IMPERATIVE OF SPECIFIC INSTRUCTIONAL STRATEGY FOR MATHEMATICS CLASSROOM CLIMATE

Dr. G. Panneerselvam,
Assistant Professor, MASS College of Education, Kumbakonam - Tamil Nadu, India.

ABSTRACT

This paper concentrates on specific instructional strategy as a factor that is directly connected to the classroom climate which focuses onmathematics. This thematic review aims to capture the role of specific instructional strategy and its efficacy, importance on handling mathematics. Currently the sections are initiated with a brief introduction of instructional strategy and discuss about the mathematics classroom climate and its necessities for assisting brain compatible instructional strategy (BCIS) as a specific instructional strategy. Collaboratively, instructional strategy, imperative for classroom climate is explained in sections. Further, the components of BCIS are explained briefly and its working nature in mathematical classroom climate was thematically registered. As a conclusion, the imperative of assisting specific instructional strategy that required for a mathematical classroom climate was discoursed.

Keywords: *Instructional strategy, mathematics, brain compatible instructional strategy and classroom climate.*

1.INTRODUCTION

Teaching mathematics through specific instructional strategy is a systematic and sensitive process for a teacher in a view to enhance learning. In support of this, there is a definite need to discuss specific types of instructional strategy in mathematics. In support of this, the nature of mathematics, need of classroom climate for teaching mathematics to be concentrated. **Instructional strategy:** Initially instructional strategy is teaching techniques that are assisted by a teacher to help learners to become independent while dealing with a mathematical problem. A specific instruction strategy handled by a teacher should obviously motivate students, make them remember data and understand it, focus their attention, and finally, to monitor and access learning as part of the teacher's part. Celal Akdeniz (2019) indicated the definition of instruction by Canady & Retting as, “It is a procedure and activities planned for teaching”. Also the author spots the definition by Moore as, “It is an activity process that is helping an individual's self-actualization and self-fulfilling”. **Nature of Mathematics:** Curriculum at all levels includes mathematics, since it has certain specific aims and objectives as its nature. Mathematics embraces an unbreakable position in school and college stage curriculum. Laxman Luitel (2019) quotes the words of Ernest about the nature of mathematics as, “Mathematics portrays knowledge as the certain and unchangeable truth, mathematical knowledge is made up of absolute truth and represents the unique realm of certain knowledge”. To concentrate in mathematics learner’s, require logical thinking, self-confidence, scientific approach, reasoning ability, calculating rapidity, systematic approach and so on. To enhance mathematics learning in learners a teacher should be strong in selecting the teaching methods that are correlated to certainty on the undertaken topics. Among these teaching methods, it is the important task for a teacher to deliberate on classroom climate.The contents in mathematics are tied up with specific terms resembling such as, formulas, measurements, signs, symbols, strategies. Concretely a teacher needs to be prepared for his session with relevancy of the above said constraints with respect to the teaching methods. **Classroom Climate:** Satisfying instructional strategy in correlation with nature of mathematics, it is essential to concentrate on classroom climate by a teacher. Ana Kuzie & Dubravka (2021) mentioned the words by Ahtee et al., as, “the classroom is a significant social environment in the multifaceted development of children. It shapes student’s essential perceptions, and it allows each child to acquire new concepts and procedures”. Also the words by Eder (2002), “there is no uniform definition of to construct classroom climate, but it is described through its fundamental supporting elements”. In general, a mathematics classroom should exist

with cooperative learning, group discussion, independent study, portfolio development, cognitive organizers, and issue-based inquiry and so on. In the above, the nature of mathematics is discussed and furthermore, it focuses on specific instructional strategies that are imperative to enhance mathematics learning.

2. CLASSROOM CULTURE AND CLIMATE

Analyze the aspects of mathematical education that direct to a range of issues. To stabilize the classroom culture, understand some issues around educational background. NCERT (2006) reported issues in teaching and learning mathematics as follows. (i) A sense of fear and failure regarding mathematics among majority of children, (ii) A curriculum that disappoints a talented minority as well as the non-participating majority in the same time, (iii) Crude method of assessing that encourage perception of mathematics as mechanical computation, and (iv) Lack of teacher preparation and support in the teaching of mathematics. Likewise, there are several factors that influenced mathematics learning in the nominal classroom. Although a classroom setting has two major components, namely physical and human resources. The physical component encompasses boards including black, green and white, projectors, working and non-working models, teaching learning aids, books, ICT equipment, library, e-books, journals etc. Human resource includes teachers, lab-assistant and students. It is necessary for a human resource to assist these physical components in a very effective manner to enhance the mathematics classroom and is known as the psycho-social environment classroom.

