

New Challenges and New Pedagogies for 21st Century Education

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Themes of the Seminar & Papers Presented

NEW CHALLENGES AND NEW PEDAGOGIES FOR 21ST CENTURY EDUCATION

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EFFECTIVENESS OF EXPERIENTIAL LEARNING IN DEVELOPING INTEREST IN SCIENCE AMONG STUDENT TEACHERS

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Abstract: Education inculcates desired learning experiences among the people. Experiential learning theories have created a space for themselves and are slowly seeping in the main stream and becoming a strong prospect for improving interest among students. Further science has contributed immensely in developing each and every human endeavour. The objective of the study was to find the effectiveness of science concepts based experiential learning program in increasing the interest of the student teachers in science. Study conducted was experimental research with single group pre-test post-test design. The tool of the study was science interest inventory. Experiential learning program was the intervention. The science concepts selected for the module were Newton's First and third Law of Motion, Gravitational Force, Surface Tension, Centripetal Force, Centre of Gravity, Displacement, DNA Detection. The data was collected through interest inventory Data so collected was analysed descriptively and inferentially. T test was used for inferential analysis. The null hypothesis was rejected and experiential learning program for science concepts was found to be significantly effective. The study concluded that experiential learning based modules can function as important tool for enhancing the interest in science among the students.

Keywords: *Experiential Learning, Inventory, Science Education, Experimental Research*

INTRODUCTION

Education inculcates desired learning experiences among the people. Researchers world over are studying the factors that affect and promote learning and the course of their interaction. A lot has gone in developing the learning theories and yet they are in their nascent stage. In such a scenario, experiential learning theories have created a space for themselves and are slowly seeping in the main stream.

Further, the importance of science in today's world is evident. Science has captured the important place in almost every field, from agriculture to the industries; medical to

engineering. The contribution of science to the education process is of two- folds - informative and cognitive. Thus science can't be taught solely by chalk and talk method. Hence it is the responsibility of the teachers to develop interest in science among students but for this it is very necessary that teacher themselves should have interest in science.

Experiential Learning

Experiential learning theory defines learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience"(Kolb, 1984). The Experiential Learning Theory model describes two dialectic styles of grasping experience - Concrete Experience (CE) and Abstract Conceptualization (AC) and two two dialectic styles of transforming experience- Reflective Observation (RO) and Active Experimentation (AE). Experiential learning cycle postulates that immediate or concrete experiences are the basis for observations and reflections which are finally assimilated and refined to develop abstract concepts. This conceptualisation then forms the basis for drawing the implications and testing them for action so as to create novel experiences.

Experiential learning can be classified into Field-based experiences and Classroom-based learning. Field-based learning integrated into higher education in 1930s, includes internships, practicum's etc. Classroom-based experiential learning can take a multitude of forms, including role-playing, games, case studies, simulations, presentations, and various types of group work. Experiential learning became a part of the school program when active learning (Chickening and Gamson) was recommended as one of the seven 'principles of good practice' for excellence in undergraduate education in 1987 (Lewis & Williams, 1994).

Kolb's experiential learning cycle is participative, collaborative, and pragmatic. It allows contact with the environment, and exposure to practices that are highly variable and ambiguous. Learning takes place on the cognitive, affective and behavioural domains. Since experiential learning effects wider domains there is a need to structure the experiences so as to make them relevant to specified learning objectives and monitor the experiences being provided. Students need to appraise the experiences in light of theory and their own feelings. Further, process feedback needs to be provided to the student to match the outcome of feedback received by the student. Hence experiential learning helps teacher to build confidence in students about their own abilities. Experiential learning provides direct experiences so the learning becomes concrete. This helps student teacher to develop interest in science which will be further useful for developing interest in science among school students.

Review and Rationale

David A. Kolb proposed that students should be able to create concepts that integrate their observations into logically sound theories, and use these theories to make decisions and solve problems (Kolb, 1984). Kolb drew upon the work of educational reformist John Dewey, who posited that discovery through experience leads to learning, stressing the intimate and

necessary relationship between the process of actual experience and education (Dewey, 1938). Learners are able to develop critical thinking skills through the process of evaluating multiple perspectives that surface within the classroom dialogue. (Bogardus, J., 2013) and open dialogue creates a space for reflection and creativity as students' construct meaning from their own experiences. (Baker, Jensen and Kolb,2005).

When students engage in problem-based and experiential learning they become active participants in their own learning process. (Keogh, Sterling and Venables, 2007). Working in service-learning, are able to develop important social and intellectual linkages, sharpen problem-solving skills, apply critical thinking and use abstract concepts to gain a desired outcome. (Edwards, 2001). Looking at the importance of Science in development of brain and its role in directing knowledge and creativity, development of interest in science has become the 'major concern of researchers and educational systems of the world'. (Osborn, Simon & Collin, 2003). This concern is aggravated by the studies that cite that interests in science tend to decline with the growth of children (Dawson, 2000; Bae, 2003; Osborne, 2003) and there are students who have negative attitude toward learning science in school but have positive attitude toward science itself (Osborne, 2003). To add upon 'as they advance from primary to secondary education, students rapidly lose their interest in science and cease seeing it as a viable option for their future, or associating it with their success aspirations' (Christidou, 2011).

This declining trend assigns strong enough reasons to undertake study to ensure retention of student

Objectives

1. To develop an Interest Inventory in Science to measure interest in science among science method students of Bachelor of Education Program.
2. To design and implement the Experiential Learning based module to teach selected concepts to science method students of Bachelor of Education Program.
3. To compare the pre-test and post-test scores of interest in science among science method students of Bachelor of Education Program.

