

TECHNOLOGY IN TEACHING OF SCIENCE - ZOOLOGY

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Abstract

In India, more and more industries are being established in various fields of productive work. But these industries are not being run as efficiently and profitably as they should due to the incapacity of our working and executive personnel. To increase the efficiency of workers and organizing personnel, we need the re-organization of our whole system of education and pattern of giving practical experiences in all aspects of technology. Our national system of education should be linked with productive workshop experiences so that trained persons work efficiently and intelligently to achieve higher and higher targets of production of all kinds of goods and materials. Technical education should be integrally correlated with practical workshop experiences and most recent techniques of production. As essential need of our modern education in science and technology is to re-orientate and reorganize it on sound and effective lines. Then only India will be able to stand in the ranks of the developed and prosperous nations of the world.

Keywords: Educational Technology, Media and Education, Instructional system, Multi media, Over Head Projector, Display Techniques, Quiz Programmes, Tape record

Educational Technology

Educational Technology emerged as a field of study and occupational category in the early 1960's. It was James Finn (1960) who introduced the term educational technology for the first time in the international arena. It is evolved from the audio visual education as the other hand. Educational Technology became a recognized name all over the world. Both teacher educators and classroom teachers began to accept it as an occupational definition which covered a range of jobs in all factors of education.

In the 1990's each new medium to arrive at the scene had raised hopes for an impact similar to that achieved in entertainment, communication and information handling aspects of society and these hopes had been raised by industries. Educational technology is nothing but the utilization of the developments in science and technology to the teaching learning process thereby realizing the process of teaching and learning effectively and efficiently Mukhopadaya (1989). Educational technology may be subsumed as instructional technology and training technology Edl tech implies the judicious use of media in the teaching learning process (kozma 1991). According to Husen (1994) Educational technology could be understood as the development of a set of systematic techniques and accompanying practical knowledge for designing, testing and operating schools as educational system.

In the words of Deign ton (1971) E.T is the systematic application of scientific knowledge about teaching and learning and conditions of learning to improve the efficiency of teaching and training. Collier (1977) stated that Educational technology is concerned

with the design evaluation of curriculum and learning experiences and with the problems of implementing and renovating them. Pillay (1981) observed E.T as a comparatively new idea grown as a result of Integration of technological deuces with the newly explored psychological panopies of learning, teaching, behavioural modification, content analysis, evaluation etc. Fern andes (1986) explained that E.T might be viewed as an attempt to apply technological know how to improve education. According to him it is a systematic way of designing, carrying out and evaluating the total process of learning and teaching.

(Sampath 1990) Economy of time, money, energy etc. is the characteristics of any technology. The preacher of E.T can increase the efficiency in learning. Edl System can be improved by the application of E.T.

Media and Education

Media helps in conveying the message effectively to the students. It adds richness to the contest. Media contribute to the educational enterprise as (i) aids to learning and instruction in the class room (ii) Media in education enrich, motivate and demonstrate a point precisely (cay 1983) Media are also seen by educators as aids rather than substitutes for the teacher (Goetz 1986). Kulkarni (1986) stated that media have broken the walls of classroom and taken over many of the functions of a class room teacher. Media make the process of class room communication more effective and meaningful. According to Husker (1994) media keeps learning in five ways. (a) media as technology or machine (b) media as teachers or tutors (c) media as socializing agents (d) media as motives for (e) media in educational problem solving. Use of media in education results in increase of effectiveness of the process. New media such as tape recorders T.V video computer, video etc are influencing the present day students.

At different stages different type of media play vital roles. Different media and strategies of presentation are necessary for different learning out comes.

Media also cater to the individual differences of the learners. E.T. Media are suitable for group learning technique also.

A.V Media: Instructional system

- A.V. Media as Presenters of Performance Models
- A.V Media as Presenters of Cases/Example
- A.V Media as practice, Guides, Aids, Opportunities
- A.V. Media as Feedback
- Tape Recorder

Influence of Media

Related prior knowledge is the single most powerful influence in mediating subsequent learning; embedded prerequisite information in layers accessible by user choice. New knowledge becomes increasingly meaningful when integrated with existing knowledge; embedded structural aids to facilitate selection, organization and integration

and activities to prompt learners to generate their own meaning. Learning is influenced by the organization of the concepts that are presented; organized content into internally consistent idea units.

