

EFFECT OF 5 E MODEL-BASED TEACHING ON PEDAGOGICAL COMPETENCY OF BIOSCIENCE TRAINEE TEACHERS DURING B.ED. INTERNSHIP PROGRAM

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ABSTRACT

Development of pedagogical competency of science teacher is an important quality to be enhanced in the teacher education institutions. To improve teaching and pedagogical competency, pre-service teacher education system organizes internship activities in which trainee teachers need to deliver lessons in the practicing schools. 5 E model-based teaching and learning is one of the significant model of constructivist theory. However, its use in B.Ed. internship program is considered as a new way of designing practical experience for pre-service teacher education. Because most of the teacher education institutions prefer to provide training on traditional and activity-based lesson planning skill instead of constructivist one. Hence, it is important to explore effectiveness of 5 E model-based teaching on development of pedagogical competency of trainee teachers. The main objective of the study was to find out the effect of 5 E model-based teaching on pedagogical competency of Bioscience trainee teachers during B.Ed. Internship program pre-test post-test experimental research methodology has been carried out to conduct the study. One performance test on pedagogical competency is taken as a tool for this research. It is found that there exists significant difference in between post-test control group and experimental group with respect to achievement of B.Ed. Bioscience teachers in pedagogical competency test. It is suggested that in teacher education system 5 E model can be utilized as an effective model of lesson planning and internship teaching for improving their pedagogical competency.

KEYWORDS: 5 E Model; Classroom Transaction; B.Ed. Trainee & Pedagogical Competency

INTRODUCTION

Science is a broad discipline of knowledge that propels society towards development. Through empirical knowledge, experimentation, observation and experience-based activities, it modifies the behavior, attitude and understanding of individual and society. In this regard, science is considered as one crucial and integrated part of secondary school curriculum. Pedagogical competency of science teacher means ability and capacity to apply as well as use knowledge, skills and attitude effectively, by adopting new circumstances for correct instructive strategies in science in a genuine teaching-learning situation with perseverance. Pedagogical competency of science teacher should not be considered as only the ability to perform skills in a class. It is a broader term, which not only includes several teaching skills required for a science teacher, but also some other factors constitute this wide field. During the internship programme of B.Ed. course, prospective teachers get the opportunity to enhance their pedagogical competency by delivering lessons in real classroom situation.

Teacher education program is a professional course that prepares teachers for the society. Internship program plays a very significant role in providing teaching experience to the novice teachers during pre-service teacher education program. In addition to content knowledge, student-teachers gain mastery in pedagogical knowledge and pedagogical content knowledge. Just like other professional courses, teacher education course at secondary level also designs field

engagement or internship program for prospective teachers in order to develop pedagogical competency in the concerned subject. Development of pedagogical competency of science teacher is an important quality to be improved in the teacher education institutions. To improve teaching and pedagogical competency, pre-service teacher education system organizes internship activities in which trainee teachers need to deliver lessons in the practicing schools. This active involvement of student-teachers with respect to teaching and acquiring experiences-related teaching profession is known as 'school internship program'. During the internship program, prospective teachers prepare lesson plans and deliver lessons in science, based on traditional, activity and constructivist approach. For the bachelor of education program, students are allowed to teach in secondary level, which is considered as one of the critical phase of learning that provides opportunities to acquire relevant level of knowledge, understanding, skills, abilities, attitudes and values among the students, which are the components of quality learning. Use of constructivist approach in teaching learning science has been emphasized by NCF 2005. Knowledge is not attained but constructed (Von Glaserfeld, 1989). A constructivist classroom provides opportunities to observe, work, explore, interact, raise questions/queries and share their expectations to all (Kumar and Gupta, 2009). Constructivism encourages development of qualities like observation, experimentation, discovery, logical thinking, interpretation ability, problem solving, creativity, reflective thinking and reflective learning on the part of students. (Miha Lee 2006, Dogra B. 2010, Sridevi, K. V. 2008, R. K. Nayak and H. K. Senapaty 2009) 5 E model-based teaching and learning cycle developed by Robert Bybee (2009) is one of the significant model of constructivist theory. It has five steps such as Engage, Explore, Explain, Elaborate and Evaluate. However, its use in B.Ed. internship program is considered as a new way of designing practical experience for pre-service teacher education because most of the teacher education institutions prefer to provide training on traditional and activity-based lesson planning skill instead of constructivist one. However, internship program must ensure development of pedagogical competency among prospective teachers. Use of the 5 Es in science instruction can help teachers address science content as well as the scientific and engineering practices (Manzo, *et al.* 2016). The constructive learning of science is a dynamic process of building, organizing and elaborating knowledge of the natural world (Glynn and Duit, 1995). John, S. T. (2000) indicated that the teacher who understood constructivist-based science scored significantly higher on most of the CLES (Constructivist Learning Environment Survey Scales). Hence, it is important to explore effectiveness of 5 E model-based teaching on development of pedagogical competency of trainee teachers.

Though various studies have been conducted abroad and in India with respect to effect of 5 E model on students' attributes concerning science learning, very few studies have tried to find out its effect on teachers' pedagogical competency. Therefore, the researcher has selected this piece of study considering it as a new area of research. In this backdrop, the present study is an endeavor to find out whether classroom transaction through 5 E model-based science pedagogy at secondary level is effective towards development of pedagogical competency of pre-service teachers. Hence, the problem is stated as "**Effect of 5 E Model-Based Teaching on Pedagogical competency of Bioscience Trainee Teachers during B.Ed. Internship Program**".

