INNOVATIVE TEACHING STRATEGIES TO FOSTER CRITICAL THINKING: A REVIEW

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Abstract : "Critical thinking skills as the mental processes required in processing information, solving problems, making a decision, and thinking critically. The teachers need to incorporate classroom activities that will promote the critical thinking skills of students" explained by Drew (2022). This objective can be achieved by using innovative teaching strategies in the classroom. These strategies advocate the use of step by step approach to developing critical thinking skills by introducing real word problems and clear instructions. The article is based on the reviews on the development of critical thinking. This article provides an insight into the previous researchers regarding the development of critical thinking skills. An attempt has also been made to explain the innovative and effective teaching strategies to foster critical thinking.

Keywords: - **Critical Thinking, Innovative Teaching Strategies**

INTRODUCTION

With the changing scenario of the education system, the skills and abilities of the students have also upgraded. It is the responsibility of the schooling system to educate the students and upgrade their skills. Students must get familiar with the real-life challenges and problems in school so that they can adjust well in their life. To face such situations, it is important to develop the critical thinking skills of students. This skill helps the students to understand a situation and generate new information on that basis. The significant components of Critical thinking depend on the appraisal, judgment, and assessment of introduced points and issues, it needs thinking assessment also (Sherafat, 2015). It appears that critical thinking is becoming increasingly important in every stream of education, including in the arts, sciences, and commerce, as well as in everyday life. Today, it is seen as a positive force for the all-around development of the students.

1.1 What is thinking?

Thinking is both a covert and symbolic cycle that permits us to shape mental affiliations and make models figure out the world. It is viewed as an incognito interaction seeing as our viewpoints, and the cycles behind their arrangement are not straightforwardly discernible. It characterizes thinking as "cognitive behaviour in which ideas, images, mental representations and other such hypothetical elements of thought are experienced or manipulated" (APA Dictionary of Psychology). The five essential components of thinking are - concept, signs, symbols, brain functions, language, and muscular activities. Objects, language, signs, and symbols in our surroundings are registered by our sense organs and translated into thoughts in the brain (Kalive, 2022). Additionally, language is the most efficient and advanced medium for carrying out the thought process. When someone reads, writes, hears, or sees words or sentences in any language, they are stimulated to think. The different methods by which our brain translates this information into thoughts can comprehend as types of Thinking:

1. Perceptual or Concrete Thinking: It is the most straightforward type of thinking that utilities our interpretation of the information to make conclusions.

2. Conceptual or Abstract Thinking: It alludes to an individual's capacity to shape thoughts about the information introduced to them utilizing complex ideas and thoughts. This type of thinking is stimulated in social settings as it requires the interpretation of non-verbal cues and body language.

3. Reflective Thinking: this type of thinking is required to solve complex issues. This thinking is based on past experiences and inferences drawn from those experiences to make the present better.

4. Creative Thinking: this sort of reasoning is related to one's capacity to make or develop a new thing, novel or strange. It permits people to decipher their environmental elements in clever ways and show up at creative answers to the difficulties presented by their current circumstances It is viewed as one of the main parts of one's mental way of behaving in light of the fact that it is an altogether inside mental interaction.

5. **Divergent and Convergent thinking:** Divergent and convergent thinking are both viewed as sorts of imaginative thinking which include tracking down answers for issues by investigating an immense range of thoughts and potential outcomes. Divergent thinking is a cognitive process in which a thinker examines infinite possibilities to a problem to come up with an original solution that is the result of a free-flowing, flexible cognitive process that connects these infinite solutions. Convergent thinking, on the other hand, is a more concentrated approach that analyses a set of solutions and chooses one to solve the problem.

6. **Linear thinking (Sequential) and Non Linear (Holistic) Thinking:** linear reasoning is a kind of reasoning where information is handled consecutively altogether. Fundamental while taking care of issues require a bit-by-bit approach wherein there is a

reasonable beginning and finishing point. Such sort of reasoning is most used in scientific callings (Mathematicians and physicists utilize straight reasoning). Then again, non-linear reasoning is a sort of conceptual reasoning that doesn't follow a solitary line movement and on second thought associates thoughts and ideas from different sources to move toward an issue.

