How Does Advance Organiser Model Affect The Learning Outcomes In Comparison To Inquiry Training Model?

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Advance Organiser Model (AOM) is an information processing theory for meaningful verbal learning. According to Ausubel, meaningful verbal learning occurs in a situation where the material being presented to learners is related with the existing cognitive structure. The Inquiry Training Model (ITM) helps students learn to organise data, examine facts, reason about cause and effect, build and test theories and become independent learners. The present study compares the effect of AOM and ITM on the learning outcomes and retention of the prospective teachers in physical science education. The investigator adopted One-Group, Pre-test-Post-test design for the study. Thirty prospective teachers for experimental groups I and II were selected as the sample for the study. Experimental group I was taught by AOM and experimental group II was taught by ITM. Findings of the study reveal that learning outcome and retention of the experimental group I taught by AOM was significantly higher than that of the experimental group II taught by ITM.

Keywords: Information Processing Models, Inquiry Training Model, Advance Organiser Model,Learning Outcome and Retention.

Introduction

Education is the most crucial investment in human development. It develops the individual like a flower, which distributes its fragrance all over the environment. True education, it must be noted at the outset, is a powerful force in bringing about a desired change. It is education and education alone that can bring about changes in knowledge, skills, attitudes, appreciations and understanding things around us. Learning in any form is the starting point of the process of concept formation (Mangal, 1990). Information Processing Models (IPMs) of teaching attempts to develop concepts and systems of inquiry used by the discipline with the assumption that as a student learns the process and ideas of the discipline, he/she incorporates them into his/her own system and behave differently as a result.

Whenever ideas or information needs to be presented, renewed or clarified the advance organiser is a useful model. Other models are also useful as means of evaluating or applying the material presented by the advance organiser. The activities designed to strengthen cognitive organisation can be spontaneously applied to the clarification of ideas in whatever instructional context they

appear, as can the technique of an organiser (Siddiqui & Khan, 1991). Planning is essential for a good lecture (Moore, 2005). Advance Organisers prepare the learner for the material they are about to learn (Tomar, 2005). Inquiry Training Model (ITM) is designed to teach students to engage in casual reasoning and to become more fluent and precise in asking questions, building concepts and hypotheses, and testing them. It has value for teaching students how to make inference and build and test hypotheses. ITM is designed to assist students in developing the skills required to raise questions and seek out answers stemming from their curiosity.

According to Ausubel each discipline has a set of concepts, which are hierarchically organised (Chauhan, 2009). Advance Organisers are the primary means of strengthening cognitive structure and enhancing retention of new information. It economises learning without losing the quality (Sivarajan, 2008). The advance organisers provide concepts and principles to the students directly. The Advance Organiser Model (AOM) is designed to strengthen student's cognitive structures, a term Ausubel uses for a person's knowledge of a particular subject matter at any time and how well organised, clear and stable it is (Ausubel, 1963). A person's existing cognitive structure is the foremost factor governing whether new material will be meaningful and how well it can be acquired or retained. Before presenting new material, the stability and clarity of the student's structures should be increased. This is done by presenting concepts that govern the information to be presented to the students (Mehra, 2005). ITM means a model, which is used for giving training of inquiry to the students. Inquiry learning provides opportunity for students to experience and acquire process through which they can gather information about the world. Inquiry Training Model stimulates and directs natural explorative instincts of students so that they can investigate new areas more forcefully in ways which help them to generate knowledge in a creative manner and organise it too (Sivakumar & Krishnaraj, 2005). Also it helps students to develop intellectual skills to raise questions concerning the problem for finding out answers (Singh, 2005). It promotes autonomous learning (Nambiar, 2003). Students become more inquisitive and feel happy and are satisfied by this model (Sachdeva, 2004). Even though there is a lot of research on Information Processing Models (IPMs), there is much scope for further research. It has been observed from the review of related research that many studies are conducted on IPMs, but little effort is made to study the effectiveness of AOM and ITM. The researchers after a thorough study of the reported past studies, smelt some gaps and deficiencies. Hence the present study is intended to explore the effectiveness of AOM and ITM.

Review Of Related Literature

Research by Curry and John (2005) revealed that the group receiving the

advance organiser had reduced anxiety. Chen and Baiyun (2007) indicated that the students of lower-learning abilities benefit more from using an Advance Organiser for online learning. Prabha (2008) found that there was significant difference between the experimental group taught by AOM and control group taught by traditional method of teaching (TMT) with regard to the post-test scores under knowledge, understanding, application and skill. Dange and Praveen (2008) and Bency and Raja (2008) identified that there was no significant difference between the control group taught by TMT and experimental group taught by AOM in the achievement after giving treatment. Bency and Raja (2010 a) also revealed that the experimental group taught by AOM performed better in physical science education than the control group taught by TMT.

