

Implementing Multimedia Instruction Technology in Science Teaching-Learning

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Abstract

Multimedia instruction is a well established means of instructional delivery in the sciences and is often used to complement or blend with traditional didactic elements or replace other 'traditional' teaching methods altogether. The present study is aimed at comparing the success of Multimedia Instructional Programme with the Conventional Teaching Approach for teaching Science to Secondary School Students. Fifty Science students of two schools of Bhiwani District were the subjects of the study. Out of Fifty Students twenty five were selected as the Experimental group and the other twenty five as the Control group. The data collection tools were: SES Form by Dr Ashok Kalia, Raven's Standard Progressive Matrices Test and Achievement Test. The Experiment was conducted for five weeks of an academic session. The Topic Cell- Structure was taught to the Experimental Group by the researcher through Multimedia Instructional Programme and the Control group through Traditional teaching. The results of t-test analysis of the Achievement test scores showed that there was a statistically significant difference between Multimedia Instructional Programme and Conventional teaching approach on the success level of students' learning in Science. The findings suggest that Multimedia Instructional Programme is a better alternative to conventional teaching for teaching Science.

Keywords: Effectiveness, Science, Teaching, Technology, Multimedia, Multimedia Instructional Programme.

Growth of Information and Communication Technology has completely transformed the mode of imparting education to students. Technology can help us to create visual aids for teaching, integrating video clips into presentations, review and comment on student work more efficiently. Moreover New Scientific and Technological advancement has increased our awareness towards identification and development of most promising minds according to the potential of students. Most educators are of view to develop a classroom atmosphere that will create a partnership between students, teachers and technology that will build on students curiosity and creativity; emphasize quality of understanding rather than quantity of information. Moreover in the new technology era, the role of educator has changed and continues to change from being an instructor, facilitator and creator of a learning situation.

Multimedia Instructional Programme: The use of mechanical devices as educational tools emerged in the 1950s with Skinner’s “teaching machine”, a machine that allowing students to respond to questions (Skinner, 1960), and later the notion of computers as educational tools became established. The affordability and availability of desk-top computers fuelled the growth in development of electronic educational resources, so-called computer assisted learning or instruction. Early software required some degree of programming knowledge whereas later resources could more easily be created using commercial authoring solutions.

In recent years there has been a grounds well of interest in how Multimedia can be best harnessed to improve the efficiency and effectiveness of education at all levels. Various Researches have shown us that the brain processes information using two channels: visual and auditory. The plea is that, when information presented using both channels, the brain can easily accommodate new information. By taking advantage of multimodal processing capability and technology-based tools, we can dramatically enhance student learning.

The term multimedia appeared in the 1990s and was defined by Reddi and Mishra (2003) as:

“an integration of multiple media elements (audio, video, graphics, text, animation etc.) into one synergetic and symbiotic whole that results in more benefits for the end user than any one of the media element can provide individually”.

Mayer (2005) extended the definition:

“a multimedia instructional message is a presentation consisting of words and pictures that is designed to foster meaningful learning”.

Multimedia, in general, means that information represented in the form of Audio, Video and Animation in addition to Traditional, Media (texts, graphics drawings and images). These elements when used in conjunction with content can spark interest in individuals. Multimedia Programme offers the teachers ample scope to present lessons. It is used to improve electronic information representation, storage and manipulation in a wide range of applications.

The use of multimedia components became an important part of e-learning strategies for teaching a wide range of subjects including physiology, although studies that have explored the educational impact of multimedia more often focused on mathematics, engineering and computer science perhaps due to the more technical inkling of staff in these areas. The educational impact of multimedia resources for life science subjects is less well studied which is surprising considering the 3-dimensional and real-time nature of these subjects and the fact that animation can easily depict processes and concepts that students often find hard to grasp.

Although several studies have been conducted on the Effectiveness of MMIP in Teaching. But studies related to its effectiveness on science teaching are still rare, especially in the technologically backward areas of Haryana. So the researcher conducted the study exploring whether Multimedia Instructional Programme are effective in enhancing academic learning level of Secondary School Science students in Bhiwani District.

Objectives of the study: 1. To compare Mean scores on the Achievement test in Science, of Control group students before and after experimental treatment.

2. To compare Mean scores on the Achievement test in Science, of Experimental group students before and after experimental treatment.

3. To compare the Mean scores on the Achievement test in Science, of Experimental and Control group students after experimental treatment.

