



Reflective Teaching: A Transformative Journey For Educators

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Abstract: Reflective teaching is crucial in Indian schools and higher education for developing educators who are thoughtful and dedicated to high academic standards and accreditation. Recognized by educators and researchers as essential for effective teaching, reflective practice plays a key role. This study addresses important questions to improve our understanding of reflective teaching and its impact on becoming a reflective practitioner: Why should teachers understand reflection and its different aspects? Why is it important for teachers to engage in reflective learning and teaching throughout their careers? What benefits can come from using a reflective approach? The study aims to address these questions and offer a clearer understanding of reflection—its conceptual framework, various forms, levels, and stages in reflective teaching, particularly in mathematics teaching—as well as strategies to promote effective reflective teaching.

Keywords: Action, Reflection, Reflection-in-action, Reflection-on-action, Reflection-for-action, Reflective Teaching, Teacher Education

1. INTRODUCTION

“Teachers are expected to be reflective practitioners, competent to use multiple methods and techniques, to engage learners, keeping the socio-cultural context and experiences of the learners in mind” — (National Curriculum Framework-2005).

Recent updates to teacher education programs, as outlined in the National Curriculum Framework for Teacher Education (NCFTE-2009) and the National Council for Teacher Education (NCTE) Regulations, 2014, highlight the importance of reflective practice in teaching. As a result, ‘reflective practice’ has become a central focus in teacher education, where teachers are encouraged to continuously adapt and enhance their pedagogy. This involves critically reflecting on their own teaching and learning practices to effectively address the diverse needs of various contexts. In 21st-century education, the intricacies of teaching across various educational levels have become a focal point of intense examination. This discourse is predominantly influenced by concerns regarding the perceived limitations in grasping diverse scientific teaching methodologies and self-assessment practices within modern pedagogical approaches, on both national and international scales.

Reflection is an ongoing process that should be integrated into your teaching practice throughout your career, as there is always room for improvement. It is also a deeply personal process. The main components of reflection include the conditions or situations prompting reflection, the processes used to engage in it, the content or focus of the analysis, and the product, which is the enhanced understanding or improved action that results from reflective thinking. Some educators view reflection as a tool for “deep learning,” describing it as intentional, purposeful, and metacognitive thinking aimed at improving professional practice. Moon, J. (2005) defines reflection as a mental process used to achieve a specific purpose or desired outcome. It involves gaining a deeper understanding of complex ideas by revisiting and reprocessing our existing knowledge, understanding, and possibly emotions.

The NCTE Regulations of 2014 stress the importance of using a participatory teaching-learning approach in the classroom, which aids in developing reflective thinking and questioning skills among students and teachers. Kaur (2015) suggests that student-teachers educated within a ‘culture of reflection’ are more likely to become reflective practitioners in their future professional careers. Gore and Zeichner (1991) identified four distinct "varieties" of teacher reflective practice, each emphasizing a different aspect: the academic version, the social efficacy version, the developmental version, and the social reconstructionist version.

2. CONCEPTUAL FRAMEWORK

John Dewey (1933) proposed the idea of child-entered learning, emphasizing that each individual's life experiences should be the starting point for learning. He believed that the development of thinking, especially reflective thinking, was essential for every child. He expressed this by saying:

“Thought affords the sole method of escape from purely impulsive or purely routine action. A being without capacity for thought is moved only by instincts and appetites, as these are called forth by outward conditions and the inner state of the organism. A being thus moved is, as it were, pushed from behind.” (p. 15).

