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Influence of Certain Strategies upon Teaching of Science at Upper Primary Level

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Abstract

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 mean 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. Using 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.

Media and Education

Media help 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 is much effective.

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A.V Media: Instructional system

Perhaps the most obvious, most common and most 'Conventional' use of the audio-visual media is in the information transmission role.

Indeed, perhaps the most frequently quoted justification for the use of audio-visual materials in teaching is to bring into the classroom stimulus material which otherwise would require the learner to go out to seek the experience (or perhaps, could not otherwise be experienced at all). This is the justification for Science films, dramatizations of historical events, descriptions of industrial and other processes, interviews or debates with well known or controversial figures, etc. such descriptive stimulus material may indeed be built into an instructional design, although the scripting and production of such material may not itself follow strict instructional design principles. For this reason, it is possible to make use of a vast range of existing audio-visual material as components in a purpose-designed instructional plan.

A.V. Media as Presenters of Performance Models

Typical examples of the use of audio-visual media as 'models of desired performance' include the 'role-models' presented by means of film or videotape as a first step in an expositive strategy geared at the development of interactive skills.

A.V Media as Presenters of Cases/Example

Yet another form of stimulus material is the presentation of good and bad, or appropriate and inappropriate examples, as in the first step in a sequence designed to develop specific discriminations or concepts. In such a case, a series of short snippets of audio, visual, or audio-visual material may be presented as examples for criticism, comment or classification.

A.V Media as practice, Guides, Aids, Opportunities

Coming to the central, or learner activity (or 'response') column, we note certain highly specific uses for audio-visual media. We may use audio-visual devices as practice-media as in the case of the tapes actually recorded by the learner in a

language laboratory exercise. We may also supply some forms of 'jobs-aids' to facilitate practice, by means of audio-visual devices.

A.V. Media as Feedback

The slide sequence just is characteristic of one type of feedback material, which in a step-by-step procedure, presents to the learner a visual, audio or audio-visual unit with which to compare his or her own efforts. Such feedback material is especially useful when the learner must identify correct or incorrect procedures or decisions by their results and these results may be identified in reality through the auditory or visual channels.

Effectiveness of Audio-Visual Aids

The effectiveness of audio-visual aids depends upon their proper use. They need only careful and intelligent planning.

1. The aid should deal with the topic under study
2. The aid should not be foreign to pupils' environment
3. The aid should be appropriate to the age and intelligence of the children
4. The aid should not be too old or damaged
5. Too many aids should not be used unnecessarily
6. Simple aids if equally effective should be preferred to expensive aids like films
7. Preparation on the part of pupils
8. Preparation on the part of the teacher
9. Proper presentation
10. Adequate follow-up

Significance of the Study

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.

Interactive learning systems must reflect and accommodate differences in learner familiarity with lesson content, the nature of the learning task, and assumptions about the structure of knowledge; provide a rich linkage of nodes; Knowledge utility improves as processing and understanding deepen; provide opportunities to reflect critically on learning and to elaborate knowledge.

Knowledge is best integrated when unfamiliar concepts can be related to familiar concepts; use familiar analogies and metaphors in both lesson content and user interface. Learning improves as the number of complementary stimuli used to represent learning content increases; present content from multiple perspectives, using multiple modalities.

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.

A report from the U.S. Department of Education (1999) contains several white papers focusing specifically on multimedia. In general, these papers indicate that the research reports support of the use of multimedia in IT-assisted Project Based Learning (PBL). In such PBL, the content and assessment tend to be authentic, and students learn both the subject area being studied and also how to create multimedia documents. However, the research points out that there tends to be a steep learning curve for teachers, so that professional development is very helpful. Moreover, initial use of multimedia in IT-assisted PBL tends to over emphasize IT and under emphasize the underlying subject areas being studied. This appears to be a standard transition that teachers and their students go through as they learn to use multimedia.

Creating multimedia documents is a rewarding, but complex and challenging task. The Center for Highly Interactive Computing in Education provides some excellent examples of interactive, multimedia documents designed to be used by students and teachers.

Giving students an opportunity to produce documents of their own provides several educational advantages.

