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IMPACT OF INTERACTIVE MULTIMEDIA PROGRAM ON ACHIEVEMENT IN RELATION TO SELF EFFICACY- AN EXPERIMENTAL STUDY

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Abstract

The main objective of the present study was to see the impact of Interactive Multimedia Program on achievement in English Grammar of secondary school students in relation to self efficacy. The present study was experimental in nature and was conducted on the final sample of N=192. Two groups randomized Pre-test - Post-test design was used to conduct the experiment. 2×2 Analysis of Variance (ANOVA) was used to interpret the results. The results of the study revealed that the mean gain scores of achievement in English grammar of the group taught through Interactive Multimedia Program was higher than the group taught trough Conventional Method of Teaching. Further it was found that there exists significant difference in the mean gain scores of achievement in English grammar with high and low self efficacy. The students with high self efficacy achieve high in English grammar than the students with low self efficacy. Further there exists significant interactional effect of instructional strategies and self efficacy on achievement in English grammar of secondary school students.

Key Words: *Interactive Multimedia Program, Achievement, Self Efficacy, English Grammar, Secondary School Students*

Introduction

The most challenging in instructing technical training or any other discipline, is to meet the needs of a variety of students. In today's information and communication technology (ICT) age, interactive multimedia has the potential to create high quality learning environment for everyone. The key elements of interactive multimedia and user's control over the delivery of information and interactivity can be used to enhance the learning process through creating integrated learning environment. A range of interactive multimedia elements can be used to convey a given message and the user can study at a time and place convenient to them, taking time as long or as little they need. When something is explained, we can combine the explanation with illustrative examples, we can give feedback to the online assignments and the user can be provided with opportunities to practice and experiment. (Cairncross and Mannion, 2001).

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One more thing which plays a vital role in human success in every walk of life is self-efficacy. Self-efficacy is explained in the theoretical framework of social cognitive theory by Bandura (1986) which states that human achievement depends upon the interactions between one's behaviour, personal factors and environmental conditions. Self-efficacy helps to determine how much efforts, perseverance and resilience being put on a task. In other words higher the sense of efficacy greater the efforts, persistence and resilience. Efficacy beliefs also trigger emotional reactions. For example, individuals with low self-efficacy believe that a task is tough and hence build stress, depression and a narrow vision on how to solve problems. On the other hand, those with high efficacy would be more relax in solving difficult tasks. Therefore, these influences are strong determinants of the individual's level of achievement. Many studies have been carried out on the concept of self-efficacy in the academic settings. Results by Peters (2013), Filiz, Dost and Bayram (2014), Nasser and Meisam (2014), Brent and Jack (2015) and Hayal and Meral (2015) showed that self-efficacy significantly impacted on student's achievement in different subjects. Based on the theoretical explanations on interactive multimedia program and self-efficacy and findings by previous studies, it is therefore aimed to find out the impact of interactive multimedia program on achievement of the students in relation to their self-efficacy.

Interactive Multimedia

Interactive multimedia is always "reader-centered." In interactive multimedia, the reader controls the experience of reading the material by being able to select among multiple choices, choosing unique paths and sequences through the materials. One of the key features of interactive multimedia is the ability to navigate through material in whatever ways are most meaningful for individual users (Bass, 1994). Interactive Multimedia is the package of material that includes some combination of texts, graphics, still images, animations, video and audio. In the Interactive Multimedia the material is packaged, integrated and linked together in some way that offers users the ability to browse, navigate and analyze these materials through various searching and indexing features as well as the capacity to annotate or personalize these materials.

Achievement

The term achievement refers to the degree of level of success attained in some general and specified areas. Achievement is an end product of learning and its level and performance is affected by various factors like creativity and motivation, at the time of learning. Achievement is the extent to which the learner is profiting from instructions in given area of learning. Achievement is the accomplishment or proficiency of performance in a given sill as body of knowledge. Achievement is generally used in the sense of ability to do, tendency to do, but a person's performance is conditioned by the alternative circumstances and abilities, capacities and tendencies. Achievement means getting success in the work which we are doing. Achievement is one of the most important goals of education.

