

Original Research Article

Practical Implication of Multimedia Package in Science and Technology: A Study on Students of Standard IX

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ABSTRACT

Science is one of those human activities that man has created to gratify certain human needs and desires. The search of truth became the dominant motive in the prosecution of science. Our daily life is full of science. There is a need for every student to identify the underneath concept and principles of science in our daily life and to understand those for our betterment. It is the role of the teacher to highlight those scientific principles while teaching science contents. Investigators studied the application of Science in day to day life with the help of a multimedia package. The study measured the effectiveness of multimedia package for practical implication of Science subject at Standard IX. Two sections of standard IX were selected purposively as experimental and control groups. The experimental group was taught through the multimedia package, whereas, the control group was taught in traditional method. Data were collected through the achievement test in Science and reaction scale. The findings revealed that the developed multimedia package was found significantly effective in enhancing achievement of Standard IX students in science in comparison to their traditional counterpart. The students also showed positive reactions towards the multimedia package for teaching science.

Key words: Multimedia package, Science and Technology, Practical Implication of Science, Effectiveness, Reaction

INTRODUCTION

Education is a powerful instrument for individual as well as national development. Education plays an important role in the progress of an individual's mind and country. Education makes man a right thinker and a correct decision-maker. It is only through a well designed and effectively implemented educational programme the child could be equipped to realize his inner potential and to contribute meaningfully to the nation building. With education, he finds himself in a room with all its windows open to the outside world. But it seems that our education system is not doing its purpose properly may be due to many factors. It

follows more or less a similar pattern of teaching, learning and evaluation pattern at all levels. Practically similar method of teaching and evaluation is followed from primary level to the higher education level. At all the levels emphasis is given on teacher centered, one way and boring methods of teaching and rote memory centered method of evaluation. It reflects the lack of a proper teaching learning environment in our school system and there is need to revamp it. There is a need to reform our teaching learning process where we could be able to prepare our children for the future. There is a need of explaining students the application of learned

knowledge in the life and the society along with many more. The existing technology can help a lot in this direction. In the present era of internet, it is quite easy for the teachers to prepare and use multimedia while teaching the subject like Science and Technology. The present study is an attempt in this direction to examine the possibility of adding the practical implications of Science and Technology with the help of multimedia package. Researchers have selected the various concepts of Science and Technology for the present study. Moreover, researchers believe that different topics of different subjects should be taught using the most appropriate method among all the available methods and available infrastructural facilities. It is necessary to make Science and Technology subject interesting, meaningful and applicable. Thus, clear understanding of Science and Technology is very necessary otherwise it may lead to confusion and boredom in higher stages of education. And so the investigators in the present study had used multimedia package for the practical implication of Science and Technology in Standard IX.

REVIEW OF RELATED LITERATURE

After going through the educational researches conducted in India and abroad, the researchers found that the major variety of researches conducted in the area were Computer Assisted Instruction (CAI), Computer based Multimedia learning and similar type of use of packages where the principle of multimedia and the self learning are used. Most of the studies revealed that teaching-learning become more interesting, joyous and prolonged with the help of these packages. CAI is an effective approach and has a great concern regarding learning in Science. CAI was superior to the traditional method Khirwadkar (1998), Dalwadi (2001), Dange and Wahb (2006), Patel (2008), etc. Researches by Phoolwala (1997), Chaudhari (2008) were conducted to see the effectiveness of the different methods in Science. These researches

showed the positive attitude of teachers towards the use of computer as well as use of CAI in teaching learning process. Most of the studies conducted in abroad were related to the integration of the CAI and multimedia with various subjects and technology. According to Rosales (2005), it was found that CAI groups perform better than the traditional group. These studies show that ICT can be used as an effective tool for teaching various subjects. The results indicate that multimedia applications with or without interactive 3D animations increase the interest of students and make the material more appealing to them. Investigators found many studies conducted on the use of technology in Science subject and study by Agarwal (2007) too explains on the use of different methods in teaching Science subject. But, the researchers could not find any studies where Multimedia Package has been used to teach the practical application of Science and Technology particularly in secondary standard. Hence, the present research is a humble attempt with the following objectives to take the help of multimedia approach to deal with the application of Science knowledge for the secondary students.