One of the most crucial components of the education process is thinking. The capacity to learn and solve difficulties is dependent on our capacity to think, which assists us in making adjustments and is required for a successful life. In all of these, critical thinking is an important type of thinking which enhances the student's ability to learn Those understudies who can think unmistakably, usefully, and cautiously can particularly contribute something beneficial to the general public.

1.2 CRITICAL THINKING

Critical thinking is a "Purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as an explanation of the evidential, conceptual, methodological, criteriological, or conceptual considerations upon which that judgment is based" (Facione, 1990)**.** Furthermore, Mertes, (1991) defined "critical thinking as a higher-order process that requires self-awareness, reflection, effort, self-control, and meta-cognition. In other words, it is an intentional and conscious process of interpreting and evaluating information or experiences". It entails not just knowledge collection, but also active learning, problem-solving, cooperative decision making, and information usage (Kim, 2009). According to Aizikovitsh-Udi and Amit (2011), "Critical thinking includes assessing the accuracy of information as well as accepting, rejecting, or questioning instances and knowledge from everyday life". It is "the ability to think about what to do for sure to accept. It incorporates the capacity to participate in intelligent and autonomous thinking". Someone with Critical Thinking skills can make connections between ideas, determine their relevance, construct arguments, solve problems, and can justify their own beliefs and values. It is much more than just gathering information and retention power. A genuine understanding of how to use this information is the major requirement of critical thinking. Critical Thinking is truly reasonable with thinking "out-of-the-container", testing arrangements, and pursuing less popular systems.

1.2.1 Meaning of Critical Thinking on the bases of Philosophy and Psychological point of view:

From a philosophical point of view, it is the study of ideas, values, and beliefs about the purpose of life, or the formulation of guidelines for how to live and behave. Critical thinking is what philosophy is all about. Abstraction and logic are the foundations of critical thinking. Philosophy is what happens when abstraction and logic are combined to investigate basic problems. Critical thinking is a method of inquiring that involves the use of abstractions and reasoning. Philosophers put an emphasis on critical thinking attitudes, while psychologists put a focus on critical thinking abilities.

As viewed from a psychological point of view – it is a collection of cognitive processes and thinking tendencies. Furthermore, it is a type of problem-solving thinking in which the person analyzes ideas or potential solutions for problems or inadequacies. It is required for tasks like evaluating the validity of the findings and understanding the significance of research findings. It allows you to assess, evaluate, explain, and reorganise your thinking, lowering the chances of you accepting, acting on, or reasoning on a wrong assumption. Most cognitive psychologists emphasize analyzing cognitive structures among beginners and specialists in a variety of domains.

To summarize, both bases give us useful information. The three domains of (1) the product (good thought) effectively developed by philosophy, (2) the person (ideal thinker dispositions) best developed by personal psychology, and (3) the process (thinker skills and abilities) effectively established by cognitive psychology might well assist in understanding the critical thinking concept at the individual level (Gyöngyi, 2015).

1.2.2 Characteristics of Critical Thinking:
Eight characteristics of critical thinking stated by Wade (1995). these are the followings:

a. **Asking questions:** pupils with critical thinking are dynamic thinkers, who address inquiries to grasp, look for answers and arrangements, support their responses with contentions, decipher, dissect intelligently, and assess the contentions of others.

b. **Defining a problem:** Problem-solving and critical thinking refer to the ability to use knowledge, facts, and data to effectively solve problems. This doesn't mean you need to have an immediate answer, it means you have to be able to think on your feet, assess problems, and find solutions.

c. **Analyzing assumptions and biases**: Evidence is examined based on facts, figures, values, and beliefs. A particular solution is arrived at by using gathered facts and relevant evidence to support and defend the solutions considered valid.

d. **Avoiding emotional reasoning:** For good critical thinking, one must avoid oversimplification, stereotyping, being immoral, inconsistent, illogical, and potentially dangerous. All of this is bad for critical thinking as it hinders arriving at correct conclusions.

e. **Tolerating ambiguity:** it is the ability to perceive uncertainties, conflicting issues that may be difficult to understand, as well as information neutrally and openly with ambiguous, contrasting, or multiple meanings (McClean, 2015).