Learning improves as the amount of invested mental effort increases (same as Fleming & Levie); focus user attention on important terms, and include generative activities that cause learners to engage or interact with the content. Learning improves as competition for similar resources decreases; structure presentations and interactions to reduce the complexity of the processing task (don't overload short-term memory).

Transfer improves when knowledge is situated in authentic contexts; anchor knowledge in realistic contexts and settings. Knowledge increases as the number of presentation perspectives increases; help learners see content from multiple perspectives and cross-reference in different ways. Knowledge of details improves as instructional activities are more explicit; understanding improves as the activities are more explicit; understanding improves as the activities are more integrative. Use advance organizers and summary statements.

Feedback increases the chances of learning content-specific information and decreases the likelihood of learning incidental content; use feedback where you want the learner to remember details, omit feedback when incidental learning is expected. Shifts in attention improve learning of related concepts; highlight, repeat, and otherwise draw attention to key terms, concepts and principles. Learners become disoriented when procedures are complex, insufficient, or inconsistent; provide clearly defined navigation procedures and access to online support.

Visual representation of lesson content and structure improve the learner's awareness of both the conceptual relationships and procedural requirements; provide both concept maps and map of hypertext structure to orient the learner in the system relative to other lesson segments. Individuals vary widely in their need for guidance; give them options to get assistance, including where to begin, how to find prerequisite information, and how to run the system.

Learning systems are most efficient when they adapt to relevant individual differences; interactive multimedia must adapt dynamically to learner and content characteristic. Meta cognitive demands are greater for loosely structured learning environments than for highly structured ones; provide prompts and self-check activities to guide the learner in monitoring comprehension and adapting individual learning strategies.

Learning is facilitated when system features are functionally self-evident, logically organized, easily accessible, and readily deployed; If screen design and procedures easy to comprehend and use.

Objectives of the Study

1. To study the effectiveness of Multi media approach upon teaching of Zoology at XII STD level.

2. To find out the extent of Achievement in Science of the students of Standard XII
3. To develop Multimedia for teaching of Science at Higher secondary Level

Hypotheses

1. There will be no significant difference in the mean scores in Achievement in Zoology in the pre-test between slow learners group and fast learners group.
2. There will be no significant difference in the mean scores in Achievement in Zoology in the pre-test and the post-test for the slow learners group.
3. There will be no significant difference in the mean scores in Achievement in Zoology in the pre-test and the post-test for the fast learners group.
4. There will be no significant difference in the mean scores in Achievement in Zoology in the post -test between slow learners group

Statement of the Problem

Science is one of the most important subjects. A sound knowledge of Science may embitter the prosperity of a nation. At this juncture which it is imperative that the teaching of Science should be improved so that the students of Science may have adequate knowledge in the subject. There are many fronts on which action is needed, of which important ones include provision of effective self-instructional materials and methods and their use as a supportive strategy to the conventional method of teaching. As there is severe shortage of research materials available in Science, in India, there is a genuine need to carry on researches on self-instructional materials. Retention of already learnt concepts, facts and ideas through reinforcement is an important aspect of effective teaching and learning. How far the strategies are useful as a reinforcement strategy is also to be studied. Hence a study is carried out in this area.

Experimental Design

The major objective of the present investigation is to study and compare the Multi media approach as an effective reinforcement strategy in teaching-learning process and its effect on Achievement of in Science among the selected XII std students and this demand to employ one of the experimental designs. There are three types of experimental methods which are widely in use. They are (1) Pure experimental method (2) Quasi-experimental method and (3) Ex post facto experimental method. In pure experimental and fast learners groups are necessary. This method could not be used for the present study, since perfect matching of the subjects is not possible in the natural classroom situations. The ex-post facto design is generally used to see the effect of naturally occurring events which are not under the control of the researcher. In quasi-experimental method the researcher has full control over the independent variables to be manipulated and could see the effectiveness of the treatment variable on human behavior. Further, the quasi-experimental design does

not require randomization and perfect matching of all the variables which affect the dependent variables.