Self- Efficacy

The term "Self-Efficacy" is coined by great psychologist "Albert Bandura". Self-efficacy is the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations (Bandura,1995). In other words, self-efficacy is a person's belief in his or her ability to succeed in a particular situation. Bandura (1993) described these beliefs as

determinants of how people think, behave and feel. Bandura also describes self-efficacy as a person's attitudes, abilities, and cognitive skills comprise which is known as the self-system. This system plays a major role in how we perceive situations and how we behave in response to different situations. Self-efficacy plays an essential part of this self-system.

For example, if a person believes he is a brilliant scientist and can complete any scientific experiment, he has a high self-efficacy in science because he believes in his competency to perform a future experiment. Whether, it is true that he is brilliant in science or not doesn't really matter. It only matters what he believes. Self-efficacy can also influence your goals, actions and successes (or failures) in life. If your self-efficacy in an area is much lower than your ability, you will never challenge yourself or improve. If your self-efficacy in an area is much higher than your ability, you will set goals that are too high, fail and possibly quit. The ideal self-efficacy is slightly above a person's ability: high enough to be challenging while still being realistic.

Operational Definitions

Interactive Multimedia Program (IMP)

In the present study Interactive Multimedia Program is considered as a package of materials that includes some combination of texts, graphics, still images, animation, video, hyperlinks and audio. The material is packaged, integrated, and linked together in some ways that offer to user the ability to browse, navigate and analyze these materials through various searching and indexing features, as well as the capacity to annotate or personalize these materials. A Compact Disc (CD) was prepared by investigator in Hyper Text Mark-up Language (HTML) on the XII topics of English Grammar by creating above said features to conduct the experiment. The program prepared by investigator is totally "reader-centered." In the present study Interactive Multimedia Program is abbreviated as IMP.

Conventional Method of Teaching (CMT)

In Conventional Mode of Teaching, the investigator taught the students in normal class room with the help of Black Board. No specific teaching aid was used by the investigator in the class.

Achievement

Achievement is operationally defined as what a student is expected to know, understand or be able to demonstrate at the end of the experimental treatment. It was measured immediately after the completion of experiment through the mean gain scores (Post -test Scores - Pre-test Scores) obtained on the achievement test prepared by the investigator.

Self-Efficacy

Self-efficacy is the belief that one is capable of performing in a certain manner to attain certain goals or succeed at a task. Here self-efficacy of students was measured by Self-efficacy Scale (2012) by Mathur and Bhatnagar as high and low.

Objectives of the Study

The study was carried out with the following objectives:

1. To develop and validate Interactive Multimedia Program on selected topics of English grammar for IX class students.

2. To construct and validate the unit tests on the selected topics of English grammar for formative evaluation of the students taught through Interactive Multimedia Program.
3. To construct and validate the test of achievement on the selected topics of English grammar to assess the achievement of IX class students.
4. To compare the achievement in English grammar of IX class students taught through Interactive Multimedia Program and Conventional Method of Teaching.
5. To compare the achievement in English grammar of IX class students with different levels of Self Efficacy.
6. To investigate the interactional effect of Instructional Strategies and Self Efficacy on achievement in English grammar of IX class students.

Hypotheses

The study was carried out to test the following hypotheses:

H_0 1 There exists no significant difference in the mean gain scores of achievement in English grammar of the groups taught through Interactive Multimedia Program and Conventional Method of Teaching.

H_0 2 There exists no significant difference in the mean gain scores of achievement in English grammar of IX class students with different levels of Self Efficacy.

H_0 3 There exists no significant interactional effect of Instructional Strategies and Self Efficacy on achievement in English grammar of IX class students.

Method

Keeping in view the nature of the study, the experimental method of research was used in the present study.

Design

In the present study two groups randomized Pre-test - Post-test design was used.

Sample

The sample was selected from four Government Senior Secondary Schools of Moga district of Punjab. The study was conducted on 200 students of IX class.