Research by Abdallah (2004) reported that there was significant relationship between learning and teaching experience through inquiry teaching. Christengen and Joseph (2005) showed that the changes in the teachers' practice helped them to promote scientific inquiry in laboratory lesson. Jimenez (2005) identified that the scientific inquiry style of teaching makes a significant impact in improving students' attitude and understanding about the nature of science. Eric (2006) revealed many positive outcomes from participating in scientific inquiry process. Purirajah (2008) revealed that highly experienced junior high school teachers were likely to see more barriers in their expertise to use the inquiry teaching model. Raja and Bency (2010 b) revealed that there were more benefits from ITM than traditional method of teaching and Bency and Raja (2011) found that there was significant difference in the spirit of inquiry of prospective teachers based on number of siblings.

Research by Singh (1990) found that the post-test achievement scores were significantly higher than the pre-test scores when taught through ITM and CAM. Sushma (1991) revealed that CAM is more effective than Biological Science Inquiry model in student's achievement in Biological Science. Mahajan (1992) found that the achievement of students who were taught by the CAM based on Bruner's theory was found to be better than those of the students taught by AOM and the routine method. Rathod and Verma (2000) found that integrated teaching strategy increased students' inductive reasoning significantly as compared to conventional method. Sidhu and Singh (2005) found that there existed a significant difference with respect to learning of concepts in physics among subject taught through three different models namely AOM, ITM and CAM. Raja and Bency (2010 c) revealed that there were more benefits from CAM than conventional method of teaching. In this section many studies have been cited which have compared the two models, but none of the studies compared AOM and ITM. As these sporadic studies do not reveal any generalized inference, further studies are required to implement various models of teaching in our country. Thus the present study was

designed with the aim to find how Advance Organiser Model affects the learning outcomes in comparison to Inquiry Training Model?

Objectives Of The Study

1. To compare the effect of AOM and ITM on the learning outcome of prospective teachers in physical science education.
2. To compare the effect of AOM and ITM on the retaining capacity of the prospective teachers in physical science education.

Hypotheses

The following hypotheses have been proposed with reference to the above objectives.

1. There is no significant difference between the experimental group I taught by AOM & experimental group II taught by ITM in the learning outcomes in physical science education before giving treatment.
2. There is no significant difference between the experimental group I taught by AOM & experimental group II taught by ITM in the learning outcomes in physical science education after giving treatment.
3. There is no significant difference between the experimental group I taught by AOM & experimental group II taught by ITM in the learning outcomes in physical science education in the gain scores.
4. There is no significant difference between the experimental group I taught by AOM & experimental group II taught by ITM in the learning outcomes in physical science education in the retention scores.

Research Methodology

The investigator adopted a One-Group, Pre-test-Post-test Design (Kahn, 2007) for the present study.

Sample

30 prospective teachers of physical science education studying in St. Joseph College of Education, Appicode under Tamil Nadu Teachers Education University, Chennai formed the experimental groups I & II.

Tools Used

The investigator constructed and validated two achievement tests in physical science education namely, Achievement Test in Physical Science Education taught by AOM (AT–AOM) and Achievement Test in Physical Science Education taught by ITM (AT–ITM) consisting of 36 and 56 objective type questions. The content validity and reliability of (AT–AOM) and (AT–ITM)

were established. The reliability of the tests was found out by the Spearman - Brown Prophecy formula (Garrett, 1961) and it was 0.85 for AT–AOM and 0.84 for AT–ITM. Also these tests were free from the subjective elements and hence the objectivity of the tests was established.

Treatment

To compare the effect of AOM and ITM on the learning outcomes of prospective teachers in physical science education, a group of 30 prospective teachers were selected as experimental group I (N = 30) and experimental group II (N = 30) and given different treatments. The experimental group I was treated with AOM and the experimental group II was treated with ITM. The major topic selected for experimentation was 'Microteaching' for AOM which included the skill of introduction, skill of explaining, skill of stimulus variation, skill of reinforcement, skill of questioning, skill of using blackboard, skill of demonstration and skill of achieving closure. Similarly for ITM the topic selected was 'Methods of Teaching' which covered heuristic approach, historical and biographical approaches, lecture method, lecture cum demonstration method, individual practical method, and analytic and synthetic method, scientific method and project method. Before taking classes for the experimental groups I & II, the topics were divided into sixteen lesson plans (8 for AOM & 8 for ITM). The experiment lasted for sixteen days with an hour per day for teaching. Before and after the treatment, two achievement tests developed and validated by the investigator were administered to find the effectiveness of AOM and ITM in terms of learning outcomes of the target groups. In addition to these a retention test was also conducted after twenty days to the post-test to know their retaining capacity.

Results

The collected data were analysed using SPSS package and the results are tabulated below.