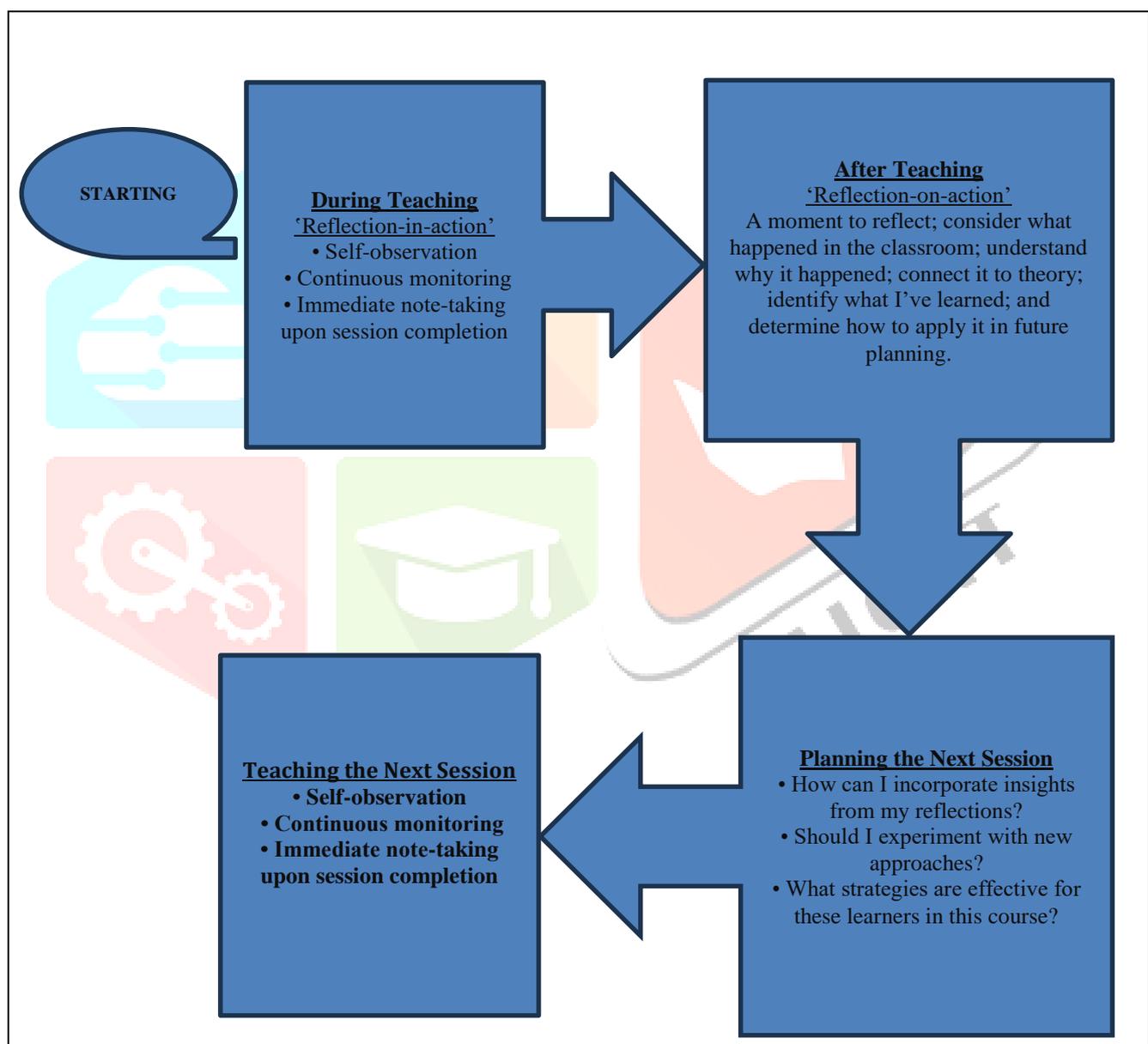


Fig.1. Illustration — How reflection enhances the teaching and learning processes in the classroom.

‘Reflection-in-action’ involves experimenting, self-observing, and monitoring, suggesting that the insights and new ideas generated should be tested in the classroom—a supportive professional environment. During a lesson that a teacher has meticulously planned and prepared, it is essential to remain constantly aware and monitor the session as it unfolds. This awareness enables the teacher to make real-time adjustments based on ongoing reflections. By analyzing and evaluating the teaching and learning process, the teacher can implement necessary changes. This post-action reflection then guides future planning and preparation, fostering a cycle

of continuous improvement in the teaching-learning process. Fig 1. illustrates the process of "reflection-in-action" and "reflection-on-action" for improving the teaching and learning experience in the classroom.

3. DIFFERENT FORMS OF REFLECTION

Donald Schön (1983) described reflection as involving two key processes: "reflection-in-action" and "reflection-on-action." Killion and Todnem (1991) extended Schon's reflection model by introducing the concept of "reflection-for-action."

3.1. REFLECTION-IN-ACTION (R-I-A)

The concept of "reflection-in-action" in teaching refers to the process where teachers reflect on their practice while actively teaching a topic in the classroom. This reflection happens almost instantly and in real-time. It is often observed that more experienced professionals can solve problems on the spot by drawing from their extensive knowledge and skills to assess the situation. Instead of trying random approaches, these professionals utilize their accumulated experience and expertise to address issues immediately. An example of "reflection-in-action" is provided in Box 3.1.

Box 3.1: 'Reflection-In-Action' by a Teacher

Bandana, a teacher for class X, was explaining the topic of 'Quadratic Equations' using a lecture method. After 15 minutes, she noticed that a significant portion of her students were not paying attention. Realizing that full attention was necessary for understanding the topic, she considered how to address the issue of students' lack of engagement. Upon reflection, she identified that her continuous speaking for the past 15 minutes might have made the students passive listeners, which could be contributing to their waning attention.

She recognized that using the same method for too long could lead to boredom. To remedy this, she decided to alter her teaching approach by incorporating varied stimuli.

