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## CONSTRUCTIVE MODEL OF TEACHING- LEARNING SCHOOL SCIENCE: PRE-SERVICE STUDENT-TEACHERS EXPERIENCES DURING INTERNSHIP IN TEACHING PROGRAM

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**Abstract:**-This study examined a cohort of pre-service teachers who participated in an innovative constructivist Internship in teaching as a major component of their teacher preparation program. The purpose of this case study was to describe the experiences and reactions of a cohort of pre-service teachers enrolled in this teacher education program. In addition, this study sought to gain a deeper understanding of how pre-service teachers described and reported learning in this constructivist based Internship in teaching. Data sources from this study included: classroom observations and interactions, field observations and notes, reflective journals, lesson plans developed during internship, and personal interviews. Major findings from this study included a deeper understanding by the majority of the pre-service teacher participants. In addition, pre-service teachers gained and reported more advanced strategies for problem solving, communicating, and working within a course that used a constructivist framework for learning. Results from this study suggest that constructivist based Internship in teaching can provide a valuable context for pre-service teacher preparation that involves learning and teaching of science, technology, and problem solving.

**Keywords:** Constructive Model ,Teaching-Learning ,Teaching program.

### WHAT IS CONSTRUCTIVISM IN EDUCATION?

Constructivism is basically a theory based on observation and scientific study about how people learn. Constructivism sees learning as a dynamic and social process in which learners actively construct meaning from their experiences in connection with their prior understandings and the social setting. In the context of science teaching learning process, it is observed that students conceptualize science as making sense of the world around them and as a mean of discovering theories, laws, and principles associated with reality. In the classroom, the constructivist view of learning can point towards a number of different teaching practices. In the most general sense, it usually means encouraging students to use active techniques (experiments, real-world problem solving) to create more knowledge and then to reflect on and talk about what they are doing and how their understanding is changing. Learners actively construct their own knowledge by connecting new ideas to existing ideas on the basis of materials / activities presented to them (experience). The teacher makes sure she understands the students' preexisting conceptions, and guides the activity to address them and then build on them. In the constructivist perspective, learning is a process of the construction of knowledge.

How children constructs knowledge and how teachers can provide interventions to help children to construct their own concepts and make a meaning out of their learning of the concepts are the guiding questions that drive constructivism in teaching-learning. Constructivist teachers encourage students to constantly assess how the activity is helping them gain understanding. By questioning themselves and their strategies, students in the constructivist classroom ideally become "expert learners."

## NCF: 2005 – TENETS OF CONSTRUCTIVISM

- All children are naturally motivated to learn and are capable of learning.
- Making meaning and developing the capacity for abstract thinking, reflection and work are the most important aspects of learning.
- Children learn in a variety of ways – through experience, making and doing things, experimentation, reading, discussion, asking, listening, thinking and reflecting, and expressing oneself in speech, movement or writing – both individually and with others. They require opportunities of all these kinds in the course of their development.
- Teaching something before the child is cognitively ready takes away from learning it at a later stage. Children may 'remember' many facts but they may not understand them or be able to relate them to the world around them.
- Learning takes place both within school and outside school. Learning is enriched if the two arenas interact with each other. Art and work provide opportunities for holistic learning that is rich in tacit and aesthetic components. Such experiences are essential for linguistically known things, especially in moral and ethical matters, to be learnt through direct experience, and integrated into life.
- Learning must be paced so that it allows learners to engage with concepts and deepen understanding, rather than remembering only to forget after examinations. At the same time learning must provide variety and challenge, and be interesting and engaging. Boredom is a sign that the task may have become mechanically repetitive for the child and of little cognitive value.
- Learning can take place with or without mediation. In the case of the latter, the social context and interactions, especially with those who are capable, provide avenues for learners to work at cognitive levels above their own. (pp. 15-16)

## CONSTRUCTIVE LEARNING ENVIRONMENT

A constructivist learning environment is characterized by learner's construction knowledge out of their experiences which are associated with pedagogical approaches that promote active leaning. (A folabi&akinboboa, 2009). Constructivist learning environments place much premium on students' prior knowledge which is also referred to as alternative framework or alternative conception. According to Neo and Neo (2009), a constructivist learning environment play an important part in achieving meaningful and retentive learning since it allows students to improve their problem solving, creating thinking and critical thinking skills.

