

EFFECT OF MULTIMEDIA INSTRUCTIONAL STRATEGY ON ACHIEVEMENT IN ENGLISH IN RELATION TO COMPUTER ANXIETY AND SELF-CONCEPT

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Abstract

The present study investigates the effect of multimedia instructional strategy on achievement in English in relation to computer anxiety and self-concept. The sample was drawn of IX class students from schools of Amritsar District affiliated to CBSE. Instructional material based on multimedia instructional strategy was prepared and implemented to the experimental group after pre-testing and gain scores were computed after post-test for all the students. The computer anxiety scale and self-concept questionnaire were also administered. A two way analysis of variance (2×2×3) was used to arrive at the following conclusions: (i) The performance of group taught through computer based multimedia instructional strategy was found to attain significantly higher as compared to control group. (ii) The performance of students with low computer anxiety was found better than that of high computer anxiety group. (iii) The performance of students with average self-concept was found better than that of high and low self-concept group. (iv) There was no significant interaction effect of instructional strategies and computer anxiety. (v) There was significant interaction effect of instructional strategies and self-concept. (vi) There was no significant interaction effect of computer anxiety and self-concept. (vii) There was no significant interaction effect among instructional strategies, computer anxiety and self-concept.

Keywords: Multimedia Instructional Strategy, Achievement in English, Computer Anxiety, Self-concept

Introduction

Multimedia is a term frequently heard and discussed among educational technologists today. Unless clearly defined, the term can alternately mean “a judicious mix of various mass media such as print, audio and video” or it may mean the development of computer-based hardware and software packages produced on a mass scale and yet allow individualized use and learning. In essence, multimedia merges multiple levels of learning into an educational tool that allows for diversity in curricula presentation. Multimedia can be defined as the technology engaging a variety of media, including texts, audio, video, graphics and animation, either separately or in combination using computers to communicate ideas or to disseminate information.

Multimedia can be described as the combination of various digital media types such as text, images, sound and video into an integrated multisensory interactive application or presentation to convey a message or information to an audience (Velleman & Moore, 1996). Multimedia is the exciting combination of computer hardware and software that allows you to integrate video, animation, audio, graphics, and text resources to develop effective presentations on an affordable desktop computer (Fenrich, 1997). Multimedia is characterized by the presence of text, pictures, sound, animation and video; some or all of which are organized into some coherent program (Phillips, 1997).

According to Mayer (1999), one of the most important promises of multimedia is that learners appreciate multimedia explanations better than just a word alone. Learners can comprehend pictures and sound more easily than words. If words alone are presented to the learners, they try to form their own mental images and this may cause them to miss the actual points of learning. The promise of multimedia is simple; learners enjoy learning by using computer-assisted multimedia instructions. Multimedia instruction assists students to learn more deeply and above all to enjoy this learning environment. Students learn because the instruction is presented to them in a meaningful way using sounds, pictures and animations. Undoubtedly, these little animations and pictures foster deep learning. So the objective of multimedia message is clear; it encourages learners to learn with meaning. This happens when the users use the presented materials differently and in new ways i.e. discovery learning. Moreover, meaningful learning happens when students' understanding is promoted using cognitive methods followed by a mixture of words and pictures (Mayer, 2003).

Mayer and Moreno (2002) stated that providing words with narration and animation helped learners' performance more than words alone; reducing the number of unneeded words and sounds helped learners' performance; providing words with narration helped learners' performance more than on-screen text; providing words as narration and animation helped learners' performance more than narration, animation, and on-screen text.

Cambre and Cook (1985) stated that computer anxiety is a form of state anxiety, and it was brought on in part by the rapidly changing nature of new technology and the subsequent pressure for social change in modern time. Howard and Smith (1986) defined computer anxiety as "the tendency of a particular person to experience a level of uneasiness over his or her impending use of a computer". Heinssen, Glass and Knight (1987) stated that computer anxiety refers to negative emotions and cognitions evoked in actual or imaginary interactions with computer-based technology, and it affects the utilization of computer-based technology and performance on tasks that involve the use of computers. Rosen and Weil (1990, 1995) described computer anxiety as "technophobia" and used the term "cyberphobia" to describe individuals who are frightened by the use of computers and technology. Computer anxiety has also been classified as a complex psychological construct that

cannot be fully described from a single perspective (Chua, Chen & Wong, 1999). They simply generalized the definition of computer anxiety as “a kind of state anxiety, which can be changed and measured along multiple dimensions”.