Tools Used

In the present study the following tools were used to collect the data:

1. Interactive Multimedia Program on selected topics of English grammar for IX class was developed and validated by the investigator.
2. An achievement test in English grammar for IX class was developed and validated by the investigator to check the learning of the students before and after the treatment.
3. Unit tests were developed and validated by the investigator for the purpose of formative evaluation.
4. Self Efficacy Scale (2012) by Mathur and Bhatanagar.

5. Group Test of Intelligence (2012) by Ahuja for the formation of two equivalent groups.

Delimitations of the Study

The present study was delimited to the following areas:

1. The study was delimited to Moga District of Punjab
2. Population of the present study was delimited to learners studying in Government Senior Secondary Schools of Moga District of Punjab.
3. The present study was delimited to 200 students only.
4. Study was restricted to IX class students only.
5. Study was restricted to twelve topics of English Grammar from the syllabus of Punjab School Education Board, Mohali (PSEB) only.

Procedure

The study was conducted in five phases as given below:

Phase-I: In this phase the investigator developed the Interactive Multimedia Program, Unit Tests and Achievement Test.

Phase-II: In this phase the investigator formed two identical groups (experimental and control group) on the basis of intelligence test. The experimental group was taught through Interactive Multimedia Program and control group was taught through Conventional Method of Teaching.

Phase-III: In this phase the achievement test prepared by investigator administered on both the groups (experimental and control group) as Pre-Test.

Phase-IV: In this phase the investigator conducts the experiment. Investigator taught both the groups by himself. Experimental group was taught through Interactive Multimedia Program and Control group was taught through Conventional Method of Teaching.

Phase-V: In this phase the investigator administered the achievement test on both the groups (experimental and control group) as Post-Test.

Statistical Techniques Used

Statistical techniques viz- Mean, Median, Standard Deviation, Skewness, Kurtosis, t-test and 2×2 Analysis of Variance were used to interpret the results.

Analysis and Interpretation

The results of the present study are elucidated as below:

The relative effectiveness of two teaching methods i.e. Interactive Multimedia Program and Conventional Method of Teaching in terms of achievement of English grammar in relation to self efficacy was determined on the basis of gain scores (the difference in post test scores and pre test scores).

Table-I Significance of difference in the Mean Gain Scores of achievement in English grammar of the groups taught through Interactive Multimedia Program and Conventional Method of Teaching (N=192)

Groups	N	Mean	SD	SE_D	t-ratio
Experimental Group	96	41.27	5.55	0.75	10.44**
Control Group	96	33.44	4.86		

** *significant at .01level*
Critical value of 't' = 1.97 at 0.05 level of significance
Critical value of 't' = 2.60 at 0.01 level of significance

Table -I reveals that mean gain score of achievement in English grammar of the group taught through interactive multimedia program is 41.27 and SD for the same is 5.55, whereas mean gain scores of achievement in English grammar of the group taught through conventional method is 33.44 and SD for the same is 4.86. The value of 't' came out 10.44, which is significant at 0.01 level. It indicates that there exists a significant difference in the achievement of English grammar between the group taught through interactive multimedia program and the group taught through Conventional Method of Teaching.

Therefore Ho1 stating "There exists no significant difference in the mean gain scores of the achievement in English Grammar of the groups taught through Interactive Multimedia Program and Conventional Method of Teaching" stands rejected.

Further as the mean gain score of the group taught through interactive multimedia program was found to be significantly higher than that of the group taught through conventional method, it may also be concluded that the achievement in English grammar of the group taught through interactive multimedia program is higher than that the group taught through conventional method of teaching.