She began using both the blackboard and a PowerPoint presentation to explain the nature of quadratic equation roots and graph different quadratic equations. This change engaged students' visual senses in addition to their auditory ones. After 10 minutes, she asked a question to the class and selected students randomly to answer. This shift in approach successfully regained and maintained the students' attention, allowing her to address the problem effectively.

3.2. REFLECTION-ON-ACTION (R-O-A)

The concept of “reflection-on-action” in teaching refers to the process of reflecting after the teacher has completed teaching a topic in the classroom. This reflection takes place after the classroom activity has ended and involves a deliberate and conscious effort to critically analyze the teaching experience and review the problem or event. An example of “reflection-on-action” by the teacher is provided in Box 3.2.

Box 3.2: ‘Reflection-On-Action’ by a Teacher

Simi, a Class IX teacher, was teaching the concept of ‘Zeros of a Polynomial’ to her students. After spending about 30 minutes explaining it, she asked the class, ‘What are the zeros of a non-zero constant polynomial?’ None of the students raised their hands to respond. She then repeated the explanation and posed another question: ‘What about the zeros of a zero polynomial?’

Only one student, Sreya, raised her hand and answered, ‘Every real number is a zero of the zero polynomial.’

The teacher responded, ‘Excellent, Sreya.’

She asked the students another question: ‘Is there any real zero of a polynomial of odd degree (e.g., linear polynomial, cubic polynomial, etc.)?’

Once again, no one responded, and the bell rang, signalling the end of the period.

Later that night, while having dinner at home, she reflected on what had happened in class and thought deeply about the situation.

This is an example of ‘reflection on action.’

Despite skillfully teaching the lesson and illustrating the concept of at least one real root of an odd-degree polynomial (such as linear and cubic polynomials) on the blackboard, the students still didn't grasp the material. She considered possible reasons for this and realized that she had spent about 30 minutes talking continuously, engaging in one-way communication (linear communication) with the class. This approach likely turned the students into passive listeners, causing them to lose focus, as their attention spans are typically short. She understood that unless students are actively engaged in the learning process, they won't effectively learn. Ensuring student participation is crucial.

The next day, she returned to the class with renewed confidence, determined to engage the students in the lesson. By encouraging participation from the outset, asking questions, and praising correct answers with remarks like ‘good’, ‘very good’, ‘excellent,’ she transformed them into active learners. These positive reinforcements encouraged them to engage in two-way communication (interactive communication), leading to remarkable results.

3.3. REFLECTION -FOR-ACTION (R-F-A)

Killion and Todnem (1991) expanded on Schon's reflection model by introducing the concept of ‘reflection-for-action.’ This form of reflection helps guide future actions by drawing on past experiences and decisions (i.e., past thoughts and actions). It integrates both ‘reflection-on-action’ and ‘reflection-in-action.’

Box 3.3: 'Reflection-For-Action' by a Teacher

Using the examples of 'reflection-in-action' (Box 3.1) and 'reflection-on-action' (Box 3.2), both teachers think about their actions and adjust their teaching methods based on what they observe and experience.

Bandana, a class IX teacher, noticed that her students were not attentive to the learning task during the first 15 minutes of her teaching (action). Despite her efforts, the students remained passive listeners. She then altered her teaching approach by varying the stimuli during the action (reflection-in-action) and observed that the students became more attentive (active learners) and engaged in the teaching-learning process.

Simi, a class X teacher, taught the concept of the zeroes of a polynomial, but her students didn't grasp it during the 40-minute period. That night, while having dinner at home, she reflected on what happened in class (reflection- on- action). She realized that her teaching had been one-sided (linear communication). The following day, she made sure to involve the students in the teaching-learning process (interactive communication) and found them more engaged and able to respond correctly.

These two examples demonstrate how reflection aids in planning future teaching-learning processes. Both teachers encountered challenges and identified effective solutions. This experience guided them in planning for improved educational quality in the future, which is why it is termed 'reflection-for-action'.

4. Levels of Reflection (by Hatton and Smith, 1995)

Individuals engage in reflection across a spectrum of depth, from basic descriptive accounts to more profound critical examination of events and actions (critical reflection). Hatton and Smith (1995) articulated a hierarchical developmental model that delineates four distinct levels of reflective practice: descriptive writing (L1), descriptive reflection (L2), dialogic reflection (L3), and critical reflection (L4), as depicted in Fig. 2.