- Students that experience the technical steps needed to produce effective multimedia documents become better consumers of multimedia documents produced by others.
- Students indicate they learn the material included in their presentation at a much greater depth than in traditional writing projects.
- Students work with the same information from four perspectives: 1) as researcher, they must locate and select the information needed to understand the chosen topic; 2) as authors, they must consider their intended audience and decide what amount of information is needed to give their readers an understanding of the topic; 3) as designers, they must

select the appropriate media to share the concepts selected; and 4) as writers, they must find a way to fit the information to the container including the manner of linking the information for others to retrieve (Smith, 1993). All of these contribute to student learning and help to explain the improved student learning that is often associated with IT-assisted PBL.

There is another aspect to developing multimedia documents that empowers students. Students quickly recognize that their electronic documents can be easily shared. Because of this, students place a greater value on producing a product that is of high standard. An audience of one–the teacher–is less demanding than an audience of many–particularly one's peers. Students quickly recognize that publishing a multimedia document that communicates effectively requires attention to both the content and the design of the document.

Multimedia bring "two for the price of one" dimension to project-based learning. Students using multimedia in PBL learn both the IT and the disciplines being focused on in the PBL lesson. Project-based learning has long been a part of the repertoire of many teachers. Blumenfeld et al. (1991) provides an excellent summary of the research literature supporting PBL. Sandholtz et al. (1997) provides strong evidence of the success of IT-assisted PBL in the Apple Classroom of Tomorrow schools in which students had ready access to IT both at school and at home. In summary, there is strong research evidence that in the hands of an appropriately prepared teacher, IT-assisted PBL works (Presidents Committee of Advisors on Science and Technology, 1997) provide a rich environment. A multimedia based PBL lesson can easily include multiple goals. The following list of goals is extracted from Moursund (1999). A good IT-assisted PBL lesson is apt to include goals listed below.

1. Expertise. The project has a goal of students gaining increased knowledge and skill within a discipline or an interdisciplinary content area. Often students gain a high level of expertise within the specific area that they are studying.
2. Research. The project requires use of research skills and helps students to improve their research skills.
3. Higher order thinking skills. The project is challenging and has a focus on students improving their higher-order thinking skills.

4. Information technology. Students increase their knowledge and skill in making use of information technology to carry out the work in a project. A project may include a specific goal of students acquiring new knowledge and skills in information technology.
5. Engagement. Students are actively and appropriately engaged in carrying out the work of the project; the students are intrinsically motivated.
6. Community of scholars. The entire class-student, teacher, teaching assistants, and volunteers-becomes a community of scholars, working together and learning from each other. Often this community of scholars expands to include parents, students from outside the class, and others.

Rationale of the Study

Studies have indicated that appealing to more senses has increased effectiveness of learning. A number of studies in the developed countries support this point. The investigator is much interested in finding out the impact of certain strategies on learning Science at VIII STD

Objectives of the study

The objectives of the present study are:-

1) To develop a certain strategies for teaching Science at VIII STD level with audio package.
2) To find out the effectiveness of the media upon teaching Science at VIII STD

Hypotheses

1. There will be no significant difference in the mean scores in Achievement in Science 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 Science 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 Science 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 Science in the post -test between slow learners group and fast learners group.
5. Gap closures in slow learners group will be greater than those in fast 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 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 VIII 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.

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 scientific 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. Charts 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 groups 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 scientific 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 (Charts)
4. Reinforcement through Overhead Projector
5. Criterion Referenced Test (Science)

Analysis and Interpretation

Hypothesis 1

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

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		

Hypothesis 2

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

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		

Hypothesis 3

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

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		

Hypothesis 4

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.

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		

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.

Conclusion

Media studies have been conducted mostly in the context of classroom based teaching learning system, whereas they are treated as secondary channels or supplementary means of classroom instruction. Hence there may not be much generalization of findings of media studies in classroom based instruction to DE situations. However, most of the media studies have proved effectiveness of print based media, mechanical media and electronic media superior to or equally effective traditional methods/media based instruction. They have indicated utility of multi media approaches from the point of view of self instructional activities. Taking a cue from such studies efforts are to be made to study media in DE situations with management perspective. Several media's effectiveness has already been ascertained from educational point of view. Their applications must be made in DE situations encouraging.

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