Table-II Significance of Difference in the Mean Gain Scores of achievement in English Grammar of the IX Class Students with High and Low Self Efficacy (N=192)

Groups	N	Mean	SD	SE_D	t-ratio
High Self-efficacy	96	42.04	5.73	0.77	7.48**
Low Self-efficacy	96	36.28	4.93		

Significant at 0.01level of significance
Critical value of 't' = 1.97 at 0.05 level of significance
Critical value of 't' = 2.60 at 0.01 level of significance

Table No. II reveals that mean gain scores of achievement in English grammar of IX class students with high self-efficacy is 42.04 and SD for the same is 5.73. Whereas the mean gain scores of achievement in English grammar of IX Class students with low self-efficacy is 36.28 and SD for the same is 4.93. The value of 't' is 7.48, which is significant at 0.01 level of significance. It indicates that there exists a significant difference in gain scores of achievement in English grammar of IX Class students with high and low self-efficacy.

Therefore H_0 2 stating "There exists no significant difference in the mean gain scores of achievement in English grammar of IX Class students with high and low self-efficacy" stands rejected.

Further as the mean gain score of secondary school students with high self-efficacy was found to be significantly higher than that of the students with low self-efficacy. It may also be concluded that the gain in achievement of English grammar of IX Class students with high self-efficacy is higher than that the students with low self-efficacy.

Table-III Significance of difference in the Mean Gain Scores of achievement in English grammar of the groups taught through Interactive Multimedia Program and Conventional Method of Teaching with High and Low Self efficacy(N=192)

Source of Variation		SS	d_f	MS	F-Value
Main Effects	Instructional Strategies (A)	2359.01	1	2359.01	149.33**
	Self-efficacy (B)	627.13	1	627.13	39.70**
First Order Interaction	Instructional Strategies X Self- efficacy (AxB)	59.63	1	59.63	3.77*
Within Group (Error)		2969.81	188	15.80	
Total		6015.58	191		

**Significant at 0.01 level *Significant at 0.05 level*

INTERPRETATION

MAIN EFFECT

Main Effect A: Main effect of Instructional Strategies (Interactive Multimedia Program and Conventional Method of Teaching) on achievement in English grammar of IX Class Students (N=192)

Table-III reveals that the F-ratio for the difference in mean gain scores of the achievement in English grammar of the groups taught through Interactive Multimedia Program and Conventional Method of Teaching came out 149.33, which is significant at 0.01 level. This indicated that the groups taught through Interactive Multimedia Program and Conventional Method of Teaching differs significantly on the variable of achievement in English grammar. These results are in tune with the results as indicated in the table no. I confirming the rejection of

H_0 1 stating 'There exists no significant difference in the mean gain scores of achievement in English grammar of the groups taught through Interactive Multimedia Program and Conventional Method of Teaching.

Main Effect B: Main effect of Self efficacy (High and Low) on achievement in English grammar of IX Class Students (N=192)

Table-III reveals that the F-ratio for the difference in mean gain scores of the achievement in English grammar of the IX class students with high and low self efficacy came out 39.70 which is significant at 0.01 level. This indicated that the IX Class students with high and low self efficacy differ significantly on the variable of achievement in English grammar. These results are in tune with the results as indicated in the table no. II confirming the rejection of H_0 2 stating "There exists no significant difference in the mean gain scores of achievement in English grammar of the IX class students with high and low Self-efficacy".

INTERACTIONAL EFFECT (A X B)

First order Interactional Effect of Instructional Strategies (Interactive Multimedia Program and Conventional Method of Teaching) and Self efficacy (High and Low) on achievement in English grammar of IX Class Students (N=192)

Table-III reveals that the F-ratio for the difference in mean gain scores of the immediate learning of English grammar of the IX Class students due to interaction between Instructional Strategies (Interactive Multimedia Program and Conventional Method of Teaching) and Self-efficacy (High and Low) came out 3.77, which is significant at 0.05 level.

Therefore Ho3 stating "There will be no significant interaction between Instructional Strategies and Self efficacy in terms of achievement in English grammar among IX class students" stands rejected.

In order to probe deeper, the results of F-test were verified through t-test. The t-ratios for different combinations of Instructional Strategies (Interactive Multimedia Program and Conventional Method of Teaching) and Self-efficacy (High and Low) on mean gain scores of achievement in English grammar have been depicted in the table no. IV.