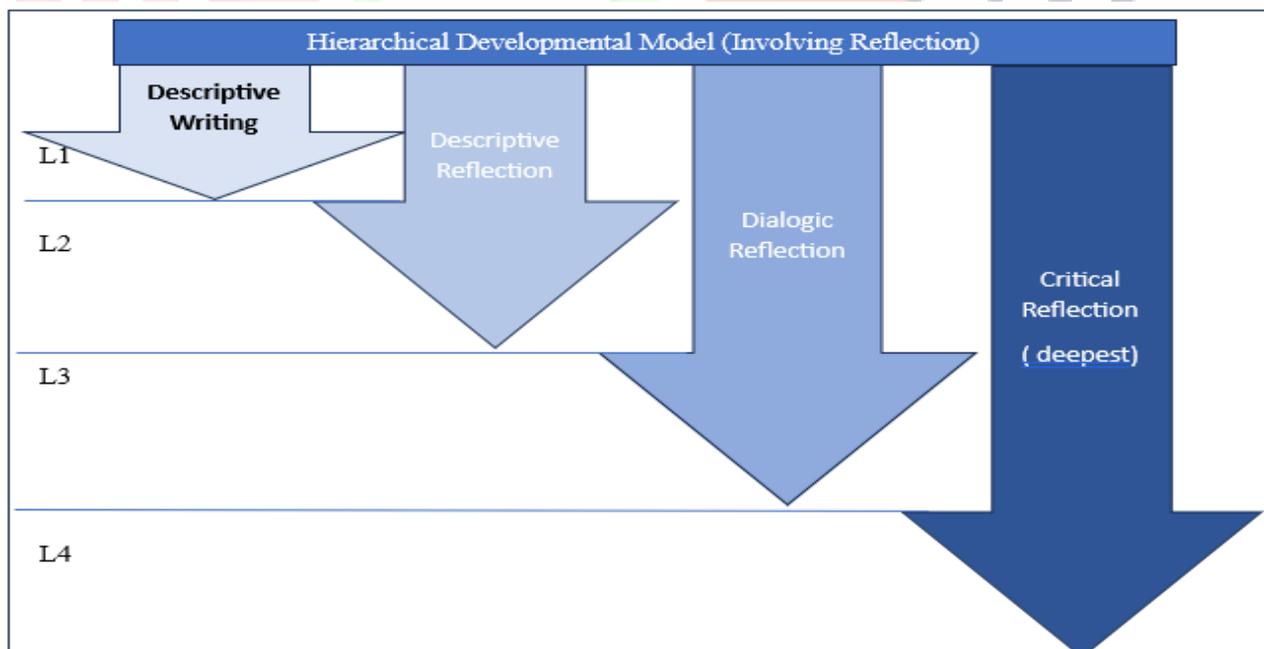


Fig.2: Levels Of Reflection (L1, L2, L3, L4)

4.1. Level 1 (L1): Descriptive Writing

This involves a straightforward description of events or actions that have taken place at a specific time and location, without any effort to explain the reasons behind them or justify them. No alternative actions are considered to address the situation. A teacher can apply this level of reflection by describing it in simple written statements or discussing it orally with students of any age, either individually, in groups, or with the entire class. After teaching a lesson, a teacher might ask students to summarize the key points covered. An example of this level of reflection, as noted by a class teacher in the context of cognition, is provided in Box 4.1.

Box 4.1: 'Descriptive Writing' by a Teacher

I went to the class X at my school, and the students were noisy at first. After a few minutes, they quieted down, and I began teaching 'Statistics.' I had prepared a chart, which I showed to the students, also I explained the key points of the topic. I asked them to write these down in their notebooks. However, I noticed that some students neither took notes nor paid attention during teaching the lesson.

4.2. Level 2 (L2): Descriptive Reflection

The second level of reflection, known as 'Descriptive Reflection,' delves much deeper than the first level, despite also being descriptive in nature. At this stage, the teacher strives to offer a rationale for documenting the events, as demonstrated by the example in Box 4.2.

Box 4.2: 'Descriptive Reflection' by a Teacher

Once the class settled down, I began teaching. My plan was to teach 'Statistics' in class X, and I had prepared a chart to assist with the lesson. Abstract concepts, like the measures of central tendency—mean, median, and mode—are easier for students to understand when presented in a tangible form such as a chart. I instructed the students to write down the key points in their notebooks. However, I noticed that a few students didn't take notes. Upon reflecting on their behaviour, I realized they didn't consider the information important enough to note down.

4.3. Level 3 (L3): Dialogic Reflection

This third level of reflection is clearly more profound than the first and second levels. Here, the teacher steps back to think critically about the events or actions that took place in the class and considers, independently, how to address the issue. An example of this is provided by a teacher in Box 4.3.