Research Question

What is the effect of 5 E model-based teaching on pedagogical competency of Bioscience trainee teachers during B.Ed. Internship Program?

Objectives

To find out the effect of 5 E model-based teaching by trainee teachers on their Pedagogical competency during B. Ed. internship program.

Hypothesis

H₀₁: No significant difference exists between post-test results of experimental group and control group of Bioscience trainee teachers during B.Ed. internship program.

Operational Definition

5 E Model: 5 E model is a learning cycle grounded on the principle of constructivist approach consisting of 5 Es, as the phases of teaching learning process. They are ENGAGE, EXPLORE, EXPLAIN, ELABORATE and EVALUATE.

Pedagogical Competency: Pedagogical competency refers to the ability of the science teacher with respect to understanding nature and context of Science, Enquiring ability, Scientific Attitude-based values and behavior, general skills of teaching, curriculum transaction ability and assessment capacity in science.

Control Group: Group of student-teachers who are allowed to teach Bioscience through traditional approach during B.Ed. internship program.

Experimental Group: Group of student-teachers, who are allowed to teach Bioscience through Constructivist Approach-based on 5 E model during B.Ed. internship program.

Delimitation of the Study

- The study is limited to B.Ed. second year students for the session 2017-2019 belonging to Nabakrushna Choudhury College of Teacher Education, Angul, Odisha.
- The study is limited to the classroom transaction through 5 E model in Bioscience subject.

Methodology

Method: Quantitative research paradigm and experimental method are followed for the proposed study.

Design: Randomized groups, pre-test post-test design are followed.

Population: All the B.Ed. students with Bioscience method for the session 2017-2019 in Odisha state considered as population of the study.

Sample: All the B.Ed. students with Bioscience method for the session 2017-2019 students of Nabakrushna Choudhury College of Teacher Education, Angul, Odisha constitute the sample, of the study, who are selected through purposive sampling method during the study.

TOOLS AND TECHNIQUES

Two performance-based performance test, one for pre-test and another one for post-test prepared by the researcher to evaluate the pedagogical competency of prospective Bioscience teachers. All these performance-based tests are based on qualities of science teachers with respect to understanding Nature and Context of Science, Enquiring ability, Scientific Attitude-based values and behavior, General Skills of Teaching, Curriculum transaction ability and Assessment capacity in

Science. Maximum score of the test was 60. By observing the teaching performance of students, scores are awarded to each student–teacher, out of maximum score 60.

RESULTS AND DISCUSSIONS

The objective of the study was to find out the effect of 5 E model of teaching on the academic achievement of students in Science at secondary level. To find out the effect of 5 E model on science class experimental research methodology is conducted by taking control and experimental groups. Hypothesis for the first objective was “No significant difference exists between test results of experimental group and control group of Bioscience trainee teachers during B.Ed. internship program.”

To test the above hypothesis, a comparison of mean scores of control and experimental group was done through ‘t’ test. The result is analyzed in the following table:

Table 1

Post Test Scores of Bioscience Trainee Teachers	N	mean	sd	df	‘t’ value	Significant/ Not significant
Experimental	15	36.8	6.41	14	5.38	Significant
control	15	17.86	3.33			

Table value at 0.05 level = 2.14.

At 0.01 level = 2.97.

In both the cases, calculated value is greater than the table value, which indicates that there is a significant difference between both the groups. Hence, null hypothesis is rejected, as there is a significant difference between experimental groups, which teaches through 5 E model of constructivist approach and control group which teaches through narration-cum-discussion method of traditional approach, and from the mean scores, we can conclude that teaching in 5 E model is more effective for improving pedagogical competency of B.Ed. trainee teachers teaching Bioscience.

Hence, Null hypothesis is rejected and alternative hypothesis is accepted, i.e., “significant difference exists between post-test results of experimental group and control group of Bioscience trainee teachers during B.Ed. internship program

Major Findings

The major findings of the study are:

- Major finding of the study related to objectives framed are as follows:
- Significant difference exists between test results of experimental group and control group of Bioscience trainee teachers during B.Ed. internship program.

EDUCATIONAL IMPLICATIONS

The findings of present study will be useful for exploring the effectiveness of 5 E mediated instruction on achievement of secondary school students. The findings of present study will be useful for exploring the effect of 5 E-mediated instruction on achievement of prospective primary and higher school teachers and factors controlling it.

The educational Implications of this study will be helpful for:

- Identifying factors related to effectiveness of 5 E model-based instruction on achievement of B.Ed. students.
- Factors and media related to 5 E instruction by teachers can be considered in preparing curriculum for pre-service and in-service teacher education.
- Teachers of higher education will be conscious about different 5 E-based instructional strategies, while dealing with the course design, unit planning and lesson planning.
- Administrators will be able to motivate teachers to use latest 5 E model-based instructional strategies to enhance study habit of students in colleges and universities.
- Experts and educationalists can frame different policies, training and programs for encouraging effective use of 5 E model-based instruction for enriching study habit at higher education levels.

CONCLUSIONS

By providing appropriate pre-service and in-service training programs to university and college teachers with respect to integrate 5 E model-based instruction that could strengthen the quality of education at secondary education level.

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