Table -IV: t-ratios for Different Combinations of Instructional Strategies and Self-efficacy on Mean Gain Scores of achievement in English Grammar

Instructional Strategies (A) →	**Interactive Multimedia Program (A1)**		**Conventional Method of Teaching (A2)**	
Self-Efficacy (B) →	**High (B1)**	**Low (B2)**	**High (B1)**	**Low (B2)**

Combination of Pairs	Mean=20.21 SD=3.90 N=48	Mean=17.71 SD=3.92 N=48	Mean=14.31 SD=4.20 N=48	Mean=9.58 SD=3.86 N=48
A1B1	-	3.13**	10.22**	4.09**
A1B2	-	-	13.40**	7.13**
A2B1	-	-	-	5.74**
A2B2	-	-	-	-

***Significant at 0.01 level*
**Significant at 0.05 level*
Critical value of 't' = 1.97at 0.05 level of significance
Critical value of 't' = 2.60 at 0.01 level of significance

Table no. IV shows that

i) The learning in English grammar of the students with high self-efficacy taught through Interactive Multimedia Program is better than the students taught trough Conventional Method of Teaching with high and low self-efficacy (t=10.22 and 4.09).
ii) The learning in English grammar of the students with low self-efficacy taught through Interactive Multimedia Program is better than the students taught trough Conventional Method of Teaching with high and low self-efficacy (t=13.40 and 7.13).

This indicates that the learning in English grammar of the students with high and low self-efficacy is higher than the students taught through Conventional Method of Teaching with high and low self-efficacy.

iii) In case of Interactive Multimedia Program the learning in English grammar of the students with high self-efficacy is found to be significantly better than students with low self-efficacy (t=3.13).
iv) In case of Conventional Method of Teaching the learning in English grammar of the students with high self-efficacy is also found to be significantly better than the students with low self-efficacy (t=5.74).

Findings

In the present study, on the basis of interpretation of hypotheses the following findings have been drawn:

1. There exists significant difference in the mean gain scores of achievement in English grammar between the groups taught through Interactive Multimedia Program and Conventional Method of Teaching. As the mean gain scores of the group taught through Interactive Multimedia Program was found to be significantly higher than that of the group taught through Conventional Method of Teaching. It may also be concluded that the learning in English grammar of the group through Interactive Multimedia Program is higher than that the group taught through Conventional Method of Teaching.
2. There exists a significant difference in gain scores of achievement in English grammar of IX Class students with high and low self-efficacy. The mean gain scores of IX Class students

with high self-efficacy were found to be significantly higher than that of the students with low self-efficacy. It may also be concluded that the gain in achievement of English grammar of IX Class students with high self-efficacy is higher than that the students with low self-efficacy.

3. There exists a significant interactional effect of Instructional Strategies and Self-efficacy on learning in English grammar of IX Class students.

   i) The achievement in English grammar of the students with high self-efficacy taught through Interactive Multimedia Program is better than the students taught trough Conventional Method of Teaching with high and low self-efficacy (t=10.22 and 4.09).

   ii) The achievement in English grammar of the students with low self-efficacy taught through Interactive Multimedia Program is better than the students taught trough Conventional Method of Teaching with high and low self-efficacy (t=13.40 and 7.13). This indicates that the achievement in English grammar of the students with high and low self-efficacy is higher than the students taught through Conventional Method of Teaching with high and low self-efficacy.

   iii) In case of Interactive Multimedia Program the achievement in English grammar of the students with high self-efficacy is found to be significantly better than students with low self-efficacy (t=3.13).

   iv) In case of Conventional Method of Teaching the achievement in English grammar of the students with high self-efficacy is also found to be significantly better than the students with low self-efficacy (t=5.74).

Discussion of Results

In the present study it was found that the achievement in English grammar of the group taught through Interactive Multimedia Program is higher than the group taught trough Conventional Method of Teaching. The reason behind that Interactive Multimedia learning is an active process; the participants are in control of their own responses and behaviours in the sense they can choose when and how to participate. It is also a multisensory process. According to Edgar Dale's Cone of Experience students learn 10% of what they read, 20% of what they hear, 30% of what they see, 50% of what they see and hear, 70% of what they say and write, 90% of what they do as they perform a task. In Interactive Multimedia there is use of more than one sense and students directly interact with the program; that's why students learn and retain maximum.