Apart from these, human resources, with the assistance of physical components, an effective instructional strategy is necessary to intermingle the above two for a successive classroom teaching to the students for a particular standard. Therefore, the instructional methods and the relevance of specific instructional methods for learning mathematics are thematically expressed in the further study as follows.

3. COLLABORATIVE OF INSTRUCTIONAL COMPONENTS

Mathematics teaching through specific instruction leads to an effective classroom, and it is also achieved by collaborating the components of instructional strategy. Pier and Wanjira (2009) quoted the report of Harris & Harvey of collaboration, it provides ways of teaching, to respond to student's needs and to provide students with the chance to experience two instructors contributing to the instruction.

Also in this paper, for mathematical climate, collaboration focuses on the specific instructional strategy, content and all other possessions that were discussed previously. Mathematics is a subject that totally deals with brain based learning and teaching is an art of challenging the brain. Sujathamalini & Panneerselvam (2016) mentioned that brain based instructional strategy is connecting brain research to school curriculum. This brain based instructional strategy otherwise brain computable instructional strategy be considered as specific instructional strategy for mathematical classroom climate.

4. IMPERATIVE FOR MATHEMATICAL LEARNING

Glenda Anthony and Margaret Margaret Walshaw & Glenda Anthony (2009) noted the imperative of mathematical learning. Teacher knowledge and learning, an ethic of care, learning arrangements, building on students' thinking, mathematical communication, mathematical language, assessment for learning, worthwhile learning tasks, making connections and tools & representations. These elements incorporate mathematical practices and the related activities, classroom discourse and the sort of tasks that enhance mathematical learning. For an effective classroom, these elements should not be considered in isolation but encountered as web factors that enhance learning.

4.1 Visualization and guided imagery

Visualization and guided imagery involves students to imagine about prescribed concepts in a more relaxed state. This strategy is most adoptable for handling word problems, study of structures, structures especially graph and geometry in mathematics. Harvey & Goudv is (2000) reported that "students who visualize have richer reading experiences but they can recall what they have read for a longer period of time". Thus guided imagery is not a mental activity; it involves the whole body, the emotions and all the senses; and is based on the concept that an individual body and mind are connected. It helps in increasing skills based activities and finally, visualization and guided imagery can work through as an associative process.

4.2 Chunking

Chunking involves breaking down a difficult text or mathematical concepts into more manageable sections and facilitates students to rewrite these "chunks". A chunk is a meaningful unit of information built from smaller pieces of data. Therefore chunking is a process of creating a new chunk, and a chunk can be seen as a collection of elements that have strong associations with one another.

Ben Nesvig (2014) articulates in a learning and development blog; "chunking is the act of breaking components into smaller chunks of related information". Chunking helps students to identify key words and ideas so that the working task is easier for them to organize and synthesize information. Chunking process consists of identifying, grouping & memorizing, and retrieving chunks.

4.3 Mind Mapping

A mind mapping is a graphical way to represent problems and concepts. It is a visual thinking tool that helps structuring information and it is also expressed as a powerful graphical technique that a student can use to translate the problem theme in mind into a visual picture.

Tony Buzan (1968), referred to mind mapping as a cluster of ideas. Gargee Mitra (2013) states that mind mapping is a colorful visual form of note taking that can be worked on by one person or a team of people. Primarily mind mapping will serve as the central image or the focal point of the mathematical problem. Secondly the main theme of the problem radiates from the source problem. Finally, the second level topics will form as the branches for individual mind maps and these form a connected nodal structure of the whole problem. Ultimately this mind map is an activity that is both analytic and artistic; it engages the student's brain in a much richer manner, serving in all its cognitive functions while solving a mathematics problem.

4.4 Graphic Organizers

The primary function of graphic organizers is to deliver information in a concise approach that highlights the organization and relationship of concepts. Bromley et al., (1999) represents graphic organizers as a visual representation of knowledge that structures information by arranging important aspects of a concept or topic into a pattern using labels. Utilizing this graphic, students are profited with clarification of doubts; infer solution to problems and reasoning strategy in content which they correspond. Possible outcomes may enhance thinking skills, provide information easier to recall, display internal thinking processes in external visual form, compile information, evaluate ideas, and reflect ideas.