Box 4.3: 'Dialogic Reflection' by a Teacher

The topic I had to teach was challenging, and I was aware of this. To make it clearer, I prepared a chart on the 'measures of central tendency' for the class X students in Statistics class. I believed that using concrete examples in the form of charts would help the students grasp the concept. However, looking back, I realize that I wasn't as successful as I had hoped, since many students didn't fully understand the concept. I could have provided additional explanations and used practical, real-life examples of mean, median, and mode, both for ungrouped and grouped data, using different methods.

I was also frustrated by a student's question during the lesson. Was his question valid, or was he just trying to disrupt the class for attention? Should I have scolded him, or would it have been better to discuss his question?

4.4. Level 4 (L4): Critical Reflection

Critical reflection is the most profound (deepest) among the four levels of reflection, where the professional practitioner critically examines every aspect of their practice. This process involves a thorough analysis of one's teaching methods, teaching areas, and related strategies leading to ongoing improvement. An example of a teacher engaging in critical reflection is provided in Box 4.4.

Box 4.3: 'Critical Reflections' by a Teacher

I had intended to teach the concept of 'measure of central tendency' in the statistics class for Grade X. Acknowledging that this topic can be challenging, I prepared a chart to help students better grasp the concepts of mean, median, and mode, particularly for grouped data. I believed that a well-organized chart demonstrating various methods for calculating these measures would enhance their understanding. However, during the lesson, I noticed that some students were struggling with the concept. Upon reflection, I realized that my approach was not as effective as I had hoped. I should have employed a variety of resources, such as video clips, PowerPoint presentations, and online materials, to illustrate methods like the direct method, assumed mean method, and step deviation method for calculating the mean, as well as different techniques for finding the median and mode for grouped data. It would have also been helpful to provide practical examples and show how the three measures of central tendency are related, using the formula "3 Median = Mode + 2 Mean."

I had considered this option earlier during the planning stage, but I was hesitant because it required extra steps, such as getting official permission to use the computer lab, arranging for the students to go there, and bringing a calculator into the classroom.

In my next class, I plan to use computer-based instruction (CBI), PowerPoint presentations, and online video clips. During a previous class, a student from class X, Rumi, asked why the mean is the most commonly used measure of central tendency and whether there are situations where the median or mode would be better. Her questions seemed strange to me, and I reacted sharply. But now, I'm wondering if her question was actually valid or if she was just trying to get attention. I should have talked to her class teacher about her behaviour. Rumi's questions, along with the confused looks on other students' faces, really upset me. She often interrupts with many questions, and I worry that my harsh response might have discouraged her curiosity. Looking back, I realize her question was valid. As a teacher, I should have used it to further explain and clarify the concept. In the future, I need to listen to her questions more carefully and respond fairly.

5. PROCESS OF REFLECTIVE TEACHING

The process of reflection involves two interconnected activities: Action and Reflection (see Figure 5.1). These activities are discussed as follows:

- (i) **Action**-based-on-reflection: When you reflect on your teaching, you may identify areas for improvement and plan actions to address them.
- (ii) **Reflection**-based-on-action: After implementing the planned actions, you observe whether the desired changes in your teaching have occurred.

Reflective teaching requires both planning for action and making observations to reflect upon.

