving excellence in education. Hence there is a author is strongly recommending the inclusion of metacognitive awareness, strategies and practices in the teacher education curriculum to implement it among the in-service teachers for improving the quality of teaching learning process.

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