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-Cognition in Teaching skills
A better approach to Teacher-Training Program

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Teachers are the backbone of the educational system and they have the greatest influence on the student's achievement. The all-round development of students and the quality of education depends on teachers to a greater extent. So it is very important to ensure the quality of teachers. The quality of education can be raised by introducing better practices in teacher-education and take the lead in imparting quality education in the nation. Simultaneously the same changes should be introduced as a part of in-service teacher training so that a total revamping of the education will be possible. One of the important areas which require enforcement is classroom practices and pedagogical practices. Our classrooms need to be active learning centers wherein learners are actively interacting with the learning material and the whole process leading to a joyful and meaning leaning.

The recent researches show that well informed and well-trained teachers are the most important school-related factor which affects student's development. So it's very important that the teacher-training programs should train the student teachers well and equip them to satisfy the demands of future generations. The teacher training program should align with the cutting edge of research in terms of its curricular and co-curricular activities. The teacher-training program should focus on the teaching skills of the student teachers. The 21st-century teachers should be able to help students to use higher-order cognitive abilities like analysis, evaluating, creating, etc. The student teachers should be equipped with better teaching skills that are suitable for future-generation classrooms. 21st Century Skills has identified self-directed learning as one of the life and career skills necessary to prepare students for post-secondary education and the workforce. However, educators may not be familiar with methods for teaching and assessing metacognition. The purpose of the present research is to study the effectiveness of a metacognitive approach in teaching skills that affect the teacher-training program.

Metacognition

John Flavell originally coined the term metacognition in the late 1970s to mean "cognition about cognitive phenomena," or more simply "thinking about thinking" (Flavell, 1979, p. 906). The researchers working in the field of cognitive psychology have given various definitions: like "The knowledge and control children have over their own thinking and learning activities" (Cross & Paris, 1988, p. 131). It's also defined as "Awareness of one's own thinking, awareness of the content of one's conceptions, an active monitoring of one's cognitive processes, an attempt to regulate one's cognitive processes in relationship to further learning, and an application of a set of heuristics as an effective device for helping people organize their methods of attack on problems in general" (Hennessey, 1999, p. 3). Meta-cognition is also considered as "Awareness and management of one's own thought" (Kuhn & Dean, 2004,p. 270) and "The monitoring and control of thought" (Martinez, 2006, p. 696)

Teaching skills

Schools in the 21st century are like a nerve center, a place for teachers and students to collaborate and equip themselves for the future. Teaching in this new environment will become fewer instructors and more orchestrators of information, helping children to develop the ability to turn knowledge into wisdom, and be more practical and creative in their approach. There are many teaching skills required for a teacher but some of the important skills that we focused on in the present study are:

Aims and/or Objectives of the Study:

1. To develop Metacognitive Training Module (MTM) in Developing Selected Teaching Skills – a) Presentation skills b) Interaction skills c) Classroom Management Skills d) Evaluation Skills