A person’s self-concept is both a cause of his/her present behavior and effect of past experience. One’s feelings about oneself depend greatly on his past history of failures and successes on the quality of his interaction with others in the environment and on what he thinks other people thinks of him. Purkey (1998) opined that self-concept is the totality of a complex, organized and dynamic system of learnt beliefs, attitudes and opinions that each person holds to be true about his or her personal existence. Encyclopedia of Psychology (1983) defined ‘self-concept’ as the totality of attitudes, judgments and values of an individual relating to his behavior, abilities and quantities. Self-concept embraces awareness of these variables and their and their evaluation. Self-concept means what an individual thinks about himself.

Need and Significance of the Study

In the 21st Century, English has become the common international language, the language most frequently used to communicate when two people are not native speakers of the same language. As a result, instruction of English as a Foreign Language (EFL) is a priority around the globe. But instructional methodologies have not always kept pace with these changing realities. In countries where there is not a surrounding population of active English speakers, the language is still often taught as a traditional classroom subject, similar to mathematics or geography. Technology, however, now offers opportunities for authentic interaction with people from other cultures that can be incorporated into the classroom (Chang & Lehman, 2002). Therefore, the investigator made an attempt to enquire into the effectiveness of computer based multimedia instructional strategy on achievement in English in relation to computer anxiety and self-concept.

Objectives

1. To compare the achievement of groups taught through computer based multimedia instructional strategy and conventional teaching strategy in english.
2. To compare the achievement of high and low computer anxiety groups of students.
3. To compare the achievement of groups having high, average and low self-concept of students .
4. To examine the interaction effect of instructional strategies and computer anxiety .
5. To examine the interaction effect of instructional strategies and self-concept.
6. To find out the interaction effect of computer anxiety and self-concept.
7. To examine the interaction effect among instructional strategies, computer anxiety and self-concept.

Hypotheses

- H₁: The achievement of group taught through computer based multimedia instructional strategy will be significantly higher than that of conventional teaching strategy in English.
- H₂: The achievement of low computer anxiety group will be significantly higher than that of high computer anxiety group of students in English.
- H₃: The achievement of high self-concept group will be significantly higher than that of average and low self-concept groups of students in English.
- H₄: There exists no significant interaction effect of instructional strategies and computer anxiety on achievement in English.
- H₅: There exists no significant interaction effect of instructional strategies and self-concept on achievement in English.
- H₆: There exists no significant interaction effect of computer anxiety and self-concept on achievement in English.
- H₇: There exists no significant interaction effect among instructional strategies, computer anxiety and self-concept on achievement in English.

Sample

The study was conducted on a random sample of 400 English students of IX class of Amritsar District affiliated to C.B.S.E., New Delhi, of experimental and control group. The study was conducted on two intact groups such as one is experimental group and other is control group in each school. The four schools such as (i) Ajanta Public School Basant Avenue, Amritsar (ii) Government Girls High School Mall Road, Amritsar. (iii) Capt. Amardeep Singh Govt. High School Majitha. (iv) Baba Desa Singh Public School, Majitha were randomly selected from the total schools of Amritsar and from each school the two intact sections of 50 students were selected each experimental and control group.

Design

For the purpose of present investigation, a pre-test and post-test factorial design was employed. In order to analyze the data a analysis of variance ($2 \times 2 \times 3$) was used for the three independent variables viz. instructional treatment, computer anxiety and self-concept. The impact of instructional treatment was examined at two levels, namely multimedia instructional strategy and conventional teaching strategy. The variable of computer anxiety was studied at two levels viz. high and low. The variable of self-concept was studied three

levels viz. high, average and low self-concept groups. The main dependent variable was performance gain which was calculated as the difference in post-test and pre-test scores for the subjects.

Tools Used

- (i) An Achievement Test in English Grammar was developed by the investigators.
- (ii) Instructional Material on Multimedia Instructional Strategy and Conventional Teaching Strategy in English Grammar was developed by the investigators.
- (iii) Computer Anxiety Scale was developed by the investigators.
- (iv) Self-concept Scale by Saraswat (1999) was used.