These results are supported by the studies conducted by Chang and Lehman (2002) and Sharma (2013) in the area of English directly supports the findings of the present study who found that Interactive Multimedia helps in the achievement in English among the students greater than Conventional Method of Teaching. There are some other studies conducted by researchers such as Vaishnav and Parage (2013), Sasikala (2014), Bannon (2015) and Khana and Masooda (2015) in different subjects other than English also supports the findings of the present study that Interactive Multimedia also helps greatly in achievement in other subjects than English as compare to Conventional Method of Teaching.

In the present study it is also found that students with high self-efficacy achieve high in English grammar than the students with low self-efficacy. The reason behind is that self-efficacy is one's ability to succeed in specific situations or accomplish a task. One's sense of self-efficacy can play a major role in one's success. The students having high ability to accomplish a task achieve high in English grammar and vice versa.

Studies conducted by Mahyuddin, Elias, Cheong, Muhamad, Noordin and Abdullah (2006) and Rehemi (2007) in the field of English directly supports the findings of the present study who were found that achievement in English language will improve when students have high self efficacy in the language. Other studies conducted by researcher such as Peters (2013), Filiz, Dost and Bayram (2014) and Brent and Jack (2015) supports the findings of the present study who were found that achievement in other subjects than English will enhance when students have high self-efficacy.

In the present study it is also found that there exists significant interactional effect of Instructional Strategies and Self-efficacy on achievement in English grammar of IX class students. But no study was found to evident these results.

Conclusion

On the basis of major findings of the present study it is concluded that achievement in English grammar of the group taught through Interactive Multimedia Program is higher than the group taught trough Conventional Method of Teaching. Further it is found that students with high self-efficacy achieve high in English grammar than the students with low self-efficacy. Further there exists a significant interactional effect of Instructional Strategies and self-efficacy on achievement in English grammar of IX class students.

Educational Implications

In the present study the students taught through Interactive Multimedia Program exhibited better gain in learning and retention in English grammar as compared to students taught through Conventional Method of Teaching. Following are the educational implications of the present study:

1. Conventional Method of Teaching should be replaced with Interactive Multimedia Programs Instructions by the teachers to bring quality and improvement in teaching and learning.

2. The Centre/State Government should establish research and development wings in which educators, project managers, subject experts, computer specialists and evaluators can be engaged in the development of Interactive multimedia Programs in all subjects. The software hubs should also be opened at the block levels in order to reduce the gap between urban-rural divisions.

3. The Centre or State Government should provide in-service teacher training programs to Government school teachers for the development and utilization of Interactive Multimedia Programs in the classrooms.

4. These results could help the Government to fulfill the aim of “Digital India” and “Make in India”.

5. The findings of the present study also show that IX Class students with high level of self-efficacy achieved high in English grammar than the students with low level of self-efficacy. These results will give immense help to teachers, parents, school principals, guidance workers to enhance the level of self-efficacy among the students so that students can achieve maximum.

6. In the present study, there exists a significant interactional effect of instructional strategies and self-efficacy on the variables of achievement in English grammar of secondary school students. These results will also give immense help to teachers and school principals to keep in mind the method of teaching and level of self-efficacy of the students during teaching-learning process so that the students can learn and retained maximum not in English grammar but also in all subjects.

7. The results of the study will give immense help to secondary school students in the learning of English grammar because interactive multimedia program is in off-line mode in the form of Compact Disc. They can interact with this program at anywhere and anytime.

8. The results of the present study will also give immense help to Government (Centre/State both), computer teachers, curriculum designers, policy framers and programmers (software developers) to develop such interactive multimedia programs in the form of mobile apps by which education for all, everywhere, all the time with minimum cost can be provide.

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