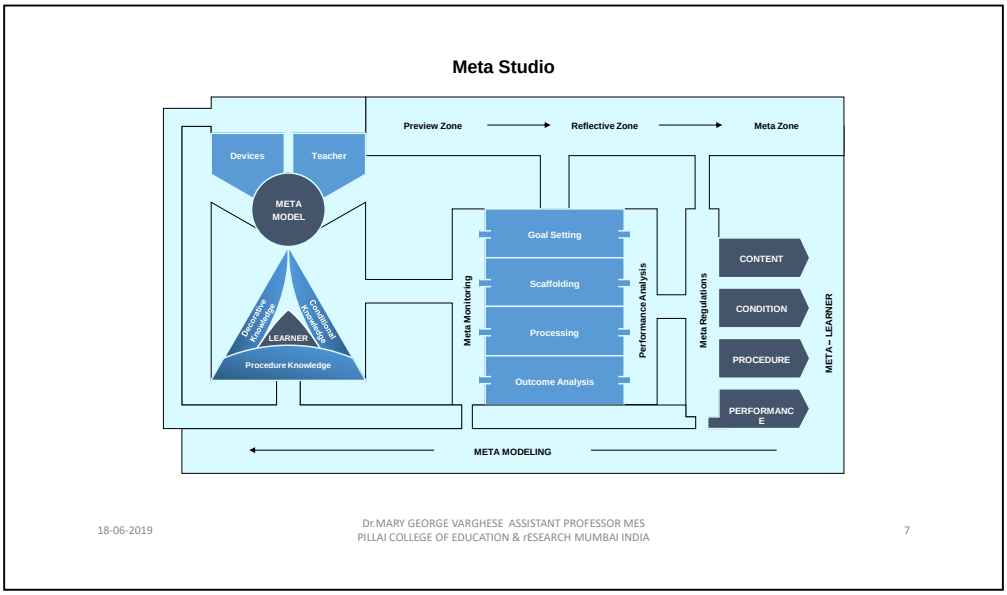
2. To analyze the Selected Teaching Skills - a) Presentation skills b) Interaction skills c) Classroom Management Skills d) Evaluation Skills, of student-teachers of experimental and control groups.
3. To compare experimental and control groups on pre-test scores of the metacognition in teaching skills among the student-teachers
4. To compare experimental and control groups on post-test scores of the metacognition in teaching skills among the student-teachers
5. To study the effectiveness of Metacognitive Training Module (MTM) in Developing Selected Teaching Skills- a) Presentation skills b) Interaction skills c) Classroom Management Skills d) Evaluation Skills, among the student-teachers

Conceptual Framework

The present research focused on developing metacognition in teaching skills through Metacognitive Training Module (MTM)**.** The study aligns neuroscience into educational practices and classrooms to find answers to the difficult questions of the twenty-first century. The following tools were used in the study

- ❖ Metacognitive Training Module (MTM)
- ❖ Rating Scales on Teaching Skills

The metacognitive training module is prepared on the basis of the model called 'Meta-studio' provides well-defined learning experiences and continuous performance Monitoring System which ensure meaningful learning among students. It influences the student's academic performance and enhances the higher learning objectives viz. analysis synthesis creating and evaluation.



The 'Meta Studio' has three zones viz. Preview Zone, Reflective Zone, and Meta-Zone. 1) Preview Zone which is a preparatory stage which includes Learner and the meta-model. The meta-model could be the teacher as reflective practitioners or any assistive technological tool or resources. The learner should be oriented at the Declarative, procedural and Conditional levels of Knowledge.

2) Reflective Zone

In this zone, the meta-monitoring is the major orient and it comprises of goal setting, scaffolding, processing and outcome analysis. All these happen in a highly assistive and reflective mode and cognitively alert and reflective in nature. Reflective nature is the major icon of this stage which immerse the learner and the meta-model in the process.

3) Meta-Zone

The zone takes care of the meta-regulatory activities on 4 major constructs viz. content, conditions, procedure, and performance of the transformed learner- The Meta Learner. The regulation can be performed at all levels depends upon the self-assessment and Performance Index.

The ‘meta-studio' follows a content-process- time matrix that was considered in the meta-modeling process. Prime Time-1, Prime Time-2, Prime Time-3, and Downshift. In the Prime-time 1 (5-10 minutes of the session) the model prepares the learner at the declarative, conditional and procedural knowledge level, and connect the learner with the Meta-model. Prime Time-2 focuses mainly on meta-monitoring which is reflective in nature. (20-25 minutes of the session) Prime Time-3 (5-10 minutes of the session) where meta regulation takes place based on Performance Index and Self- check. In Downshift-The Meta-learner unwind before coming out of the Meta-Studio. In this stage, the principle of self-analysis and reflection is mostly employed.