Procedure

After the selection of the sample and allocation of students in two groups for instructional strategies, the experiment was conducted in four phases as: *Firstly*, an achievement test as a pre-test measure was administered on the total sample. *Secondly*, The computer anxiety scale and self-concept questionnaire were administered in each school of the experiment and control groups. *Thirdly*, treatment was given to the experimental group. The experimental group was taught through computer based multimedia instructional strategy and the control group was taught by conventional teaching strategy. *Fourthly*, after the completion of the instructional program, the same achievement test in English grammar was administered as post-test to the students of both the groups. The students were given 45 minutes to complete the test. The answer-sheets were scored with the help of scoring key. The experiment and control group scores were compared according to their pre-test and post-test scores and difference was called as gain achievement scores of the experiment and control group.

ANALYSIS AND INTERPRETATION OF THE RESULTS

- **Analysis of Descriptive Statistics**

Analysis of the total gain achievement scores on achievement in English of the two treatment groups was employed. The Mean and SD of different sub-groups have been presented in table-1.

Table -1: Mean and SD of gain achievement scores for different sub groups

Dependent Variable	Computer Anxiety	Self-Concept	Experimental Group			Control Group		
			N	Mean	SD	N	Mean	SD
Achievement in English	High Computer Anxiety	High	15	20.8	4.16	15	19.53	6.03
		Average	24	20.04	4.42	24	11.42	8.81
		Low	15	19.52	6.68	15	9.27	5.56
		Total	54	20.11	5.00	54	13.07	8.29
	Low Computer Anxiety	High	15	24.00	7.06	15	17.87	8.85
		Average	24	25.75	7.23	24	15.12	7.11

		Low	15	23.8	7.09	15	9.87	6.44
		Total	54	24.72	7.07	54	14.43	7.94
	Total Computer Anxiety	High	29	22.79	6.18	29	18.48	7.52
		Average	50	23.28	6.28	50	13.70	8.25
		Low	29	20.55	7.08	29	9.10	5.44
		Total	108	22.42	6.52	108	13.75	8.10

Source: Field Study, 2012

Table-1 reveals that the total mean gain achievement scores of experimental group were higher than that of control group. The mean gain scores of low computer anxiety group were higher than that of high computer anxiety group in respect of computer based multimedia instructional strategy. It showed that the achievement of low computer anxiety group was higher for both the instructional strategies. The mean gain achievement scores of high, average and low self-concept groups on computer based multimedia instructional strategy were higher than conventional teaching strategy. To probe deeper, analysis of variance was employed for the data.

- **Analysis of Variance on Achievement Score**

The sum of squares, degree of freedom, mean sum of squares and the F-ratio has been presented in table-2.

Table - 2: Summary of Analysis of Variance (2×2×3) factorial design

Dependent Variable	Source of Variation	Sum of Squares	df	Mean of Sum of Squares	F-ratio
Achievement in English	Instructional Strategy (A)	3693.89	1	3693.89	79.43**
	Computer Anxiety (B)	357.38	1	357.38	7.69**
	Self-Concept (C)	730.13	2	365.07	7.85**
	A × B	158.50	1	158.50	3.41
	A × C	568.88	2	284.44	6.12**
	B × C	149.66	2	74.83	1.61
	A × B × C	19.83	2	9.91	0.21
	Error Term	9486.58	204	46.50	

**Significant at 0.01 level

(Critical Value 3.89 at 0.05 and 6.76 at 0.01 level, df 1/204)

(Critical Value 3.04 at 0.05 and 4.71 at 0.01 level, df 2/204)

MAIN EFFECT

- **Instructional Strategy (A)**

Table-2 reveals that the F-ratio for difference between the mean gain scores for multimedia instructional strategy and conventional teaching strategy is 79.43, which in comparison to the table value was found significant at 0.01 level of significance. This suggested that instructional strategy effect on mean gain achievement scores of two groups was significant beyond the contribution of chance. Thus, the hypothesis **H₁**:

The achievement of group taught through multimedia instructional strategy will be significantly higher than that of conventional teaching strategy in English, is accepted. It may thus be concluded that the use of different instructional strategies to impart instruction in English attributed to development of difference in mean gain achievement scores in English.