1.3 TEACHING STRATEGIES FOR DEVELOPING CRITICAL THINKING

The teacher can develop critical thinking among students by making the teaching-learning process interesting by using effective teaching strategies in the classroom to foster critical thinking. Various teaching strategies help in fostering the critical thinking which are as follows:

1. **Concept Mapping:** In 1972, Joseph Novak's research team developed concept mapping. This technique is based on David Ausubel's learning psychology. Ausubel's cognitive psychology is based on the premise that learning occurs through absorption. The student expands his or her knowledge by absorbing new concepts into previously held beliefs. This notion distinguished between rote learning and learning that was meaningful. Concept mapping is a tool that aids in the organisation of a learner's cognitive framework into more powerful integrated patterns. It's a graphical tool for organizing, connecting and synthesizing data (Dhull & Verma,2020).Wheeler and Collins (2003) examined that concept mapping is helpful in the development of critical thinking abilities in students and results in better gains in all Critical Thinking skills (Huang, et al. (2012); Maneval, et al (2011).

2. **Blended Learning:** It is a method of learning that includes face-to-face and online learning. Kokmaz and Karakus (2009) found that the blended learning model contributed more to student critical dispositions and levels, and there was a favorable relationship between students' attitudes to geography course and their Critical Thinking dispositions and levels. The blended social collaborative learning environment is certainly helpful in improving critical thinking in pre-service teachers stated by Mamman et al. (2018). Krishnan (2011); Lu. D (2021) observed that blended learning is more successful than traditional teaching

methods in improving critical thinking, positive perception towards learning, problem-solving, science process abilities, and science achievement among secondary school students.

3. Questioning Techniques: This is the most straightforward method to begin using in the classroom right away. Instead of asking "yes" or "no" questions, a teacher should ask open-ended inquiries. Open-ended questions allow students to assess their understanding of the issue at hand. Santos (2017) found that the questioning strategy is effective for improving critical thinking abilities in Science Education.

4. Student-Led Discussions: learners -centered learning settings encourage students to reflect meta-cognitively, which helps them develop critical thinking abilities. In a student-centered classroom, students seek solutions to their queries from their peers rather than from the teacher.

5. Inquiry-Based Learning: it is a great way to get students engaged in learning while also encouraging them to use their critical thinking abilities. Inquiry-based learning is about arousing interest and curiosity in kids, not merely asking what they want to learn. Cara et al. (2009) found that inquiry-lab students acquired confidence in their scientific ability, and conventional students gained more, indicating that the traditional curriculum encouraged overconfidence. Smitha and Rao (2011); Alijaafreh (2013);Duran (2016);Wartono, et al. (2017);(Nisa, et al. (2018) demonstrated that both the Inquiry Training Model and Guided Discovery Learning were equally successful in promoting critical thinking, academic achievement in students. Kanwal et al. (2021) observed that the degree of critical thinking abilities among university students is insufficient since students are not provided with inquiry-based situations that might encourage deep reflection even at the university level.

6. Problem-Based Learning (PBL): It is an approach that enables students to utilize critical thinking abilities by offering a framework for discovery that allows them to get a deeper grasp of a topic. The steps are easy to remember and may be used for any new topic: a. Investigate a particular issue or problem; b. Explore and brainstorm; c. Create a solution and share it with the class; d. Students should describe the measures that must be followed to remedy the situation. Tiwari, et al (2006); Burris and Garton (2007);Temel, S.(2014);Yenice (2011);Mundilarto and Ismoyo (2017); Makhzoum et al. (2020) observed that PBL was successful in improving students' Critical Thinking dispositions, content Knowledge, motivation. Sulaiman (2013) observed statistically significant differences in creativity and critical thinking in favour of the PBL group. PBL online learning successfully promotes Physics students' creativity and critical thinking on physics students. Sari et al. (2019) found the following outcomes: (1) PBL developed critical thinking skills; (2) PjBL enhanced critical thinking skills positively and (3) significant difference in critical thinking skills between the groups taught using PBL and those taught using PjBL.