Research Question or Hypotheses

The hypotheses formulated in the study are:

1. There is no significant difference in Selected Teaching Skills of student-teachers of experimental and control groups.
2. There is no significant difference between experimental and control groups on pre-test scores of the metacognition in teaching skills among the student-teachers.
3. There is no significant difference between experimental and control groups on post-test scores of the metacognition in teaching skills among the student-teachers.
4. There is no significant difference in the effectiveness of Metacognitive Training Module (MTM) in Developing Selected Teaching Skills among the student-teachers

The sample of the study comprises 100 student-teachers selected through incidental sampling. In order to achieve the aim of the study, it adopts a mixed method in which the researcher adopts the exploratory design. A mixed methods research design is a procedure for collecting, analyzing, and "mixing" both quantitative and qualitative research in a single study to understand a research problem.

The phase I was carried out through qualitative methods. The data collection methods include Interviews, Observations, Focus Groups. The researchers conduct interviews and observation on student teachers to understand the teaching skills among them. Participant and non-participant observation (if necessary) also will conduct. Phase II was carried out through a quasi-experimental method in which of the pre-test, post-test quasi-experimental design type, viz. O1 X O2 and O3X O4 methods were used in the study. Here, O1 and O3 are the pre-test scores; O2 and O4 are the post-test scores.

Review of Related Literature

The researcher has done an extensive analysis of literature on the empirical evidence on the “teachability” of metacognitive skills, and some the studies which are relevant to the present studies are included in this paper.

Several researchers offer evidence that metacognition is teachable (Cross & Paris, 1988; Dignath et al., 2008; Haller et al., 1988; Hennessey, 1999; Kramarski & Mevarech, 2003). Cross and Paris (1988) describe an intervention targeted at improving the metacognitive skills and reading comprehension of 171 students in third and fifth grades. Children were exposed to a curriculum (Informed Strategies for Learning) designed to increase their awareness and use of effective reading strategies. During instruction, students received strategy training that included explicit attention to declarative, procedural, and conditional knowledge about reading strategies. Students in both grades made significant gains relative to comparison students with regard to awareness about reading in three areas—evaluation of task difficulty and one’s own abilities, planning to reach a goal, and monitoring progress towards the goal.

Dignath et al. (2008) meta-analyzed 48 studies investigating the effect of training in self –regulation on learning and use of strategies among students in first through sixth grades. The overall effect size for all studies examining the effect of any type of self-regulation training on the use of cognitive or metacognitive strategies was 0.73. Training that specifically emphasized metacognitive strategies had an effect size of 0.54. Training approaches that combined metacognitive components with other aspects of self-regulation, such as cognitive or motivational strategies, were even more successful, with average effect sizes of 0.81 and 0.97, respectively. The most successful cognitive strategies included elaboration taught in isolation (mean effect size = 1.19), followed by a combination of elaboration, organization, and problem solving strategies (mean effect size = 0.94) and problem solving taught in isolation (mean effect size = 0.72). The most effective metacognitive strategies included the combination of planning and monitoring (mean effect size = 1.50) and the combination of planning and evaluation (mean effect size = 1.46), both of which were more successful than teaching any of the skills in isolation or teaching a combination of all three metacognitive skills

(planning, monitoring, and evaluation). In studies where the intervention also included instruction designed to promote student metacognitive reflection, the most effective type of instruction emphasized a combination of knowledge about strategies as well as specific benefits of those strategies (mean effect size = 0.95).

Haller et al. (1988) meta-analyzed 20 empirical studies, comprising more than 1,500 students, on the effects of metacognitive instruction on students' metacognition during reading. They computed a mean effect size of 0.71, which suggests that instruction in metacognition can have robust effects on children's reading awareness and comprehension. Effects were largest for students in the seventh and eighth grades, but were also impressive among students in the second and third grades. The most modest effect sizes were found among students in fourth through sixth grades. Results suggest that instructional interventions involving fewer than 10 minutes of instruction per lesson are insufficient for producing these types of effects. The most effective instructional strategies included the textual-dissonance approach, self-questioning, and backward-forward search strategies, although the authors recommend using a variety of diverse techniques for best results.