In order to probe deeper, F-ratio was followed by t-test. The value of the t-ratios for the two groups have been placed in table -3

Table 3: t-ratios for mean gain achievement scores of experimental and control group

Variable	Experimental Group			Control Group			SE _D	t-value
	N	Mean	SD	N	Mean	SD		
Gain Scores	108	22.42	6.52	108	13.75	8.10	1.00	8.67**

***Significant at 0.01 level*

(Critical Value 1.97 at 0.05 and 2.60 at 0.01 level, df 214)

Table-3 shows that the mean gain achievement scores of experimental group i.e. group taught through computer based multimedia instructional strategy is 22.42 which is higher than the corresponding mean gain scores of 13.75 for the control group i.e. group taught through conventional teaching strategy. The t-value testing the significance of mean gain difference on achievement in English of two groups is 8.67, which in comparison to table value was found significant at 0.01 level of significance. It may be concluded that imparting instructions through computer based multimedia instructional strategy resulted in significant difference in mean gain scores than that of conventional teaching strategy on achievement in English.

- **Computer Anxiety (B)**

Table- 2 shows that the F-ratio for difference between the mean gain scores for high and low computer anxiety groups is 7.69, which in comparison to table value was found significant at 0.01 level of significance. This suggested that computer anxiety effect on achievement scores was signified at the specified level. Hence, the hypothesis **H₂**: The achievement of low computer anxiety group will be significantly higher than that of high computer anxiety group of students in English, is accepted. It may be, therefore, concluded that low and high computer anxiety groups were different on mean gain scores on achievement in English.

To probe deeper, F-ratio was followed by t-test. The value of t-ratio for difference in mean gain scores of low and high computer anxiety groups have been placed in table -4.

Table -4: t-ratio for low and high computer anxiety groups on gain achievement scores

Variable	High Computer Anxiety			Low Computer Anxiety			SE _D	t-value
	N	Mean	SD	N	Mean	SD		
Gain Scores	108	16.59	7.67	108	19.57	9.09	1.15	2.60**

***Significant at 0.01 level*

(Critical Value 1.97 at 0.05 and 2.60 at 0.01 level, *df* 214)

Table -4 reveals that the mean gain score of low computer anxiety group is 19.57, which is higher than the corresponding mean gain score of 16.59 of high computer anxiety group. The t-value testing the significance of mean difference on achievement in English score of high and low computer anxiety groups is 2.60, which in comparison to the table value was found significant at 0.01 level of significance. Hence, the result indicates that low computer anxiety group gained higher in achievement in English than that of high computer anxiety group.

- **Self-Concept (C)**

Table -2 that the F-ratio for difference between the mean gain scores for high, average and low self-concept groups is 7.85, which in comparison to the table value was found significant at 0.01 level of significance. This suggested that self-concept effect on achievement scores was signified at the specified level. Hence, the hypothesis **H₃**: The achievement of high self-concept group will be significantly higher than that of average and low self-concept groups of students in English, is accepted. It may be, therefore, concluded that high, average and low self-concept groups were different on achievement in English.

To probe deeper, F-ratio was followed by t-test. The value of t-ratio for difference in mean gain scores of high, average and low self-concept groups have been placed in table- 5.

Table-5: t-ratio for different combinations of different self-concept groups

Variables	High Self-Concept			Average Self-Concept			Low Self-Concept		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
	60	20.55	6.95	96	18.08	8.81	60	15.62	8.90
High Self-Concept									
N	Mean	SD	---	1.84			3.38**		
60	20.55	6.95							
Average Self-Concept									
N	Mean	SD	---	---			1.69		
96	18.08	8.81							
Low Self-Concept									
N	Mean	SD	---	---			---		
60	15.62	8.90							

**Significant at 0.01 level

(Critical Value 1.98 at 0.05 level and 2.62 at 0.01 level, *df* 118)

(Critical Value 1.98 at 0.05 level and 2.61 at 0.01 level, *df* 154)

Table-5 shows that the mean gain score of high self-concept group is 20.55, which is higher than the corresponding mean gain score of 18.08 of average self-concept group. The t-value testing the significance of mean difference on achievement scores of high and average self-concept group is 1.84, which in comparison to

the table value was not found significant even at 0.05 level of significance. Hence, it may be inferred that mean gain in achievement scores was not significant for high and average self-concept groups.

Table- 5 reveals that the mean gain score of high self-concept group is 20.55, which is higher than the corresponding mean gain score of 15.62 of low self-concept group. The t-value testing the significance of mean difference on achievement score of high and low self-concept group is 3.38, which in comparison to the table value was found significant at 0.01 level of significance. Hence, it may be inferred that high self-concept group performed significantly better than that of low self-concept group on achievement test in respect of gain scores.