OBJECTIVES OF THE STUDY

1. To develop a multimedia package for practical implication of Science and Technology subject at Standard IX.
2. To implement the developed multimedia package for practical implication of Science and Technology subject at Standard IX.
3. To study the effectiveness of the developed multimedia program in terms of achievement in Science and Technology and reaction of Standard IX student.

HYPOTHESIS

There will be no significant difference in the Post test mean achievement score of Standard IX students of experimental and control group in Science and Technology.

OPERATIONALIZATION OF THE TERMS

Achievement in Science and Technology: Achievement in Science and Technology is the scores secured by students in the achievement test prepared by the investigators based on the practical concepts of Science and Technology subject of Standard IX.

Reaction of Student: It is the preferred scale value of students regarding the component of the multimedia package on a five point-scale. The aggregate quantitative scale value was considered as the reaction of the students towards the developed multimedia package.

RESEARCH DESIGN

The present study was experimental in nature where a quasi-experimental research design was used. The Pretest-Posttest Equivalent-Controlled group design was used in this research.

POPULATION

All Standard IX students of 71 English medium schools in Vadodara affiliated to Gujarat Secondary and Higher Secondary Education Board constituted as population of the study.

SAMPLE

Navyug English Medium School in Vadodara city having two sections i.e. A and B of standard IX was selected purposively as the sample school of the study. Section A was taken as the experimental group and Section B was selected as the control group. There were 45 and 43 students in the experimental and control group respectively. After making the groups equivalent on the basis of the pre-test score in Science, there were 20 students in each experimental and control groups and constituted as the sample of the present study.

TOOLS FOR DATA COLLECTION

To achieve the objectives of the present study, an achievement test in Science and Technology and a Likert type 5 point reaction scale was constructed and validated by the researchers.

DEVELOPMENT AND IMPLEMENTATION OF MULTIMEDIA PACKAGE

A Multimedia package was prepared by the researchers with the help of text, sound effects, music, speech, images, movies and animation related to the practical related concepts of Science and Technology for Standard IX comprising nine chapters of Semester II. Most of the components of multimedia were taken from the available Open Access Resources on the internet. The multimedia was validated by the experts. The multimedia was implemented on the experiment group during a period of 15 days, taking two continuous periods every alternate days. Two days each were devoted for Chapters of Physics, Chemistry and Biology. During the same time the control group was taught by their teachers using traditional method.

DATA COLLECTION

Pre-testing of the achievement in Science and Technology was done on the both experiment and control group before implementation of the multimedia package. It was used to make the groups equivalent. Post testing of the achievement in Science and Technology was done on the both experiment and control group after implementation of the multimedia package. Reaction scale was also administered on the experiment group after implementation of the multimedia package.

DATA ANALYSIS

To achieve objective 3 of the study and to test the null hypothesis, data were analyzed using Mean, Standard Deviation (SD), Mann-Whitney U-test and Intensity Index (II) which are given in table 1, table 2 and table 3.

Table 1: Mean, SD and Standard Error of Mean (SE) wise distribution of Achievement in Science and Technology for Experimental and Control groups.

Groups	N	Mean	SD	SE
Experiment	20	30.4	8.76	1.95
Control	20	16.25	5.58	1.24

From the table 1, it was found that the Mean achievement in Science and Technology for experimental and control

group students were 30.4 and 16.25 respectively out of total score of 50. The SD from the Means were found to be 8.76 and 5.58 respectively for experimental group and control group students with SE of Means of 1.95 and 1.24 for the experimental and control group respectively. Comparing the Means it was found that the Mean achievement in Science and Technology of experimental group students was higher than that of control group students. The higher mean achievement score of experimental group in Science and Technology may be due to the implementation of the multimedia package. To find whether the difference in the mean achievement was significant or by chance and to test the null hypothesis, U-test was used which is given in table 2.