Hennessey (1999) describes an instructional program involving 170 students in grades 1 through 6 over a period of three years. Students engaged in science units designed to explore students' science conceptions and the nature of science, with activities focusing specifically on development of metacognition. Teachers' instruction emphasized making students' science conceptions visible, creating opportunities for students to clarify their conceptions in small groups, promoting metacognitive discourse among students, encouraging conceptual conflict, and facilitating student practice in different contexts. Hennessey concludes that students did exhibit qualitative changes in their metacognitive abilities from one year to the next, with students as young as first graders exhibiting the highest level of metacognition. Kramarski and Mevarech (2003) report the results of a study investigating the effects of metacognitive training on the mathematical reasoning and metacognitive skills of 384 eighth-grade students. They found that students exposed to metacognitive instruction in either cooperative or individualized learning environments outperformed comparison students with respect to the ability to interpret graphs, fluency and flexibility of correct mathematical explanations, use of logical arguments to support math reasoning, performance on transfer tasks, and level of domain-specific metacognitive knowledge, such as strategies for representing math concepts in multiple ways and specific mathematical strategies for interpreting graphs.

Researchers have recommended a number of specific instructional approaches to teaching metacognition. Cross and Paris (1988) recommend providing explicit instruction in declarative, procedural, and conditional knowledge. Similarly, Schraw et al. (2006) and Schraw (1998) urge educators to provide explicit instruction in cognitive and metacognitive strategies. Further, Schraw emphasizes that such strategy training needs to emphasize how to use strategies, when to use them, and why they are beneficial. A number of other researchers echo the importance of highlighting the value of particular strategies in order to motivate students to use them strategically and independently (Cross & Paris, 1988; Kramarski & Mevarech, 2003; Schneider & Lockl, 2002). In addition to providing instruction on cognitive knowledge, educators should also assist students in developing their abilities to monitor and regulate their cognition. Most of these recommendations concern the level of teacher scaffolding and structure provided. For example, Kuhn (2000) points out that instruction for metacognition should be delivered at the meta-level rather than the performance level, which means instruction should be aimed at increasing awareness and control of meta-task, rather than task, procedures. Schraw (1998) recommends providing explicit prompts to help students improve their regulating abilities. He suggests using a checklist with entries for planning, monitoring, and evaluation, with sub questions included under each entry that need to be addressed during the course of instruction. Such a checklist, he argues, helps students to be more systematic and strategic during problem solving. Similarly, Kramarski and Mevarech (2003) provided students with sets of metacognitive questions, including comprehension questions, strategic questions, and connection questions, to be completed during the task. Finally, connection questions were designed to encourage students to identify and recognize deep-structure task attributes so that they could activate relevant strategy and background knowledge.

Researchers also recommend the use of collaborative or cooperative learning structures for encouraging development of metacognitive skills (Cross & Paris, 1988; Hennessey, 1999; Kramarski & Mevarech, 2003; Kuhn & Dean, 2004; Martinez, 2006; McLeod, 1997; Paris & Winograd, 1990; Schraw & Moshman, 1995; Schraw et al., 2006). This recommendation appears to be rooted in Piagetian and Vygotskyian traditions that emphasize the value of social interactions for promoting cognitive development Dillenbourg et al., 1996. Piaget touted the instructional value of cognitive conflict for catalysing growth, typically achieved by interacting with another person at a higher developmental stage. Along similar lines, Vygotsky identified the zone of proximal development as the distance between what an individual can accomplish alone and what he/she can accomplish with the help of a more capable other (either a peer or adult). Each of these approaches