7. Case Study /Discussion Method: The instructor presents a case (or tale) to the classroom without a conclusion in this manner. The teacher then guides students through a conversation using prepared questions, allowing them to come up with a conclusion for the topic McDade (1995). Simpson and Courtney (2008) stated that the discussion and role-play approach was beneficial in fostering critical thinking abilities and small group discussion was a useful technique for students to promote Critical Thinking (Hayes and Devitt (2008).

8. Use Writing Assignments: utilization of writing is essential to emerging critical thinking skills. "With written assignments, an instructor can encourage the development of dialectic reasoning by requiring students to argue both (or more) sides of an issue" (Wade, 1995). Blue, Taylor and Rice (2008) explored that peer review, scaffolded assignments, and the use of grading rubrics all helped undergraduate students improve their Critical Thinking abilities.

9. Cooperative learning: It is a learner-centered, instructor-facilitated educational technique in which a small group of students is in charge of their learning as well as the learning of the entire group. Students work together in a group to learn and practice the aspects of a topic to solve a problem, complete a task, or accomplish a goal (Li & Lam, 2005). Tan, Sharan and Lee (2007);Goyak, M. (2009); Muraya and Kimamo (2011) exposed that cooperative learning helps both creative and critical thinking improvement to enhance Critical Thinking and achievement (Klimoveiena, et al. (2006). Deepa (2012); Kumar (2014) demonstrated that the Jigsaw method of co-operative learning boosted students' critical thinking, and problem-solving abilities and helped both urban and rural students, as well as medium and low performers.

10. Project-based learning: It is defined by Thomas (2000) as a model that organizes learning around projects. Projects are complex tasks based on difficult questions or problems that require students to engage in designing, problem-solving, decision-making, or investigative activities; allow students to work relatively independently for extended periods, and culminate in realistic products or presentations. Authentic evaluation, teacher facilitation but not direction, cooperative learning, reflection, and the incorporation of adult abilities are among the other distinguishing qualities identified in the research (Diehl, Grobe, Lopez, & Cabral, 1999). Maya Sari (2021) found that critical thinking skills and way of thinking enhancement were positively influenced by project-based learning.

11. Multimedia: It is a multi-faceted approach. It is the exciting combination of computer hardware and software that allows the integration of multiple media elements (audio, video, graphics, text, animation, etc.) into one synergetic and symbiotic whole that results in more benefits for the end-user than any one of the media element can provide individually (Sharma & Priyamvada, (2017). Manjula (2013) referred to multimedia development as beneficial in improving IX standard pupils' critical thinking skills and different degrees of intelligence also had a significant impact on pupils' math achievement and critical thinking abilities.

12. **Think-Pair-Share (TPS):** It is a helpful learning methodology, a three-venture procedure where understudies think about a given inquiry or issue, given a restricted opportunity to think, put together their considerations and figure out their thoughts and replies to the given inquiries. Then, they move to the subsequent stage where they work in pairs and examine their responses (Sharma and Priyamvada, 2018; Raba, 2017). In the last advance, the students share their thoughts with the entire gathering (Millis, 2012). In recent years, various studies have examined the influence of TPS strategy on Critical Thinking. Sele et al (2016); Fatma. et al. (2019);Warliati et al (2019); Pamungkas, D. M. (2019); Rathakrishnan et al. (2019) stated that TPS helps to improve their critical thinking abilities, motivation, and improve speaking abilities. Implementation of TPS strategy Carinih. (2020);Taty R Koroh, F(2019);V. Giri, M. U. Paily (2020); Kurjum at. el (2020); Doyan at el. (2020) observed the same that the TPS strategy effective tool to develop the decisive reasoning abilities and critical thinking abilities. Rathakrishnan et al. (2020); Fauzi, et al. (2021) suggests that by adopting TPS, students were able to collaborate in small groups toward a shared objective, understand new material, think critically via discussion, and be secure in speaking themselves orally.