Table 2: Summary of U-test for Achievement in Science and Technology of different groups with the Sum of Ranks (SR), U-value, z-value and Probability

Groups	N	SR	U-value	z-value	Probability
Experiment	20	594	358.5	4.295	0.00003
Control	20	251.5			

From table 2, it was observed that the Sum of Ranks of experimental group

and control group students in Science and Technology achievement score were 594 and 251.5 respectively. The U-value and z-value were found to be 358.5 and 4.295 respectively. Referring Table for normal probability (Table A of Siegel, 1956) under null hypothesis (H_0) of z, for $z \leq 4.295$, the two tailed probability was found to be 0.00003 which is less than our decided significance level (α) i.e. 0.01. Hence the null hypothesis i.e. 'There will be no significant difference in the Post test mean achievement score of Standard IX students of experimental and control group in Science and Technology, is rejected. Referring table 1, it can be said that experimental group did significantly better in comparison to the control group in their achievement in Science and Technology. Hence, it showed that the developed multimedia package in teaching Science and Technology is effective in enhancing achievement of students in comparison to traditional approach. Reaction of students towards the multimedia package was studied and presented in table 3.

Table 3: Percentage of the reactions of students along with Intensity Index (II). Strongly Agree (SA), Agree (A), Can't Say (CS), Disagree (D), Strongly Disagree (SD).

SNo	Statements	SA	A	CS	D	SD	II
1.	Multimedia Package provided more Practical information than textbook.	40.91	59.09	---	---	---	4.41
2.	It will help in remembering the concepts for longer time.	36.36	56.81	6.81	---	---	4.29
3.	It helped in visualizing abstract concepts of Science more clearly.	31.81	50	18.18	---	---	4.14
4.	It gave many real life examples related to the application of scientific concepts.	18.18	63.63	15.9	2.27	---	3.97
5.	It helped in active involvement of all the students of the class.	38.63	36.36	15.90	6.81	2.27	4.02
6.	It helped to increase concentration in the class.	36.36	45.45	18.18	---	---	4.18
7.	It helped in removing misconception in science subject.	20.45	54.54	22.72	2.27	---	3.93
8.	It helped in interrelating different topics of Science subject.	22.72	59.09	13.63	4.54	---	4.0
9.	It helped to increase my interest in Science subject.	45.45	45.45	4.54	2.72	2.72	4.29
10.	It was enjoyable experience in learning through Multimedia Package.	45.45	47.72	6.81	---	---	4.6
11.	The language used in the multimedia package was easy	29.54	56.81	13.6	---	---	3.93
12.	Combination of text and graphics made our learning interesting for each topic.	25	68.18	4.54	2.72	---	4.15
13.	Content presented in multimedia package was arranged properly	15.90	54.54	25	4.54	---	3.81
14.	Each topic became easier while learning through multimedia package.	47.72	36.36	15.90	---	---	4.31
15.	The picture and the text presented for each slide is totally appropriate.	27.27	59.04	9.09	4.54	---	4.09
	Overall reaction	31.22	54.19	12.37	1.91	2.29	4.14

From the table 3, it was observed that in terms of the reaction of the students towards the statement 1, 40.9% and 59.09% students reacted Strongly Agree and Agree respectively. The II of 4.41 showed favourable reaction of students towards the developed multimedia package for more practical information than the textbook. For

the statement 2, 36.36%, 56.81% and 6.81% students reacted Strongly Agree, Agree and Can't Say respectively. The II of 4.29 showed their favourable reaction towards the concept remembrance for the longer time through this multimedia package. For the statement 3, 31.81%, 50% and 18.18% students reacted Strongly Agree, Agree and

Can't Say respectively. The II of 4.14 showed their favourable reaction towards the visualization of the abstract concepts of science more clearly. For the statement 4, 18.18%, 63.63%, 15.9% and 2.27% students reacted Strongly Agree, Agree, Can't Say and Disagree respectively. The II of 3.97 showed favourable reaction towards the application of scientific concepts linked with their daily life. For the statement 5, 38.63%, 36.36%, 15.90%, 6.81% and 2.27% students reacted Strongly Agree, Agree, Can't Say, Disagree and Strongly Disagree respectively. The II of 4.022 showed their favourable reaction towards the active involvement of students. For the Statement 6, 36.36%, 45.45% and 18.18% students reacted Strongly Agree, Agree and Can't Say respectively. The II of 4.18 showed their favourable reaction towards the increase in the concentration in the class through multimedia. For the statement 7, 20.45%, 54.54%, 22.72% and 2.27% students reacted Strongly Agree, Agree, Can't Say and Disagree respectively. The II of 3.93 showed their favourable reaction towards the removing of misconception in their science subject. For the statement 8, 22.72%, 59.09%, 13.63% and 4.54% students reacted Strongly Agree, Agree, Can't Say and Disagree respectively. The II of 4.0 showed their favourable reaction towards the interrelation of different topics of science subject. For the statement 9, 45.45%, 45.45%, 4.54%, 2.72% and 2.72% students reacted Strongly Agree, Agree, Can't Say, Disagree and Strongly Disagree respectively. The II of 4.29 showed their favourable reaction towards increased interest of students in science subject. For the statement 10, 45.45%, 47.72% and 6.81% students reacted Strongly Agree, Agree and Can't Say respectively. The II of 4.61 showed their favourable reaction towards enjoyable learning experiences of students in the use of multimedia package. For the statement 11, 29.54%, 56.81% and 13.6% students reacted Strongly Agree, Agree, Can't Say and Disagree respectively. The II of 3.93 showed their favourable