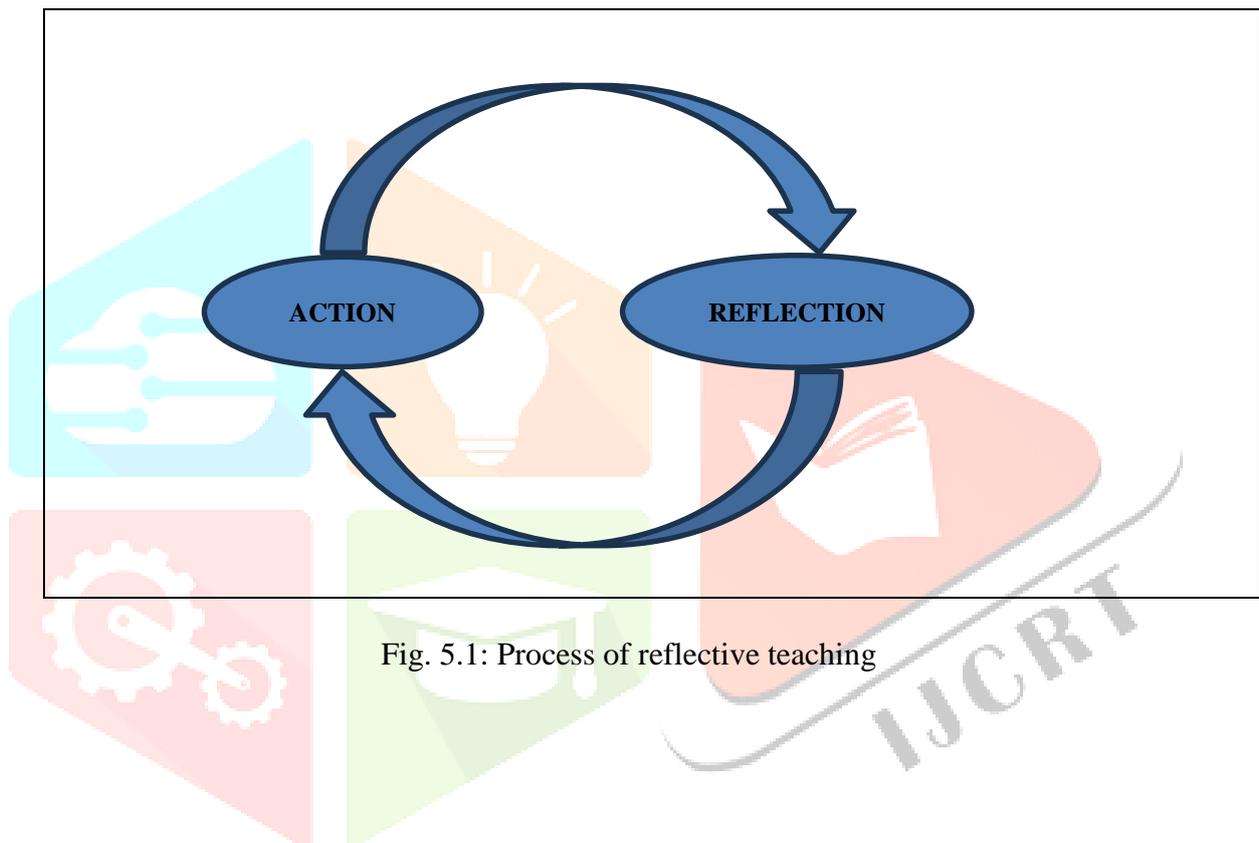


Fig. 5.1: Process of reflective teaching

6. ACTION CYCLE

As a reflective teacher, if you determine that changes are needed in your teaching process, you should follow four stages: S1: planning, S2: acting, S3: observing, and S4: reflecting. Each stage is interconnected with both the previous and subsequent stages (see Fig. 6.1), indicating that the process of self-reflection has neither a clear starting point nor a fixed endpoint. This cycle is referred to as an “action cycle” or “action spiral”.