4.5 Peer Tutoring

Peer tutoring is a system of instruction in mathematics in which students facilitate each other and teach themselves. It is a peer-mediated flexible strategy that allocates students as academic tutors. The dual important constraint is that a higher performing student is paired with a lower performing student to review academic or behavioral concepts. Eskay et al., (2012) quoted peer teaching as a process by which a competent pupil, with minimal training and with teacher guidance, helps one or more students at the same grade level to learn a simple skill or basic concept. (cited by Thomas, 2000). Strategy of peer tutoring is to ensure if tutors are trained utilization of reward systems and give emphasis to confidence.

4.6 Reciprocal Teaching

Reciprocal teaching refers to an instructional activity in which students become the tutor in small groups in a mathematics classroom. Ghorbani et al (2013), referred that, in classroom, while implementing the reciprocal teaching strategy, the tutor represents four comprehension strategies (summarizing, questioning, predicting, and clarifying) through guided group discussion and the four strategies are closely connected to the student's other sides, (cited from Palincsar, 1986). Once students are comfortable with the process and the strategies, such as similar discussions about different contents are dominated in this method of teaching.

Also, Palincsar and Brown (1986) believe the purpose of reciprocal teaching is to facilitate a group effort between teacher and students as well as among students in the task of bringing meaning to the text. Comprehensive strategies are highlighted as follows: Summarizing, questioning, predicting and clarifying

4.7 Elaborative Rehearsal

Elaborative rehearsal takes over the thoughts and ideas of short-term memory to long term memory. It works under the principle of relating new concepts to old concepts that are already in long-term memory, so that the

new concept sticks in a positive manner. Esther Heerema (2019) denotes elaborative rehearsal is a method to more effectively encode information into long-term memory by requiring the brain to process it in a more in-depth way. This type of rehearsal is effective for students with mild memory loss, while here learning involves thoughts about the denotation of data and connecting relevant information that was previously stored in memory. Usually an elaborative rehearsal system is frequently programmed by repetition of content.

The sequential strategies of elaborative rehearsal are as follows while concentrating with mathematical problems. Data translation in own words, compose study materials and elicit solutions, employ images to assist, grouping of terms and space out learning.

5. SPECIFIC INSTRUCTIONAL STRATEGY

In this paper, for teaching mathematics through specific instructional strategy some of the components that are related to brain based learning are reviewed. The components are visualization and guided imagery, chunking, mind mapping, graphic organizers, peer tutoring, reciprocal teaching and elaborative rehearsal. Sujathamalini & Panneerselvam (2016) reported that these components are used to enhance mathematics learning and this instructional strategy is also called brain computable instructional strategy. Mathematics is a subject that needs a personalized state of mind to learn it. This mind setup is rendered by this specific instructional strategy since it makes the students mind in a state of self-control and relaxed. Also with assisting these approaches in a mathematical classroom, a teacher may engage students in the learning process actively without any deviation.

This kind of classroom climate drives the teacher coaching to work to achieve the specific learning objectives and ensure with student's success. This must also have met entire learning techniques and developmental needs of the students, perhaps the only thing is the teacher engages students actively with the appropriate components of instructional strategy to ensure maximum effectiveness. Throughout the session, the teacher assists this specific instructional strategy to deal mathematics with respect to specific content, then the classroom climate resembles to be; learners are personalized, meaningful, learning by doing and enjoyable.