Operational Definition

Experiential Learning: Experiential learning is "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience". (Kolb,1984)

Experiential learning for this study signifies that the science method students of Bachelor of Education program will be able to share, process, generalize, apply and experience the selected concept of science that have been taught to them through experiential learning.

Interest in Science: Interest in Science among the science method students of Bachelor of Education program is defined as the scores obtained on the Science Interest Inventory by the science method students. The science inventory comprises of items interest in science. Thus, experiential learning program is truly a win-win situation (Clark and White, 2010). Considering these perspectives and realising the contextual importance of the experiential learning the researcher has attempted to study the effectiveness of Experiential learning approach in developing interest among student teachers.

Hypothesis

H₀₁: There is no significant difference in the pre-test and post-test Science Interest inventory scores for the interest in selected concept of science among Bachelor of Education students.

Research Question

Does the science module based on Experiential Learning develops interest in science among science method students of Bachelor of Education Program?

Variables

The variables of the present study are:

- a. **Independent Variable:** Teaching Method- Experiential learning based science education module
- b. **Dependent Variable:** Interest in Science among science method students
- c. **Controlled Variable:** Bachelor of Education program, Science Method, Content,
- d. **Intervening Variables:** Anxiety, Fatigue, Motivation and Boredom

Delimitation

1. **Geographical delimitation:** The present study will be delimited to Bachelor of Education colleges functioning in Mumbai.
2. **Sample delimitation:** The present study will be delimited to 17 Science method students studying Bachelor of Education.
3. **Tool delimitation:** The results of the present study are delimited to the results obtained in the science interest inventory developed by the researcher.

Methodology and Sample

The study was an experimental research with a single group pre-test- post-test design. The sample of the study consist of all science method students studying in Bachelor of Education. 17 science method students were selected through convenient sampling technique. The area of the study was science education.

Tool of the Study – Science Interest Inventory --Science Interest Inventory was prepared by the researcher. It comprised of 36 statements of which 20 items were positive and 16 negative. The split half reliability of the inventory was computed as 0.67, i.e. highly reliable. The inventory was validated by the expert opinion.

Intervention Program- Experiential Learning Module

The modules were developed using ADDIE – Analysis, Design, Development, Implementation and Evaluation. The science concepts selected for the module were Newton's First and third Law of Motion, Gravitational Force, Surface Tension, Centripetal Force, Centre of Gravity, Displacement, DNA Detection. Various activities were selected to teach these concepts. Experiential Learning Environment was created using group activities, reflective sessions, demonstrations, heuristic method and experiments to test their interest in science with reference to context, content and engagement in science activity.

Data Collection

The data was collected through interest inventory filled by the science method students of Bachelor of Education Program. Students were given science interest inventory before and after the intervention. Data so collected was analysed descriptively and inferentially.

Analysis of the Data

Table 1. shows that obtained value of 't' is 24.84 which is greater than the table value of 2.58 at 0.01 level of significance and 1.75 at 0.05 level of significance, which means that the null hypothesis is rejected.

Fig. 1 Frequency Distribution of Pre and Post Intervention Science Interest Scores

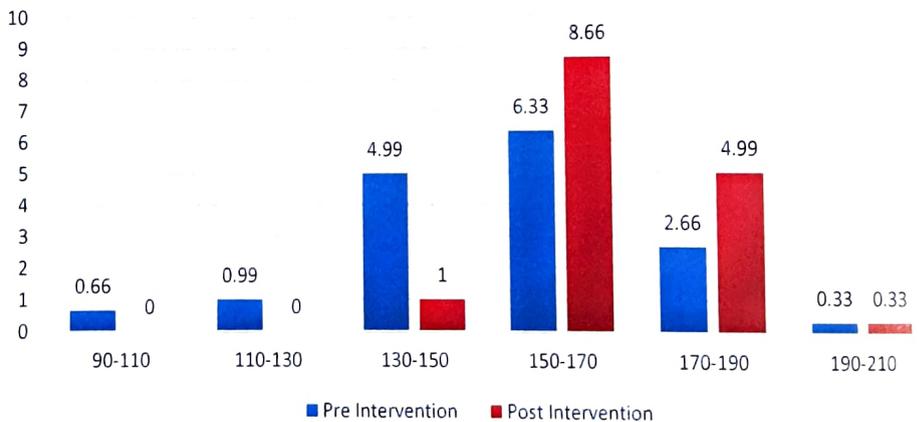


Table: 1: t Values of Pre-Intervention and Post Intervention Science Interest Inventory Scores

Variable	Groups	N	Mean	SD	t-Value	Significance Level
Interest in science	Pre-intervention	17	146.52	24.32	24.84	S**
	Post- intervention	17	153.65	13.11		

Result

The experiential learning is effective in increasing the interest of science method students pursuing Bachelor of Education Program.

CONCLUSION

The study implied that experiential learning can be used as an effective technique for enhancing the interest of the student trainees towards science. The research is intended to bring the change in the process of teaching and learning that is the focus from teacher centred to student centred approach. The training program for teaching through experiential learning must be organised for pre-service teachers. School should motivate the teachers to use different innovative approaches of teaching.

A transformation from the existing education system to the experience based education system is by no means an easy task. The above proposal will take extra time and effort on the part of the teachers, who need to reflect on their own worldviews and their teaching methods in order to develop experiential learning based curriculum, which will focus on all round development of students as experiential learning approach does not give direct answer to the problem but it makes the student to think and analyse the problem, to have hands on experience and go through the learning cycle for effective learning process.

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