According to Akinbobol and Afolabi ( 2010) in a constructivist learning environment, the teachers' role is to serve as the facilitator of learning in which students are encouraged to be responsible autonomous and construct their own understanding of each of the scientific concept, Hence the activities are learner- centered, democratic and interactive. The teacher provides students with experiences that allow them to use science process skills. According Thorndike (2000), the teachers' responsibility in a constructivist learning environment involves taking into account students' prior knowledge and understanding the nature of the concepts to be learned and the learning outcomes expected, conceptual demands made on the child and the strategies available to the teacher.

It is important for teachers to create learning environments which ensures that students play an active role in their own learning process and access knowledge through investigation and questioning. Constructivist teaching strategy has been known to crate learning environments where the learners are actively involved.

## 5E MODEL OF LEARNING SITUATION

The 5 E's is an instructional model based on the constructivist approach to learning, which says that learners build or construct new ideas on top of their old ideas. The 5 E's can be used with students of all ages, including adults. Each of the 5 E's describes a phase of learning, and each phase begins with the letter "E": Engage, Explore, Explain, Elaborate, and Evaluate. The 5 E's allows students and teachers to experience common activities, to use and build on prior knowledge and experience, to construct meaning, and to continually assess their understanding of a concept.

**Engage: This phase of the 5 E's starts the process. An "engage" activity should do the following:**

1. Make connections between past and present learning experiences
2. Anticipate activities and focus students' thinking on the learning outcomes of current activities. Students should become mentally engaged in the concept, process, or skill to be learned.

**Explore:** This phase of the 5 E's provides students with a common base of experiences. They identify and develop concepts, processes, and skills. During this phase, students actively explore their environment or manipulate materials.

**Explain:** This phase of the 5 E's helps students explain the concepts they have been exploring. They have opportunities to verbalize their conceptual understanding or to demonstrate new skills or behaviours. This phase also

provides opportunities for teachers to introduce formal terms, definitions, and explanations for concepts, processes, skills, or behaviors.

Elaborate: This phase of the 5 E's extends students' conceptual understanding and allows them to practice skills and behaviours. Through new experiences, the learners develop deeper and broader understanding of major concepts, obtain more information about areas of interest, and refine their skills.

Evaluate: This phase of the 5 E's encourages learners to assess their understanding and abilities and lets teachers evaluate students' understanding of key concepts and skill development.

## **RATIONALE OF THE STUDY**

Keeping the above discussion in view, the pre-service trainee teachers need to know about constructivism as the most widely accepted pedagogical approach and the latest developments that have taken place in education. Pre-service trainee teachers are offered 6 to 8 weeks of internship in teaching where they administer 5E model of learning situation and hence they are also trained for applying constructivism in their classroom teaching. Internship program in teaching was conducted for duration of 6 weeks for B.Sc. B.Ed. and eight week for B.Ed. In such a context, it is pertinent to know the experiences that pre-service teachers have had on 5 E Models of teaching and learning. In addition, it is of utmost important to understand their experiences with regard to the easiness in creating and implementing the learning situations based on 5 E Model. At the same time is more than important to understand the challenges that they might have faced in creating and implementing learning situations. Significance of any research depends on its applicability to bring educational reform. Also, the findings o the study may help to overcome the dilemmas faced by the present pre-service trainee teachers in a constructivist teaching- learning approach. This research will help the institute to improve upon the present pedagogical practices of the trainees teachers and may become wide spread across the nation.

## **STATEMENT OF THE PROBLEM**

The problem for the present study was worded as: Experiences of pre-service trainee teachers towards 5E model of creating learning situation Achievability and Challenges"

## **OPERATIONAL DEFINITION OF TERMS**

1.5E Model: The 5E's is an instructional Model based on the constructivist approach to learning, having five phases of teaching: engagement, exploration, explanation elaboration and evaluation, where each phase has a specific function and contributes to till teacher's coherent instruction and to the learners' formulation of a better understanding o scientific and technological knowledge, attitudes and skills.