Table- 5 reveals that the mean gain score of average self-concept group is 18.08, which is higher than the corresponding mean gain score of 15.62 of low self-concept group. The t-value testing the significance of mean difference on achievement score of average and low self-concept group is 1.69, which in comparison to the table value was not found significant even at 0.05 level of significance. Hence, it may be inferred that the achievement of average and low self-concept groups was not significantly different in respect of gain scores.

- **Interaction between Instructional Strategies and Computer Anxiety (A × B)**

Table- 2 that F-ratio for interaction between instructional strategies and computer anxiety is 3.41, which in comparison to the table value was not found significant even at 0.05 level of significance. Hence, the null hypothesis **H₄**: There exists no significant interaction effect of instructional strategies and computer anxiety on achievement in English, is accepted. It may be concluded that there was no difference in the gain scores on achievement in English due to interaction effect of instructional strategies and computer anxiety.

- **Interaction between Instructional Strategies and Self-Concept (A × C)**

Table-2 that F-ratio for interaction between instructional strategies and self-concept is 6.12, which in comparison to the table value was found significant at 0.01 level of significance. This suggested that interaction effect on achievement in English was signified at the specified level. Hence, the null hypothesis **H₅**: There exists no significant interaction effect of instructional strategies and self-concept on achievement in English, is rejected. The result indicates that there was a significant difference in the gain scores on achievement in English due to interaction effect of instructional strategies and self-concept.

To ascertain significance of difference among means of various combination groups, t-ratios were computed, which have been placed in the following table -6.

Table -6: t-ratio for difference in mean gain achievement scores of instructional strategies and different levels of self-concept

Variables				Experimental Group						Control Group					
				C ₁		C ₂		C ₃		C ₁		C ₂		C ₃	
				N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
				29	22.79	50	23.28	29	20.55	29	18.48	50	13.70	29	9.10
Experimental Group	High Self-Concept														
	N	Mean	SD	-		0.34		1.28		2.38*		5.54**		8.95**	
	29	22.79	6.18												
Experimental Group	Average Self-Concept														
	N	Mean	SD	-		-		1.72		2.91**		6.52**		10.50**	
	50	23.28	6.28												
Experimental Group	Low Self-Concept														
	N	Mean	SD	-		-		-		1.08		3.89**		6.90**	
	29	20.55	7.08												
Control Group	High Self-Concept														
	N	Mean	SD	-		-		-		-		2.64**		5.45**	
	29	18.48	7.52												
Control Group	Average Self-Concept														
	N	Mean	SD	-		-		-		-		-		2.99**	
	50	13.70	8.25												
Control Group	Low Self-Concept														
	N	Mean	SD	-		-		-		-		-		-	
	29	9.10	5.44												

*Significant at 0.05

**Significant at 0.01 level

(Critical Value 1.99 at 0.05 and 2.64 at 0.01 level, df 77)

(Critical Value 2.00 at 0.05 and 2.66 at 0.01 level, df 56)

Here C₁ for High Self-Concept, C₂ for Average Self-Concept and C₃ for Low Self-Concept.

Table -6 indicates that high self-concept group with mean of 22.79 of experimental group exhibited higher mean gain scores than high self-concept group with mean 18.48 of control group. The t-ratio for difference in mean gain scores of high self-concept groups of experimental and control group was 2.38, which in comparison to the table value was found significant at 0.05 level of significance. Hence, the high self-concept of experimental group exhibited higher mean gain scores than that of high self-concept of control group.

Table -6 revealed that high self-concept group with mean of 22.79 of experimental group exhibited higher mean gain scores than average self-concept group with mean 13.70 of control group. The t-ratio for difference in mean gain scores of high self-concept of experimental group and average self-concept of control group was 5.54, which in comparison to the table value was found significant at 0.01 level of significance.

Hence, the high self-concept of experimental group exhibited higher mean gain scores than that of average self-concept of control group.

Table- 6 revealed that high self-concept group with mean of 22.79 of experimental group exhibited higher mean gain scores than low self-concept group with mean 9.10 of control group. The t-ratio for difference in mean gain scores of high self-concept of experimental group and low self-concept of control groups was 8.95, which in comparison to the table value was found significant at 0.05 level of significance. Hence, the high self-concept of experimental group exhibited higher mean gain scores than that of low self-concept of control group.

Table-6 shows that average self-concept group with mean of 23.28 of experimental group exhibited higher mean gain scores than high self-concept group with mean 18.48 of control group. The t-ratio for difference in mean gain scores of average self-concept of experimental group and high self-concept of control groups was 2.91, which in comparison to the table value was found significant at 0.01 level of significance. Hence, the average self-concept of experimental group exhibited higher mean gain scores than that of high self-concept of control group.