Table 1

t-Test for the Pre-test Scores of Experimental Groups I & II

Group	N	M	S.D	*t*	P – value
Experimental I	30	27.95	7.530	0.563	0.578
Experimental II	30	26.98	4.150		

In Table 1, since P value is greater than 0.05, the null hypothesis is accepted at 0.05 level of significance. Hence it is concluded that there is no significant difference in pre-test scores between the experimental group I taught by AOM and experimental group II taught by ITM.

Table 2

t-Test for the Post-test Scores of Experimental Groups I & II

Group	N	M	S.D	*t*	P – value
Experimental I	30	55.76	7.080	2.758	0.010*
Experimental II	30	49.69	9.663		

** Reject H0 at 5% level*

In Table 2, since P value is less than 0.05, the null hypothesis is rejected at 5% level of significance. Hence it is concluded that there is significant difference in post-test scores between the experimental group I taught by AOM and experimental group II taught by ITM.

Table 3

t-Test for the Gain Scores of Experimental Groups I & II

Group	N	M	S.D	*t*	P – value
Experimental I	30	27.80	8.643	2.171	0.038*
Experimental II	30	22.70	9.829		

** Reject H0 at 5 % level*

In Table 3, since P value is less than 0.05, the null hypothesis is rejected at 5% level of significance. Hence it is concluded that there is significant difference in gain scores between the experimental group I taught by AOM and experimental group II taught by ITM.

Table 4

t-Test for the Retention Scores of Experimental Groups I & II

Group	N	M	S.D	*t*	P – value
Experimental I	30	62.50	9.242	9.356	0.000**
Experimental II	30	41.95	9.199		

*** Reject H0 at 1 % level*

In Table 4, since P value is less than 0.01, the null hypothesis is rejected at 1% level of significance. Hence it is concluded that there is significant difference in retention scores between the experimental group I taught by AOM and experimental group II taught by ITM.

Findings of the Study

The findings are given here under.

1. There is no significant difference between the experimental group I taught by AOM and experimental group II taught by ITM in the learning outcomes in physical science education before giving treatment.
2. There is significant difference between the experimental group I taught by

AOM and experimental group II taught by ITM in the learning outcomes in physical science education after giving treatment. The experimental group I taught by AOM scored more in physical science education than experimental group II taught by ITM.

3. There is significant difference between the experimental group I taught by AOM and experimental group II taught by ITM in the gain scores in physical science education. The experimental group I taught by AOM attained more gain scores in physical science education than experimental group II taught by ITM.
4. There is significant difference between the experimental group I taught by AOM and experimental group II taught by ITM in the retention scores in physical science education. The experimental group I taught by AOM retained more in physical science education than experimental group II taught by ITM.

Conclusion

The results indicate that Information Processing Models (IPM) may be introduced for the benefit of the prospective teachers at the teacher education level, because the students at higher education levels are thoroughly dissatisfied with the conventional lecture method. So the Government may conduct workshops, seminars and symposia on Information Processing Models for teachers and teacher educators through teacher education institutions. Information Processing Models have been found to be more effective in gaining factual knowledge. Teachers can make their instructions more meaningful while teaching concepts through Information Processing Models of teaching and clarify content making it more effective. Therefore, as per the purpose of teaching-learning process, Information Processing Models may be used. Schools need to shift their emphasis from passive answer-absorbing to child-directed classrooms. For that educational planners/curriculum developers may prepare resource materials for conducting classes using Information Processing Models.

When presenting the Advance Organiser, inner speech of the learner is reinforced to think and link with previous knowledge. Executive process of organisation is possible by Advance Organiser Model. The enhancement of the metacognitive skills of the learners is made possible in general and specifically organisation of information into an integrated system helps the low performing students. So seminars and symposia on models of teaching may be conducted for teacher educators to have interaction and innovative exposure with the experts who make use of those in their own teaching. Advance Organiser Model bridges the gap between what is already known and what is to be learned; higher level of abstraction is also possible by Advance Organiser Model. So demonstration sessions on Advance Organiser Model of Teaching

may be arranged for the pre-service and in-service teachers. As it strengthens the cognitive structure and facilitates meaningful learning and retention, prospective teachers may be trained to integrate Advance Organiser Model in regular classroom teaching. Higher order tasks can also be performed well by Advance Organiser Model. So empirical studies on effectiveness of different models of teaching carried out by the in-service teacher educators in colleges ought to be published in educational journals to popularise the technique. Advance Organiser Model provides clear and well-organised cognitive structure, which is better anchorage for new learning and retention. The teacher educators who have been practising Advance Organiser Model -like models in their classrooms may be encouraged so that the prospective teachers can make use of them in their routine teaching so that both the slow and advanced learners are equally benefitted.

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