2.Experience: Experience, for the purpose of the study, can be defined occurrence which leaves an impression on interns and the way they articulate their classroom engagement during internship. Experiences can be seen from two levels:

- Achievability: The extent to which the pre-service trainee teachers perceive that his/her 5E model learning situation has been created and implemented successfully may b defined as achievability in this proposed student.
- Challenges: The extent to which a pre-service trainee teacher perceived the challenges she or he encountered while creating and implementing 5E model learning situations may be defined as challenges in this proposed study.

## **OBJECTIVES OF THE STUDY**

The following were the objectives of the present study:

- 1.To study the experiences of pre-service trainee teachers towards 5E model of creating learning situations and influence of experience of pre-service trainee teachers on preparing am implementing learning situations through 5E Model.
2. To study the achievability and challenges that pre-service trainee teacher encountered while preparing and implementing learning situations through 5E Model.

## **DESIGN OF THE STUDY**

The present study is a quantitative study as well as quantitative culminating into mixed methods. Mixed methods research is a methodology for conducting research that involves collecting, analyzing, and integrating (or mixing) quantitative and qualitative research (and data) in a single study or a longitudinal program of inquiry. The purpose of this form of research is that both qualitative and quantitative research, in combination, provides a better understanding of a research problem or issue than either research approach alone. Creswell (2003) defines mixed

methods as “integrating quantitative and qualitative data collection and analysis in a single study or a program of enquiry.”

Purposive sampling was used for selection of pre-service trainee teachers of B. Sc B. Ed. and two year B. Ed. The pre-service trainee teachers' experiences have been scored and categorized into positive, negative or neutral (favorable, unfavorable or indifferent) th relationship between the experience on 5E model and the pre-service trainee teachers narratives on achievability and challenges that they have encountered during their internship was established.

## **SAMPLE OF THE STUDY**

During Internship in teaching, 5 E Model is used as a teaching learning approach which is peculiar to RIE Bhopal. As Internship for student-teachers take place during 2nd year for B. Ed. and during 7th Semester for B.Sc.-B. Ed. with a specialization in Biology and Chemistry. The entire classes mentioned above are taken as a sample that amounts to total of 60 participants. In order to understand each case as what achievability and challenges that they have faced while creating and implementing learning situations.

## **TOOLS USED IN THE STUDY**

A self constructed scale was used to study the experience of pre-service trainee teacher on 5E model in accordance with Likert scale (i.e. five-point scale), In order to understand the achievability and challenges, interview schedule was developed.

A scale was prepared to study the experience of pre-service trainee teachers towards 5E model of creating learning situations and influence of attitude of pre-service student-teachers on preparing and implementing learning situations through 5E Model. It consisted of 21 test items and instructions directing the pre-service trainee teachers to tick the box in option of starting from strongly agree to strongly disagree.

### **Interviews**

In-depth interviews were conducted with the participants to understand their attitude on achievability of creating and implementing 5E Model learning situation and challenges that they had encountered in the process. There were 15 planned and open ended questions based on the components of 5E mode procedural details of the study. The researcher personally met with the participants of B. Sc. B. Ed. and two year B. Ed. for conducting the study and established rapport with them.

### **Experience scale**

This tool was administered in the very beginning of data collection so the researcher has the idea about participants' experience of 5E model of constructivism. Prior to the administration of the tool, the participants were explained about the test items, which they suppose to answer. The significance of the tool and the necessary instructions were made clear to them. In-depth interviews after having the idea about participant's attitude towards 5E model of constructivism in-depth interviews were conducted. They were given sufficient time ranging from forty-five minutes to one hour to answer to the queries of the researcher. The answers to the questions were recorded in an audio recorder to be used for further analysis.

## **STATISTICAL TECHNIQUES USED**

The statistical techniques used in the study for analyzing the data are given as follows:

- 1.For studying the experience of pre-service trainee teachers towards 5E model of constructivism, data were analyzed by computing mean and standard deviation respectively.
- 2.For studying the achievability and challenges that pre-service trainee teachers encountered while preparing and implementing learning situations through 5E Model, were analyzed by taking in-depth open-ended interviews.

## **DEIMITATIONS OF THE STUDY**

The study has some avoidable limitations arising out of the constraints of human and physical resources and the time of the investigator. In view of the research constraints under which the study was conducted, it remained confined to the following:

- 1.Only the Regional Institute of Education, Bhopal was selected for the study.

