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TITLE OF THE STUDY: A STUDY OF THE EFFECTIVENESS OF INNOVATIVE HANDS-ON ACTIVITIES AND MULTIMEDIA SCIENCE CONTENT IN ENHANCING COMPETENCE OF TEACHERS AND ACHIEVEMENT OF ELEMENTARY LEVEL STUDENTS

ABSTRACT

This piece of research work was taken up with the set of objectives to study the effectiveness of Low-Cost, No-Cost and locally available material based Hands-on Activities in Science, Multimedia Content in enhancing conceptual understanding and pedagogical skills of In-service Elementary Teachers, and Pre-service Teachers and in enhancing the achievement level of Elementary level students. In this experimental study a pre-test posttest design was used and efforts were made and to compare the interventions of teaching science with the use of Hands-on Activities and Multimedia Science content with Lecture Method of training of In-service Elementary teachers and Pre-service Teachers and in teaching of Elementary level students. A number of null hypotheses were formulated assuming that there is 'no significance difference' observed between groups treated with different approaches.

For the present study, TWO experimental and ONE control group were formed from the intact group of elementary teachers (in-service and pre-service) and students and also from the Classes VI, VII and VIII. All the three groups were subjected to different treatment by the investigator, as described below:

Control Group 1: Training/ Teaching through Lecture Method (TLM)

Experimental Group 1: Training/Teaching through Hands-on Activities (THA)

Experimental Group 2: Training/Teaching through Multimedia Content (TMC)

The sample of the study comprised of 212 elementary teachers including the 98 In-service Science Teachers (TGTs) of Government Schools under Directorate of Education, Government of Delhi and 114 pre-service teacher trainees of DIETs of Delhi, and 312 students including 102, 106 and 104 students of Classes VI, VII, and VIII, respectively of Government schools.

The tools developed included, a set of 35 questions for teachers containing items to test the knowledge, understanding and application of the science concepts and pedagogical processes for organizing the teaching-learning of the selected content from NCERT Text Books of Classes VI, VII, and VIII and Sets of Achievement tests each containing 20 items 1 mark for each (MM= 20), for administration as Pre-Test and Post-Test to the control group and both the experimental groups of Classes VI, VII and VIII.

The above tools were administered to the selected sample of students as *pre-tests* and *post-tests*. The following topics were identified for developing the Hands-on activities and procurement/development of the multimedia content: *Separation of Substances (Class VI); Air (Class VI); Water (Class VI); Acids, Bases and Salts (Class VII); Physical and Chemical Changes (Class VII); Combustion and Flame (Class VIII); and Metals and Non-Metals (Class VIII)*. A set DVDs of interactive Multimedia Science by private agencies and CAL unit of Sarva Shiksha Abhiyan, Directorate of Education, Delhi was procured and used for organizing the training/teaching sessions on the following topics/units.

The interventions with experimental groups as well as control groups of teachers and students were made by the investigator himself.

The study was limited to the students of Upper primary classes (VI, VII, and VIII) of Elementary Level of 2 Government Schools, In-service science teachers (TGTs) of Government Schools, Directorate of Education Delhi and Elementary Teacher Trainees of 3 District Institutes of Education and Training (DIETs) located in Delhi. The data collected was subjected to 't' test and ANOVA.

On comparing the interventions it was found that the performance of the group exposed to Hands-on Activities improved more than the one exposed to Multimedia content during the course of training. Thus in comparison to the use of multimedia content, hands-on activities were found to be more effective in enhancing the conceptual understanding and competence of in-service teachers as well as pre-service teacher trainees.

The data suggest that Hands-on Activities carried out in the training sessions by using low-cost, no-cost material and locally available material were found effective by the groups of students of Classes VI, VII and VIII. Thus, it could be corroborated on the basis of analysis of data that Hands-on Activities helps in enhancement of the achievement levels of students, as they participate in them more interestingly. The analysis of data indicate that the performance of the all three groups have a non-significant difference in the pre-tests. However, analysis of post-test scores indicates that teaching through Hands-On Activities (THA) proved to more effective in comparison of is more effective than the Teaching through Multimedia Content (TMC) and Lecture Method. No significant difference was observed in the performance of the groups taught through Multimedia Content (TMC) and teaching through Lecture Method (TLM).

The findings of the study have wider implications for promoting and improving the science education at elementary level. It has established that hands-on activities are more effective than the use of multimedia in teaching-learning of science at elementary level. Further, that the pre-service and practicing teachers need to be oriented by providing them hands-on experiences for enhancing their competence and teaching skills. However, an amalgamated approach of using multimedia science content as well as Hands-on experience could be useful in developing the repertoire of teachers and achievement of students.

The impact of this study could be for future planning and organizing effective training of elementary teachers (pre-service and in-service) in science and facilitating effective learning in the classroom with a greater emphasis on the Hands-on Activities in science. However, a blending of this approach with the use of multimedia could be an effective strategy for developing competence of teachers and creating an interesting environment of learning science in classroom.