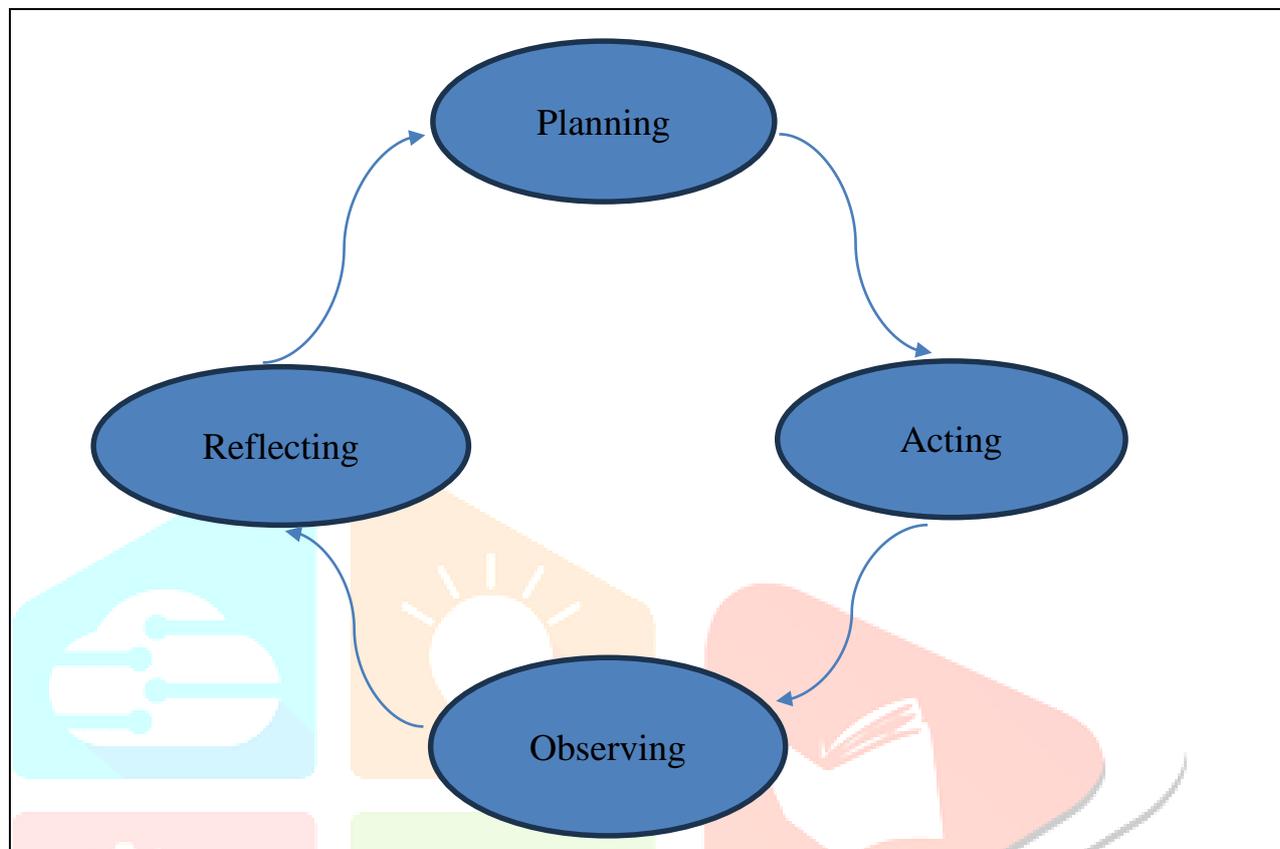


Fig. 6.1: Stages of the ‘Action Cycle’

- 6.1. **Stage 1 (S1): Planning:** - In the planning stage of the action cycle in reflective teaching, once you identify a problem in your classroom or recognize an area of weakness in your teaching, you need to develop a plan to address the issue.
- 6.2. **Stage 2 (S2): Acting:** - This is the stage where you implement your plan to address the problem.
- 6.3. **Stage 3 (S3): Observing:** - At this stage, you observe and assess the impact of your efforts or plan in addressing the problem.
- 6.4. **Stage 4 (S4): Reflecting:** - At this stage, you evaluate whether the desired outcomes have been achieved. You should identify what has been successful and what hasn't. If the desired outcomes are not met, you need to plan new strategies or adjustments to achieve them.

The above process repeats until the desired outcomes are achieved.

Initially, the teacher attributed the issue solely to the students and focused on correcting their behaviour. However, after finding her approach ineffective, she began to reflect on her own teaching methods instead of placing all the blame on the students. She made adjustments to her teaching approach, which ultimately resolved the problem. By incorporating various group learning methods, such as cooperative learning, collaborative learning, peer learning, and problem-based learning, she provided students with opportunities to become active participants in the teaching-learning process. An example of the action spiral is provided in Box 6.1.

Box 6.1: 'Action Cycle' used by a teacher

Sima, a Class X mathematics teacher at a secondary school, notices that 7 students in her class have been inattentive during recent lessons. Some of these students sit idle, while others engage in disruptive arguments, using inappropriate language. Frustrated by this situation, she begins to consider strategies to address the problem.

Planning: She devises a plan to address the problem by creating engaging activities tailored to the students' interests.

Acting: The following day, she implements the plan by involving these students in activities that allow them to work at their own pace. She moves between groups to assist with their questions and difficulties.

Observing: She observes that when students are engaged in meaningful activities, they no longer disrupt the class. They enjoy working in groups.

Reflecting: Sima reflects on the ineffectiveness of her previous approach and considers her next steps. She decides to adopt a cooperative learning approach for teaching the content. By shifting from a lecture-based method to cooperative learning, she notices that the students' disruptive behaviour completely disappears. She concludes that the change in her teaching approach was effective in her teaching-learning context.

7. STAGES OF REFLECTION (by Griffith and Tann, 1992)

Griffith and Tann (1992) divided reflection into five stages: (i) Rapid Reflection; (ii) Repair; (iii) Review; (iv) Research; and (v) Rethorizing and Reformulating. A brief discussion is provided in subsections 7.1 to 7.5, with illustrations of the five stages of reflection presented in Boxes 7.1 to 7.5.

7.1. **Rapid Reflection:** This is the initial stage of reflection and is typically personal and private, aligning with what Schön described as "reflection-in-action." This refers to immediate and automatic "reflection-in-action."

Box 7.1: 'Rapid Reflection' used by a Teacher

This occurs when teacher reflect instantly and instinctively while teaching.

7.2. **Repair:** This is the second stage of reflection, which also falls under thoughtful "reflection-in-action."

Box 7.2: 'Repair' used by a Teacher

Here, the teacher quickly pauses for thought to assess/observe student reactions during a class and then alters their approach based on these observations.

7.3. **Review:** As the third stage of reflection and the first in a series of stages that Schön (1983) described as "reflection-on-action," this occurs after the action is completed. It is a less informal form of "reflection-on-action" that occurs at a specific point in time.

Box 7.3: 'Review' used by a Teacher

Review, often collaborative and interpersonal, can take place during or after the teacher's workday or the teacher's class teaching. In this stage, the teacher reflects on or discusses aspects like the progress of specific students or groups or the development of curriculum units, leading to adjustments in existing plans.

