CHAPTER VII

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SUMMARY, FINDINGS AND SUGGESTIONS

Introduction

It has been experimentally found that the learning and retention of unfamiliar but meaningful verbal material can be facilitated by the advance introduction of relevant subsuming concepts. The underlying assumption is that cognitive structure is hierarchically organized in terms of highly inclusive concepts and information data. The new meaningful material becomes incorporated into cognitive structure in so far as it is subsumable under relevant existing concept. The most effective way of facilitating retention is to introduce appropriate subsumer and make them part of cognitive structure prior to the actual presentation of the learning task. They become advance organizers, to provide anchoring for the reception of new material. The “Meaningful Verbal Learning” advocated by David P. Ausubel (1960) allows the teacher to convey a large amount of information as meaningfully and efficiently as possible. Based on the theory of “Meaningful Verbal Learning”, the Advance organizer model was developed. The basic idea underlying this model is that learning of new information can be facilitated through manipulation of the learner’s cognitive structure. According to David P. Ausubel (1977) the Advance Organizers can serve “to provide specifically relevant anchoring ideas for the more differentiated and detailed a material that is subsequently presented for the learning of the subject”.

Statement of the Problem

The Advance Organizer Model Learning package was developed on the topic “The Living World” in Biology for secondary level and its effectiveness has been experimentally assessed in a classroom setting. The study is entitled Developing Advance Organizer Model Learning Package in Biology for Secondary Level.
Teaching of Biology

The subject, Biology which emphasizes bot1>> ' , process and product. As such it can be better taught through problem solving and discovery approach. Childs curiosity and exploratory attitude should be fully utilized in arriving at solutions to the problems, which he comes across during learning science. The knowledge, which the child acquires only through memorizing facts, cannot be of much use in learning science. Emphasis must be placed in understanding the environment and the physical phenomena. The project, heuristic, problem solving, demonstration methods, have been prescribed but seldom used due to lack of well-equipped laboratories and other constraints. The most commonly used method continues to be the ‘lecture method’ in most of the Indian schools.

One cannot question the validity of Bruners firm faith in the efficacy of discovery learning. Undoubtedly, personal and first hand experience always remains superior to listening to verbal instruction in class. It does not mean that every bit of knowledge, one acquires is always the result of first hand experience. There is a need for verbal instruction also in a class, which lays foundation for listening, comprehension, enhancing vocabulary for meaningful learning. In this context, we need to consider the contribution of David. P.' Ausubel advocating for advance organizer model in teaching learning process.

Teachers have the responsibility of conveying large amounts of information meaningfully within a time frame. David P. Ausubel calls it as expository method resulting in meaningful reception learning under the “Advance Organizer Model”. The review of related researches reveal that not much research has been done in this field in India. It becomes imperative to explore this area of research and its utility for school science education. The researcher therefore decided to develop advance organizer model learning package in Biology and
find its effectiveness at the secondary level of education in the state of Karnataka,

Objectives

1. To develop Advance Organizer Model (AOM) Learning Package for biology education at the secondary level.
2. To expose the learning package to the secondary school students in an experimental setting.
3. To find out the achievement of secondary school students who learnt biology using AOM Learning Package.
4. To find out the achievement of secondary school students who learnt biology using conventional instruction (CI)
5. To compare the effectiveness of Advance Organizer Model (AOM) Learning Package and Conventional Instruction (CI) on students achievement in knowledge, understanding, application and skill in biology.
6. To suggest innovative instructional strategies for biology education at secondary level.

Terminology

Developing

The term developing means the process through which desired changes are brought about with the help of appropriate means. In the present study, developing means act or process of preparing executing and evaluating the effectiveness of Advance Organizer Model Learning Package.

Advance Organizer Model

The advance organizer model is developed from David P. Ausubel’s theory of meaningful verbal learning. The basic idea underlying this model is that learning of new information can be facilitated through manipulation of the learner’s cognitive structure.
According to Ausubel, the purpose, which the Advance Organizer serves, is “to provide specifically relevant anchoring ideas for the more differentiated and detailed material that is subsequently presented” (Ausubel 1977).

Learning Package

Learning Package is a set of instructional materials designed in a systematic order to gain knowledge and skills on a specific topic and the material can be used for instructional purposes.