13. PMI (Plus-Minus-Interesting): It is an attention directed tool is the brainchild of Edward, de Bono. (1982). It is a lateral, creative and critical brainstorming thinking strategy and attention directing tool that prompts students to consider multiple

approaches to a topic. In this strategy, P stands for Plus or good points, M stands for Minus or bad points, I stands for Interesting points. Plus, Minus, Interesting is a way to analyse ideas, texts (written, visual, digital) and topics for learning explained by Sharma and Priyamvada, (2020). PMI is a critical thinking strategy which helps learners to consider different aspects of a situation, problem or issue and help in achieving students curiously about topic & engage them in learning.Sharma and Priyamvada (2017); Supartinah (2010) states that the PMI strategy can help the teachers to modify their teaching- learning process by incorporating PMI strategy to enable children to improve their creative and critical thinking.

Some other innovative strategies that have a positive effect on promoting critical thinking are Active Learning Strategy, Reading Composition, Flipped Classroom, K-W-L, Six Thinking Hats, Brainstorming, Role Playing, Socratic Seminars, and no one here an expert. These findings substantiate the effectiveness of active learning strategies explored by Yoder and Hochevar (2005). Mazer, et al (2007) found that the new instructional model with increased Critical Thinking instruction has resulted in significant development in students' Critical Thinking skills over time. Seeja (2012); Kim et al. (2013) demonstrated that Active Learning Strategies(Active learning tools such as Think-Pair-Share, Group Investigation, Concept Mapping, K-W-L) were successful in improving secondary school students' Critical Thinking Skills, Critical Thinking Dispositions, Legislative Thinking Styles, Judicial Thinking Styles, and Physics Achievement. Kalelioğlu & Gülbahar (2014) stated that the Mixed Techniques group (Six Thinking Hats, Brainstorming, Role Playing, Socratic Seminar, and Anyone Here an Expert) scored best in terms of critical thinking abilities in the online discussion, followed by the Anyone Here an Expert group, and the Brainstorming group. Tung and Chung (2009) found that 1) literature reading helped students who scored low on the pretest improve their overall Critical Thinking skills, particularly those in analysis; 2) students' English proficiency had no bearing on their performance on the pretest or post-test, and 3) students found guided in-class discussion to be more effective than other student-directed activities in developing Critical Thinking. Oliveras and Marquez (2013) explored "the use of newspaper articles as a tool to develop critical thinking in science classes". The findings demonstrate that the exercises created were effective in assisting pupils in reading critically.Fitriyadi & Wuryandani (2021) stated that the educational game was shown to help develop students' critical thinking abilities during the learning process based on statistical assessments.

CONCLUSION

Critical thinking is indispensable in real life, especially in the field of education, because critical thinking in education is the process of thinking to make decisions from various foundations such as evidence, methods, criteria, context, conceptualization, and relevant sources of information. In the end, this can be practiced by students in real life. Guilford (1956) suggests that experts have recommended two types of thinking strategies in learning, i.e., convergent and divergent thinking that is developed in a balanced way. Convergent thinking strategies have been tested to improve critical, logical, systematic, and planned thinking skills, while divergent thinking strategies generate creative, imaginative, and spontaneous thinking. It takes more than just giving students knowledge, theories, and strategies to teach them to think critically. Teachers should involve actively, need time to design content, have the patience to tackle the problems of students, and the deliberate creation of classroom exercises that enable students to Foster Critical Thinking. Critical Thinking takes time to teach and learn, and it must be a continuous practice. Because the development of critical thinkers capable of making successful decisions is vital, teachers must use innovative teaching strategies that encourage cognitive and affective thinking advancement.

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