7.4. **Research:** The fourth stage of reflection, “research,” represents a more systematic form of “reflection-on-action” conducted over an extended period.

Box 7.4: ‘Research’ used by a Teacher

During this stage, the teacher's reflections and observations become more structured and specifically targeted on certain issues. Gathering information about one's teaching may take weeks or even months, but the process of adjusting plans based on this analysis remains consistent.

7.5. **Rethorising and Reformulating:** The fifth and final stage of reflection, “retheorising and reformulating,” is a long-term form of “reflection-on-action” guided by academic theory. This stage is more abstract and rigorous than the previous ones, occurring over months or even years.

Box 7.5: ‘Rethorising and Reformulating’ used by a Teacher

In this stage, teachers critically analyse their practical experiences or working theories, considering them in light of academic theories. In a way, advanced study and teacher certification at the master's or doctoral level should focus on this type of theorising.

8. STRATEGIES FOR PROMOTING REFLECTIVE TEACHING

To foster reflective teaching, various strategies can be utilized, such as reflective diaries or journals, reflective video analysis, reflective peer collaborations, student feedback, concept maps, teaching portfolios, teaching inventories, brainstorming, and more. According to the literature, reflective diaries are the most commonly used and referenced reflective tools/strategies. In this chapter, we will focus on eight of these strategies to explore their impact on teaching and how they can support teachers' development into effective reflective practitioners. The following table presents a range of strategies and tools that support reflective teaching by helping educators critically analyze, evaluate, and improve their instructional practices.

No.	Name of the Strategy/ tool	The role of the strategy on reflective teaching
I	Reflective Journal / Reflective Diaries	Helps teachers record thoughts, reactions, and learning experiences to re-think over the memories, prevent them from being forgotten, and make learning concrete.
II	Reflective Video Analysis	Enables review and analysis of actual teaching to identify profitable tools that help in improving reflective practice and enhancing teaching effectiveness.
III	Reflective Peer Collaboration	Encourages teachers to work together, discuss teaching practices, interact, give and receive feedback, and learn from each other to improve teaching.
IV	Student feedback	Teachers can ask students what they think about what goes on in the classroom. Students' opinions and perceptions add different and valuable perspectives. This can be collected using simple questionnaires or learning diaries.
V	Concept map	Helps organize and visually represent relationships among ideas, topics, or concepts, enabling teachers to reflect on the connections within the subject matter and teaching approach.
VI	Teaching Portfolio	Helps teachers compile evidence of their teaching practices, achievements, and reflections to evaluate and improve their professional work.
VI	Brainstorming	Encourages generating a wide range of ideas without immediate judgment, fostering creativity and reflection on potential strategies, solutions, and improvements in teaching.
VII	Teacher's Inventories	Provide structured tools to help instructors assess and reflect more broadly on their teaching approach. They typically measure the

	extent to which specific pedagogies are applied (e.g., student-centered vs. teacher-centered practice).
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Table 8.1. Strategies and Tools for Enhancing Reflective Teaching Practices

9. CONCLUSION

Teaching strategies must be tailored to meet the diverse needs of students, acknowledging the differences in their abilities, dispositions, and social attributes. Reflection, a crucial tool in the teaching-learning process, enables teaching from experiences. By engaging in reflection, teachers critically evaluate their practices and plan purposeful actions to enhance their teaching and learning. This process broadens their professional knowledge and understanding, encouraging the adoption of new methods for reflection, evaluation, and research-based practice development. As part of their professional growth, teachers will also share these newly acquired practices with others, fostering continuous professional development through the use of an 'action cycle.'

Reflecting on teaching practice involves connecting theory with real-world application. Engaging in reflective teaching allows educators to recognize both the strengths and areas for improvement in their professional practice. Reflection can be undertaken either individually or in groups. When reflecting individually, it involves a personal dialogue with oneself, which can occur internally (either implicitly or silently) or through written expression—both methods aid in organizing one's thoughts. Group reflection, on the other hand, involves sharing personal reflections with others. Reflective teaching is an ongoing process designed to help educators continually improve their effectiveness in the workplace, regardless of the models they follow or employ. Fostering reflective thinking should be a key focus for both new and experienced teachers, as well as teacher educators. This growth is critical in assisting teachers to become good reflectors over time.

In summary, it's evident that reflective teaching practices play a crucial role in addressing weaknesses in teaching and enhancing teachers' effectiveness in the classroom. The literature identifies several powerful strategies for promoting reflective teachers, including reflective diaries, video analysis, peer collaboration, concept mapping, brainstorming, and student feedback on teaching. These strategies provide significant benefits for improving teachers' skills and practices.

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