highlights the potential for cognitive improvement when students interact with one another. Cross and Paris (1988), who identify group discussions about the use of reading strategies as one of the critical features of the Informed Strategies for Learning curriculum. Hennessey (1999) points out that such techniques promote metacognitive discourse among students and stimulate conceptual conflict. Such conflict can lead to clarifications of students' beliefs and concepts. Similarly, Kramarski and Mevarech (2003) attribute the superior performance of students working in collaborative group settings to the higher quality of discourse observed among students working together. Students participating in cooperative learning expressed their mathematical ideas in writing more ably than did those who worked alone. Moreover, as Schraw and Moshman (1995) note, peer interaction can encourage the construction and refinement of metacognitive theories, which are frameworks for integrating cognitive knowledge and cognitive regulation. Kuhn and Dean (2004) argue that social discourse can cause students to "interiorize" processes of providing elaborations and explanations, which have been associated with improved learning outcomes. Schraw et al. (2006) point out that small group work should involve peers at a similar developmental level, because they can provide examples within the learner's zone of proximal development. Further, they observe that collaborative learning works especially well when students have been explicitly taught how to collaborate, a point echoed by Kramarski and Mevarech (2003). Other instructional recommendations include making student reasoning, concepts, and beliefs visible (Hennessey, 1999) by having students construct conceptual or mental models of the phenomena under study. Construction of such models may facilitate conceptual change for students holding inappropriate science conceptions, particularly if the process of developing and refining such models produces cognitive disequilibrium or conflict (Schraw et al., 2006).

A number of researchers have proposed alternative models of metacognitive development over time. Cognitive knowledge tends to emerge first, with regulation of cognition not appearing until much later. Metacognition improves with both age and appropriate instruction, with substantial empirical evidence supporting the notion that students can be taught to reflect on their own thinking. Researchers recommend a number of specific instructional strategies, including providing explicit instruction in both cognitive knowledge and cognitive regulation, using collaborative or cooperative learning methods, using tasks and activities that make student conceptions and beliefs visible, promoting awareness of metacognition through teacher modelling, and attending to the affective and motivational aspects of metacognition.

Thus the review shows that there are no researches conducted on metacognitive skills on teaching skills. The literature shows that there are very few studies conducted in India and those studies have been done in isolation. Hence the researcher found this as a potential area for extensive research. There are hardly any studies conducted among student teachers on their meta cognitive skills hence the researcher decided to focus how these skills can be taught to them and encourage them to practice in their future classrooms.

Result and Discussion

This study validates the following ideas. Between-groups comparison of the teaching skills of the student-teachers showed that there are significant differences among the post-test scores for teaching skills - (Presentation skills $p=0.00076 \leq 0.50$, Interaction skills $p=8E\text{-}05 \leq 0.50$, Classroom Management Skills $p=0.00076 \leq 0.50$, Evaluation Skills $p=0.00512 \leq 0.50$). Thus significant differences favoring the experimental group were observed for the post-test scores.

The analysis of the qualitative data of the control group and experimental group students also shows significant behavioral outcomes in terms of post-test scores. This finding supports the idea that, where it is applied, the metacognitive approach improves the teaching skills among the student teachers.

Metacognition in teaching skills leads to well-defined professional development skills among the student teachers and it influences the improvement of student-teachers' achievement through the identification of authentic areas of strengths and leads to innovative practices through the continuous process of setting and attaining goals and its refinement. Metacognition in teaching skills helps the learners to overlearn the prerequisite content knowledge for the subject matter topic being studied and master the teaching skills.

The study will benefit educators to train student-teachers to use meta-cognitive skills in teaching skills. The meta-cognitive strategies familiarize the educators, the different student engagement and active participating learning techniques and enable students to be responsible for their own learning. The study will also help the educationists and psychologist and other special educators to work out with diverse learners. Thus the outcome of the study will contribute immensely to improve the quality of the teacher-training Program. Hence the project contributes immensely to the body of knowledge and the system of educational practices. The study prepares the student- teachers to practice metacognition in teaching skills which they can apply in their classrooms.

Conclusion

"Good education requires good teachers" that it becomes essential that the most capable and appropriate be recruited into the teaching profession, provided with a high-quality pre-service program of teacher education, and they offered opportunities to upgrade their knowledge and skills over the full length of their career. It is very essential to train the Student-teachers to work individually and collaboratively, using rich and varied sources, to reach understandings, make decisions, discuss issues and solve problems. Student teachers should be provided with opportunities construction of meaning is facilitated by a clear explanation, modelling, and interactive discourse.

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