5.1 Working Nature of Components

To select the one-to-one mathematics corresponding through the components of brain compatible instructional strategy be quoted with appropriate themes as follows. Rezan & Ziya (2018), reports about the working nature of visualization and guided imagery mentioned by authors Bishop et al., It is assisting visualization generates interpretation, creation of pictures, images, diagrams in our minds, on paper, or with technological tools for the purpose of portraying. The author also expressed that "visualization appears not only in the development of mathematical thoughts but also in the discovery of new relations between mathematical objects' '. Opportunity to decrease the complexity in case of huge information is available within a specific problem. Arcaviet al., (2003), reported that using these components an individual's forms a spatial arrangement and finally constructs a transformation process or visual mental images. Educational principles/working procedures derived from chunk-based theories Fernand Gobel (2012), reported that chunking teach from simple to complex, known to unknown, using spiral technique (specific problems come back to the same concepts, ideas and collect new information), and encourage the students to find a balance between rote learning and understanding. According to Petro (2010), mind mapping increases the learning and maintenance of information by 10% if used correctly. Mind maps increase the learner's ability to take notes. Brinkmann (2003) conducted a study in math's classroom, "mind map has developed students in understanding the class content". Goodnough et al., (2014) found that the students practiced creating mind maps in groups where they had to create associations with words and images; they found students enjoyed a lot in making experience making learning fun and easier. Ahsan and Edy (2017) represent mind mapping as it can provide assistance to students to think creatively and increase the motivation of students as whole, because it is the process of mental activities by highlighting the problems from various aspects in order to find a solution, both from students and the teachers. In the circumstance of graphic organizers, it helps students to coordinate various parts of mathematical problems. Allen Zolman (2009) reported that on assisting with graphic organizers students can explore with; what is the question? What information is known? What strategies must be used? Which operations, procedures, or algorithms of the strategies need to be shown? What explanations and reflections are needed to communicate the method(s) of solution? These kinds of critical thinking about a mathematical problem finitely engages critical thinking mathematical classroom climate. Zolman (2009) also reported that before assisting with graphic organizers the score at "meets" or "exceeds" the level on each of the open-response item categories on the pretest was 4% for math knowledge, 19% for strategic knowledge, and 8% for explanation. After instructing students to use the graphic organizers in mathematical problem solving, the percentage of students scoring "meets' '

or “exceeds' ' on the post-test improved to 75% for math knowledge, 68% for strategic knowledge, and 68% for explanation. Adbelkarim & Reem (2016) concluded that “there is a statistical difference at a $(\alpha = 0.05)$ in mathematics academic achievement of students attributed to the peer teaching process”. Also the authors mentioned that in light of the findings, the instructors use peer teaching as an instructional strategy to help students in increasing their achievement. Moliner and Alegre (2020) reported that the conclusion was, “from their study, peer tutoring may be very beneficial for middle school students (12-15 years old) with mathematics anxiety”. Alegre et al (2019) reported that peer tutoring has been found to improve academic results in mathematics in secondary education most of the time. Although their study suggests implementing peer tutoring under certain conditions, practitioners should also find academic benefits in any scenario as academic gain has been documented overall under any condition”. Aqsa Batool et al., (2021) identifies that “peer tutoring is the most effective mode, and it has a good fortune for both the teachers and students' '. Darsono (2015), reported about reciprocal teaching as, “through reciprocal teaching students are taught four independent strategies, namely; summarizing, asking questions, explaining, and predicting”. Rasmuin et al., (2019) emphasize that “learning mathematics through reciprocal teaching is not only a rote learning, but is also simulating the students' reasoning power, so that is expected to be able to solve the mathematical problem well and correctly”. Nunung (2020) points out that the use of reciprocal teaching learning can improve mathematical communication skills.

Abdel Kader et al (2015) reported that elaboration theory was adopted to provide for student’s analogies familiar to the content of the lesson, which makes it easy to learn without the occurrences of errors in understanding. Rawlins et al (2020) highlighted the words of Smith & Stein, that collaborative planning for the teaching of rehearsal was an integral part of the process. A specific planning template includes a series of possible teaching points, prompts to consider potential integration of high level practice, and prompts to anticipate student’s solution strategies, and how the teacher might respond.

6. DISCUSSION

In general, developing a positive rapport in the classroom improves learning, promotes motivation and increases connected content with practical activities, and also leads to enhanced focus. Also it creates a positive climate for learning innovative, creative and logical belongings in the classroom. This study focuses on the mathematical classroom climate when teachers assist their session with specific instructional strategy. Through this specific instructional strategy classroom climate can be seen with the following. Learning objectives can be satisfied and aligned, provide a clear course structure; prepare students to do within and outside of the class to succeed; provide early opportunities for feedback; and continue with timing and targeted feedback during the session; students get a lot of opportunity to practice and reflect upon the learning content. Ultimately, a mathematics classroom climate requires a supportive, personalized situation in part of learners to grasp the content. This can be successfully achieved by assisting with specific instructional strategy. Intended for this the teachers should guide with their efforts as well as place more emphasis on focusing the content to attain the better classroom climate with better result.

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