reaction towards easiness of the language used in multimedia package. For the statement 12, 25%, 68.18%, 4.54% and 2.72% students reacted Strongly Agree, Agree, Can't Say and Disagree respectively. The II of 4.15 showed their favourable reaction towards the combination of text and graphics in multimedia package which made the learning interesting for each topic. For the statement 13, 15.90%, 54.54%, 25% and 4.54% students reacted Strongly Agree, Agree, Can't Say and Disagree respectively. The II of 3.81 showed their favourable reaction towards the proper arrangement of content in the multimedia package. For the statement 14, 47.72%, 36.36% and 15.90% students reacted Strongly Agree, Agree and Can't Say respectively. The II of 4.31 showed their favourable reaction towards the easiness of learning of the topics through multimedia package. For the statement 15, 27.27%, 59.04%, 9.09% and 4.54% students reacted Strongly Agree, Agree, Can't Say and Disagree respectively. The II of 4.09 showed their favourable reaction towards the appropriateness of the presentation of picture and text in the multimedia.

Out of 15 statements in the reaction scale, students have the reaction of Strongly Agree for one statement and the reaction of Agree for rest of the 14 statements. The average II of 4.14 also indicate the overall favorable reaction of the students towards the multimedia package that was used for their Science teaching. So it can be said that the multimedia package to teach practicability of Science and Technology was found to be effective in terms of the reaction of students towards the package.

MAJOR FINDINGS

Following Major findings were drawn on the basis of analysis and interpretation of the data.

1. The developed multimedia package for teaching practical implications of Science and Technology was found to be significantly effective in terms of enhancing science achievement of

Standard IX students in comparison to the traditional approach.

2. The developed multimedia package for teaching practical implication of Science and Technology was found to be effective in terms of reaction of students towards the package.

CONCLUSION

The findings of the present study showed that the developed Multimedia Package was more effective than the traditional method for teaching practical implication of Science and Technology in terms of achievement of students in Science and Technology. It may be due to the fact that the teaching through traditional method does not take care of inclusion of more sensory activities of the students in comparison to that of Multimedia Package and students are only the passive listeners in the traditional classes. Other reasons can be that the students have to learn whatever the teachers teach them in the classes irrespective of their interest. But the developed Multimedia Package has pictures of life like situations and model structures related to them. The students might have made use of their understanding as well as their imagination, experiences through the co-ordination of the learnt things with different situations. The other benefit was that the students could have learn the topic of their own interest which might have helped for better learning. Thus the overall effect of Multimedia Package in comparison to traditional method was found to be more effective for teaching practical implication of Science and Technology to standard IX students.

The reactions of the students were also found favorable towards the multimedia package. The reasons behind that may be the difference in teaching – learning process itself, the color of the pictures, background of the slides, relevance of the pictures with their lives, usability of the learnt topics in life through pictures and structures, animation effects to pictures, freedom of learning and clarity of

explanation presented in the Multimedia Package. Even the students of this level like the animation, pictures which might have developed their liking for the developed Multimedia Package. Investigators found enhancement in achievement in using Multimedia for showing the practical implication of Science and Technology helped relating various concepts of science with their daily life. It was helpful in visualizing the abstract concept very well.

From the present study, it could be concluded that the use of available technology could be possible through teachers and experts to teach abstract concepts of Science, Mathematics and Social Studies through different multimedia packages which can help students to be interested in teaching learning and achieving more in their studies.

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