2. Only B. Sc. B.Ed. VIII sem. and two year B.Ed. pre-service trainee teachers were selected for the study.
3. Challenges faced in teaching science (namely chemistry and biology) subject only were considered.

### MAJOR FINDINGS OF THE STUDY

The following findings came out from the interpretation of data collected from the above said sample:

1. A clear majority 68.33 % (41) of pre-service trainee teachers had a neutral view towards 5E Model of creating learning situations. Whereas a few 20% (12) number of pre-service trainee, teachers held a negative experience, even fewer 11.66%(7) were in support of 5E Model of creating and learning situations.
2. During the phase Evaluate, the participants faced a number of problems like insufficient time allotment, lack of proper acquaintance with Rubrics, confusion in understanding specific terminologies in rubrics, inability in preparing rubrics due to lack of sufficient pre-internship training.
3. As the learners were used to behaviorist approach of teaching-learning, they would respond to question of evaluation in a bookish manner despite being discouraged of the same. The participants also confessed that they were unable to ask application level question or domain specific question.
4. The participants also encountered a problem in evaluating the students when they would give collective answers. It took a lot of discipline and patience for the learners to learn and wait for their turn.
5. The participants faced a problem in evaluating divergent and critical thinking, however impressive it might be, as most of them evaluated the learners in the achievement test manner.
6. Evaluation was a problem when the class consisted of more than forty children.
6. Some of the students had communication problems, as they were too shy to interact with the different teachers. This created a problem in oral evaluation of student.

- Rubric was every participant's bone of contention as it was very difficult to be executed in the Indian context of classrooms consisting of 30 to 40 learners.

❖ 5E Model requires at times the use of multimedia and ICT. Some of the schools to which the participants were sent did not have this facility freely available.

❖ Traditional classroom have the row wise seating arrangement, which posed a significant problem for the participants while making groups.

❖ Learners, not used to the constructivist classroom setting, were bound to the teacher for instructions, and could not function properly at all without the participant's instructions and continuous disciplinary monitoring.

❖ Time proved to be the biggest issue in implementing the 5E model of creating learning situations. The traditional 35 to 40 minutes of classroom time was mostly wasted away in forming groups or explaining instructions. Most of the participant pointed out to the rarity of being able to complete a single lesson with all 5Es implemented in the same period.

❖ The regular teachers were not very supportive of the new approach of teaching-learning as they felt inferior to it, and were of the opinion that it isn't a very practical approach in the Indian context where to finish the syllabus was the paramount for a teacher.

### EDUCATIONAL IMPLICATION OF THE STUDY

5E Model is the model, which is based on research-oriented constructivist learning theory and experimental activities. 5E Model, while including students in activity at every phase, encourages learners to constitute their own concepts. It includes skills and activities that increase curiosity for research, satisfy learners' expectations, and make learner focus on an active research for information and understanding. Learners use their previous knowledge in discovering new concepts for the concepts to gain a meaning.

Present study is significant to teacher educators and pre-service trainee teachers to improve upon the mistakes that might have occurred during internship. In addition, the findings of the study may help to overcome the dilemmas faced by the present pre-service trainee teachers in a constructivist teaching- learning approach. This research will help the institute to improve upon the present pedagogical practices of the trainees teachers and may become wide spread across the nation.

### SUGGESTIONS FOR FURTHER STUDIES

Looking into the constraints under which the study was conducted, the findings do not warrant wide generalizations. It is therefore, felt that replication of this study, on a larger sample, and is requisite to arrive at precise results. However, studies may be undertaken on the following topics:

1. This study can be conducted on pre-service trainee teachers of B. A. B. Ed course.
2. This study can be conducted on pre-service trainee teachers of B. Sc. B. Ed in subjects other than biology and chemistry.
3. This study can be conducted longitudinally on a batch of next five to ten final year pre-service trainee teachers.
4. Similar study can be conducted on pre-service trainee teachers of other Educational Institute.
5. This study can be conducted taking gender as a variable.
6. A comparative study between pre-service and in-service trainee teachers can be undertaken to know about their perceptual differences over SE Model of creating learning situation.

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