Biology

Biology is the scientific study of the life and structure of plants and animals and the study materials have been developed on the topic The Living World of standard IX of state board of Karnataka.

Method and Procedure

The experimental study was conducted by using a non-randomized control group pre test, post test design. The preparation of the learning package and its experimental treatment has been carried out in three phases of PREPARATION, EXECUTION, and EVALUATION.

Preparation

Advance Organizer Model learning package in Biology for secondary level has been developed under seven stages as follows.
Stage 1: Identification of a topic in biology from IX Standard syllabus of State Board of Karnataka.
Stage 2: Content Analysis of the topic selected
Stage 3: Formulation of Advance Organizers
Stage 4: Preparation of Learning Package Based on Advance Organizer Model syntax
Stage 5: Evaluation of Advance Organizer Model Learning package by experts
Stage 6: Pilot study on a try out sample and modification of the package
Stage 7: Finalization of the Advance Organizer Model Learning Package for experimental exposure

**Execution**

A non-randomized control group, pre-test post-test design was employed. A pre-test on basic knowledge in biology was administered by the researcher to the two groups of students. The group, which received treatment of Advance organizer Model of teaching, formed the experimental group, while the other group taught by conventional method formed the control group. Instructional material prepared for the study was on the topic “The Living World” which included subtopics such as classification of living organisms, characteristics of multi-cellular organisms, invertebrates and different phylum’s under Invertebrates.

**Evaluation**

The dependent variable was the performance of students on the achievement test administered at the end of the treatment. The researcher developed an achievement test on the topic “The Living World”. It comprised of short answer type as well as objective type items. Under objective type items, there was multiple choice type, fill in the blanks and matching questions. The test was administered to both the experimental and control group to measure their achievement to find the effectiveness of Advance Organizer Model Learning Package.

**Sample**

The study was conducted in Rashtreeya Vidyalaya Girls High School, Bangalore, Karnataka State. The sample comprised of hundred students of class IX selected from two sections of the school. The sample consists of fifty students from each section. The students
were in the age group of the 14 to 18 years and represented different socio-economic groups of society.

The Experimental Design

After consultation with experts in the field, it was decided that a non-randomized control group pre test, post test designs is the most appropriate method for testing the effectiveness of the instruction material developed in Biology for Secondary School Level.

In a school situation, it is sometimes practically difficult to disturb class schedules, to gather subjects for obtaining a sufficiently large samples or to reorganize classes in order to employ randomization procedures for getting equivalent control and experimental groups. Under these circumstances, therefore, an experimenter may use pre-assembled groups, such as, intact classes, for framing experimental' and control groups. The pre-assembled groups are selected and are administered pre-test. The pre-test course are analyzed to show that the means and standard deviations of the two groups do not differ significantly. If the pre-test course for the groups are not equivalent, the experimenter may proceed with the conduct of the experiment by using the technique of analysis of co-variance to compensate for this lack of equivalency between the groups. Once the two groups are obtained, it is advisable to use a random procedure to determine which group is to be assigned to experimental treatment and which one to the controlled condition. After determining the groups the experimental treatment is administered to the experimental group and the post-test is given to both the groups. The differences between the post-test scores between the groups are compared with the help of appropriate statistical test to ascertain the effect of the independent variable.
Data Analysis
In order to analyze the data, independent sample students test was used. This was used with a purpose to study whether there is significant difference among the means of pre-test and post-test achievement scores of the experimental and control groups under study. Friedman test was used to compare the variability of knowledge, understanding, application and skill objective in the experimental and control group. Pair wise comparison was carried out with the experimental and control group using Witcoxom signed rank test. Mann Whitney test was applied to compare the variability of knowledge, understanding, application and skill objective between the experimental and control group.

Major Findings
The important findings that have emerged from the study are presented under appropriate heads.