Hypotheses of the study: The researcher tested the following Research hypotheses:

1. There is significant difference between Mean scores of the Control Group students, (taught through Traditional Method) before and after experimental treatment.
2. There is significant difference between Mean scores of the Experimental Group students, (taught through Multimedia Instructional Programme) before and after experimental treatment.
3. There is significant difference between the Mean scores of the Experimental and Control group students, after experimental treatment.

Methodology:

Sampling: Criteria for including the participants for the study were Intelligence and Socio-Economic Status. 50 Students belonging to average level of intelligence and Socio-Economic Level were selected from the two schools of Bhiwani.

Experimental Method was used for testing the hypotheses the study.

Design: Researcher used **Pre-test and Post-test Control Group Design**. The First stage involved Pre-testing of all the students of two groups on Achievement tests in Science. The Second stage involved treatment of five weeks. The experimental treatment consisted of teaching science to Control group students through Traditional Method and Experimental Group students through Multimedia Instructional Programme. In the Third stage, the students of the both groups were post-tested on Achievement test in Science.

Variables: Three kinds of variables were identified for the study i.e. **Independent Variable** (Multimedia Instructional Programme and Traditional Method of Teaching), One **Dependent Variable** (Academic Achievement) and **Intervening Variables** (Grade to be taught, Subject to be taught, Socio-economic Status and Intelligence.)

Tools used: The Urban form of Socio-Economic Scale by Dr. Ashok Kalia for testing the S.E.S, Raven's Standard Progressive Matrices Test for testing the Intelligence and Achievement test having reliability value 0.85 and content validity.

Experimental Procedure:

- I. **Pre-Testing:** Before the commencement of experiment, the researcher administered Pre-tests in Science.

II. **Experimental treatment:** After pre-testing the experimental treatment of teaching science to 9th class students was started. Students of the Control group were taught through Traditional method of teaching and of the Experimental group through Multimedia Instructional Programme.

III. **Post-testing:** After teaching treatment the students of both groups were post-tested on Achievement test for testing the Effectiveness of MMIP.

Scoring: Scores of each student in the Achievement test were measured using the scoring key. The scores were tabulated and statistical analysis was done.

Statistical Analysis: The values of Standard Deviations of the Experimental Group at the Pre and Post test level were found to be 1.1 and 3.4 respectively. The value of t-test was found to be 60.56 which is significant at 00.1 level of significance.

Table 4·2 Statistical Analysis of Mean scores of Control Group

Group	Test	Mean	SD	SE _D	t-value	Level of significance
Control	X ₁	7	1.2	0.95	36.84	0.01
	X ₂	42	4.6			

Table 4·4 Statistical Analysis of Mean scores of Experimental Group

Group	Test	Mean	SD	SE _D	t-value	Level of significance
Experimental	Y ₁	7	1.1	0.71	60.56	0.01
	Y ₂	50	3.4			

Table 4·6 Statistical Analysis of Mean scores of Control and Experimental Group

Group	Test	Mean	SD	SE _D	t-value	Level of significance
Control	X ₂	42	4.6	1.1	7.14	0.01
Experimental	Y ₂	50	3.4			

The values of Standard Deviations of the Control and Experimental group at the post test levels were found to be 4.6 and 3.4 respectively. The value of t-test was found 7.14, which is significant at 00.1 level of significance.

Results of the study: On the basis of the interpretation of data the investigator analysed the hypotheses items in the following way:

Research Hypotheses:

1. From the interpretation of table 4-2 the investigator retains the hypotheses item no. 1 that there is significant difference between Mean scores of the Control Group students, before and after experimental treatment.
2. From the interpretation of table 4-4 the investigator retains the hypotheses item no.2 that there is significant difference between Mean scores of the Experimental Group students, before and after experimental treatment.
3. From the interpretation of table 4-6 the investigator retains the hypotheses item no. 3 that there is significant difference between the Mean scores of the Experimental and Control group students, after experimental treatment.

The study explored the importance of Multimedia and role that it can play in creating a successful learning experience. The results of the study reveals that Multimedia Instructional Programme can enhance learning achievement in science. This systematic research study highlights the need for implementation of multimedia in secondary school science education for a broader range of scenarios, not just replacing laboratory practicals and lectures, but as self-directed study aids and distance learning resources appropriate with modern educational models. Studies in the future would benefit from being rigorous in design with good quality reporting of all aspects of methodology and study results.

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