Considering the major objectives of the study and pre conditions of experimental research designs, the investigator has adopted the quasi-experimental design for the present study.

Variables

The variables are the conditions or characteristics that the experimenter manipulates, controls or observes. The investigator has identified three major types of variables in the present study. They are Independent variables which have to be manipulated, Dependent variables which were to be seen as change due to manipulation of independent variables and Intervening variables which were to be controlled are to be matched.

Independent or Treatment Variables

The independent variables are those manipulated or treated by the experimenter to ascertain their relationship or effect on observed phenomena. In the present investigation independent or treatment variables considered are conventional method of teaching and self-instructional methods viz., Computer Assisted Method

Dependent Variables

The dependent variables are the conditions that appear, disappear or change as the experimenter introduces, remove or change independent variables. The dependent variable of the present study is Achievement in Science (knowledge, understanding and application) obtained by the students of the control and slow learners groups at various test phases.

Development of Strategies

The following strategies were employed for enhancing the achievement of learners Science.

Strategy 1: Question Banks

Preparation of Question Bank for conducting Quiz programme: The slow learners were divided into nine groups and each group was given an assignment to prepare objective type of questions conveying all the historical entities. These question banks were meant for conducting Quiz programme later by the slow learners.

Strategy 2: Over Head Projector

This was used to give reinforcement and rapid revision and to evaluate the extent of knowledge obtained by students in learning Science. Fill in the blank type was used to be projected through transparency.

Strategy 3: Display Techniques

The slow learners were assigned the task of preparing Maps and Charts. Charts contained the unit analysis of each lesson. Charts focused on Concept Mapping of the unit. Maps were displayed on the wall and they were displayed on the wall and they were subject to change once in these days.

Strategy 4: Quiz Programmes

The slow learners were divided into four groups. One quiz master and one recorder chosen from the slow learner group conducted the Quiz. Questions were posed to the four group in rotational order. The group which scored highest was adjudged to be the winners. Care was taken to see to it that there was healthy competition among the groups.

Strategy 5: Tape record

Summary points were recorded in the tape and played during the leisure time so as to foster reinforcement to the students. The students themselves came forward to record the messages.

Strategy 6: Newspaper scraps

The slow learners were encouraged to collect and collate current historical information gathered from the Newspaper.

Thus the strategies were developed to accelerate the attainment of knowledge in Science among slow learners.

Tools Used in the Study

The investigator has developed or adopted the following tools to generate the data for the present study.

1. Quiz programme
2. Assignments
3. Display materials (Maps & Charts)
4. Reinforcement through Overhead Projector
5. Criterion Referenced Test (Science)

Phase-1 Identification and Development of strategies and tools

In this phase, the investigator had developed the Media materials, Lesson Plans and Criterion Referenced Tests. Pilot study for the validation of Media packages and for validation of CRT and a Pre-study to establish validity and reliability of the tools were also conducted at this stage.

Phase-2

Students were divided into two groups by random selection to form the control and slow learners groups. In the second phase of the study, the investigator conducted the pre-test on the sample selected from grade VIII. The investigator taught the unit 'Science' to all the students by Conventional Method of Teaching. After completing these units, a pre-test

was administered by using the CRT, to assess the achievement of cognitive skills in 'Science'.

Phase - 3

The slow learners group was called as media group. The students of media group were given reinforcement through media materials for duration of ten teaching periods. Special care was also taken to avoid the meeting of the students of the experimental and fast learners groups during these intervals. The students of the fast learners group were sent out of the class and were not given any type of reinforcement on the content on Science.

After giving reinforcement to the slow learners groups through the strategies identified for employment for the study, all the students including the fast learners group were called together and a Post - Test was administered on the same day, with the help of the same CRT.

Analysis and Interpretation

Hypothesis 1

Research Hypothesis (H_R)

There will be significant difference in the mean scores in Achievement in Zoology between experimental group and control group in the pre-test performance.