Comparison of Pre-test Achievement Scores
The analysis revealed that there was no significant difference among AOM group and CI group with regard to pre-test achievements scores. The mean and standard deviation of achievement scores during pre-test in the experimental group is 11.32 + 5.18 and in control group it is 11.86 + 4.11. The respective standard error of mean is 0.73 and 0.58. The mean values of both the groups are well within the 95% confidence interval, that is (9.85, 12.79) and (10.69, 13.03) respectively. Hence, it can be concluded that the entry behaviour of the students in the experimental and control group are more or less similar with regard to pre-test achievement score in biology.
Comparison of post test Scores between Experimental and Control Group

The analysis revealed that there was significant difference among experimental and control group with regard to post test achievement Scores. It is evident that the terminal behaviour of students in experimental group and control group are different with respect to post test achievement scores. It may be concluded that the students in the experimental group taught through Advance Organizer model learning package performed better than control group which was taught through conventional method with regard to achievement in biology at secondary level. The average score for initial achievement at Pre-test was 11.86 for control group and 11.32 for the experimental group. The achievement score increased to 13.12 for the control group and 32.44 for the experimental group due to the learning strategies adopted in those groups.

Comparison of variability of Instructional objectives in the Experimental group

Friedman test is used to compare the variability within the experimental group with regard to instructional objective, and pair wise comparison between instructional objectives, and the values were found statistically significant. It may be concluded that Advance Organize Model Learning Package' is effective in achievement of Instructional objectives of knowledge, understanding, application and skill.

Comparison of variability of Instructional objectives in the Control group

Friedman test and pair wise comparison was used to compare the variability within the control group with regard to instructional objectives. The analysis revealed statistically highly significant values.
when compared to experimental group the standard deviation of control group is less than that of experimental group. It is evident that AOM Learning Package is effective than conventional instruction.

Comparison of Variability of **Instructional** objectives between experimental and Control Groups under Study

- The AOM learning package designed found effective than the conventional lecture method in enhancing the achievement at knowledge level. The mean scores of experimental group (11.36) was much greater than that of the control group (8.04) and there was significant difference between the two groups in their mean achievement scores.
- The AOM learning package is more effective than the conventional lecture method in enhancing the achievement at Understanding Level. The mean 'score of experimental group (11.44) was much greater than that of the control group (3.88). Thus there was significant difference between the experiment group and the control group.
- The AOM learning package is more effective than the conventional Lecture method in enhancing the achievement at Application level of cognitive development The mean score of experimental group (7.56) was much greater than that of the control group (0.86). It could be inferred from the findings that the achievement of experimental group at Application level is much better than that of control group.
- The AOM learning package is more effective than the conventional lecture method in enhancing the achievement at Skill Level of Cognitive Development. The mean score of experimental group (2.23) was much greater than that of the control group (0.05). It could be inferred from the findings that
the achievement of experimental group at Skill Level is much better than the Control group.

The Mean + SD of Knowledge, Understanding, Application and Skill in the Experimental group is much higher than the Control group probably must have lead to the Statistical Significance. The major conclusions that emerged from this experimental study are as follows.

- The study has emphatically shown that the Advance Organizer Model of teaching is far superior to the conventional method in teaching of Biology at the secondary level.
- The pupils taught through Advance Organizer Model secured significantly higher achievement scores than those taught through the conventional method with respect to Knowledge, Understanding, Application and Skill level. Therefore AOM is more effective in realizing instructional objectives than that of conventional method at the secondary level of teaching biology.

Educational implications and Suggestions

The findings of the present study revealed a number of facts which have great implications in teaching Biology. The suggestions based on the findings of the study are summarized below

1. The study has proved that the Advance Organizer Model of teaching is effective than conventional method of teaching Biology. Hence teachers could be encouraged to use this method while teaching the subject.
2. Models of Teaching need to be included in the curriculum of the teacher education programme so as to orient the teachers to theory and practice associated with models of teaching.
3. In-service training and workshops should be organized with a view to familiarise teachers with all the various Models of Teaching and their practical requirements for teaching at the secondary level.
4. Models of teaching as a component on the curriculum should facilitate student teacher to develop interest and motivation in using it for classroom instruction in teaching of science.
5. Model Lesson transcripts on selected units may be developed by an expert team and made available to teachers on all units of biology.

**Future Research Directions**

There is a need for conducting further research in the field of models of teaching to reform the classroom practices, some topics for future studies are listed here under:

1. Innovations in classroom practices and constraints related to use of learning package at the secondary level of education.
2. Instructional effects of AOM on conceptual structures and meaningful assimilation of information.
3. The nurturant effects of AOM on interest in inquiry and thinking habits of secondary school students.
4. Role of AOM to promote meaningful verbal learning by reducing rote memorization among secondary students.
5. Instructional reforms and constructivist learning through models of teaching: An analytical study.