Null Hypothesis (H_0)

There will be no significant difference in the mean scores in Achievement in Zoology between experimental group and control group in the pre-test performance.

Table 1: Pre-Test Performance Control Group and Experimental Group

Group	N	Mean	SD	"t" value	Significance
Control	16	21.75	8.17	0.21	NS
Experimental	16	21.13	8.29		

df = 58 $t_{(0.05)} = 1.96$ $t_{(0.01)} = 2.58$

There is no significant difference in the mean scores in Achievement in Science between experimental group and control group in the pre-test performance.

Hypothesis 2

Null Hypothesis (H_0)

There will be no significant difference in the mean scores in Achievement in Science between pre-test and post test performance for control group.

Table 2: Pre-Test / Post - Test Performance for Control Group

Type	N	Mean	SD	"t" value	Significance
Pre	16	21.75	8.17	0.93	NS
Post	16	24.25	7.07		

df= 58 $t_{(0.05)} = 1.96$ $t_{(0.01)} = 2.58$

There is no significant difference in the mean scores in Achievement in Science between pre-test and post test performance for control group.

Hypothesis 3

Null Hypothesis (H₀)

There will be no significant difference in the mean scores in Achievement in Science between pre-test and post test performance of Experimental group.

Table 3: Pre-Test / Post - Test Performance for Experimental Group

Type	N	Mean	SD	"t" value	Significance
Pre	16	33.59	7.50	7.04	S
Post	16	21.13	8.29		

There is significant difference in the mean scores in Achievement in Science between pre-test and post test performance of Experimental group.

Hypothesis 4

Null Hypothesis (H₀)

There will be no significant difference in the mean scores in Achievement in Science between experimental group and control group in the post-test performance.

Table 4: Post-Test Performance Control Group and Experimental Group

Group	N	Mean	SD	"t" value	Significance
Control	16	24.25	7.07	3.62	S
Experimental	16	33.59	7.50		

There is significant difference in the mean scores in Achievement in Science between experimental group and control group in the post-test performance.

Findings

1. There was significant difference in the mean scores in Achievement in Science in the pre-test between slow learners group and fast learners group.
2. There was significant difference in the mean scores in Achievement in Science in the pre-test and the post-test for the slow learners group.
3. There was significant difference in the mean scores in Achievement in Science in the pre-test and the post-test for the fast learners group.
4. There was significant difference in the mean scores in Achievement in Science in the post -test between slow learners group and fast learners group.
5. Gap closure for fast learners was greater than that of the slow learners.

Interpretation

This is an experimental study with pretest post test equivalent group design. Entry behaviour test was conducted to separate control and experimental group to assess the prerequisite knowledge. Both the groups are identical and this indicates the nature of identicalness in tune with the pre-test mean scores of both groups. All the pre-test 't' value for control and experimental reveal no significant difference among control and experimental groups. This establishes their identical nature and no significant achievement in their pre-requisite knowledge.

The means of pre-test scores and post-test scores of control as well as experimental groups differ significantly (0.01 level) with the post test mean being greater than the pretest mean. The implication of that is that the level of acquiring of the basic skills in Science has increased due to traditional method in control group and concept attainment in experimental group.

The post test scores of control and experimental group differ significantly. The means score of experimental group is greater than of control group.

Limitations of the Study

The limitations of the study are as follows

1. This study was limited to the pupils studying in standard VIII
2. The sample is not random.
3. The experimental was limited to a period of a few months.

Suggestion for Further Research

1. The experiment may be conducted at different level
2. The experiment may be performed to develop the other skills of the Science subject
3. Comparative study may be undertaken in relation to rural with urban, Low SEs with High SES, slow learners with fast learners studying in different types of schools.
4. More instructional material for employing programmed learning method may be prepared.
5. Exposure to the teacher in developing AV materials may be given.

Conclusion

It could be observed through experimentation that application of educational technology was at advantageous point over the traditional method in teaching Zoology. Effectively technology may be built in to develop scientific knowledge for the rest of the units.

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