Table -6 revealed that average self-concept group with mean of 23.28 of experimental group exhibited higher mean gain scores than average self-concept group with mean 13.70 of control group. The t-ratio for difference in mean gain scores of average self-concept of experimental group and average self-concept of control group was 6.52, which in comparison to the table value was found significant at 0.01 level of significance. Hence, the average self-concept of experimental group exhibited higher mean gain scores than that of average self-concept of control group.

Table -6 shows that average self-concept group with mean of 23.28 of experimental group exhibited higher mean gain scores than low self-concept group with mean 9.10 of control group. The t-ratio for difference in mean gain scores of average self-concept of experimental group and low self-concept of control group was 10.50, which in comparison to the table value was found significant at 0.01 level of significance. Hence, the average self-concept of experimental group exhibited higher mean gain scores than that of low self-concept of control group.

Table -6 indicates that low self-concept group with mean of 20.55 of experimental group exhibited higher mean gain scores than average self-concept group with mean 13.70 of control group. The t-ratio for difference in mean gain scores of low self-concept of experimental group and average self-concept of control groups was 3.89, which in comparison to the table value was found significant at 0.01 level of significance. Hence, the low self-concept of experimental group exhibited higher mean gain scores than that of average self-concept of control group.

Table -6 revealed that low self-concept group with mean of 20.55 of experimental group exhibited higher mean gain scores than low self-concept group with mean 9.10 of control group. The t-ratio for difference in mean gain scores of low self-concept of experimental group and low self-concept of control group was 6.90, which in comparison to the table value was found significant at 0.01 level of significance. Hence, the low self-concept of experimental group exhibited higher mean gain scores than that of low self-concept of control group.

Table-6 shows that high self-concept group with mean of 18.48 of control group exhibited higher mean gain scores than average self-concept group with mean 13.70 of control group. The t-ratio for difference in mean gain scores of high and average self-concept of control group was 2.56, which in comparison to the table value was found significant at 0.01 level of significance. Hence, the high self-concept group exhibited higher mean gain scores than that of average self-concept of control group.

Table-6 revealed that high self-concept group with mean of 18.48 of control group exhibited higher mean gain scores than low self-concept group with mean 9.10 of control group. The t-ratio for difference in mean gain scores of high and low self-concept of control group was 5.45, which in comparison to the table value was found significant at 0.01 level of significance. Hence, the high self-concept group exhibited higher mean gain scores than that of low self-concept of control group.

Table -6 indicates that average self-concept group with mean of 13.70 of control group exhibited higher mean gain scores than low self-concept group with mean 9.10 of control group. The t-ratio for difference in mean gain scores of average and low self-concept of control group was 2.99, which in comparison to the table value was found significant at 0.01 level of significance. Hence, the average self-concept group exhibited higher mean gain scores than that of low self-concept of control group.

Table-6 shows that rest of the combination groups i.e. high and average self-concept of experimental group, high and low self-concept of experimental group, average and low self-concept of experimental group, low self-concept of experimental group and high self-concept of control group did not yield significant difference on achievement in English even at 0.05 level of significance. It can thus be concluded that when instructions were imparted through computer based multimedia instructional strategy higher gain scores were exhibited by average self-concept group and high self-concept group exhibited better gain scores when instructions were imparted through conventional teaching strategy.

- **Interaction between Computer Anxiety and Self-Concept (B × C)**

Table-2 shows that F-ratio for interaction between computer anxiety and self-concept is 1.61, which in comparison to the table value was not found significant even at 0.05 level of significance. Hence, the null hypothesis **H₆**: There exists no significant interaction effect of computer anxiety and self-concept on

achievement in English, is accepted. It may be concluded that there was no difference in the gain scores on achievement in English due to interaction effect of computer anxiety and self-concept.

- **Interaction among Instructional strategies, Computer Anxiety and Self-Concept (A× B× C)**

Table -2 reveals that F-ratio for interaction among instructional strategies, computer anxiety and self-concept is 0.21, which in comparison to the table value was not found significant even at 0.05 level of significance. Hence, the null hypothesis **H₇**: There exists no significant interaction effect among instructional strategies, computer anxiety and self-concept on achievement in English, is accepted. The result indicates that the interaction effect among instructional strategies, computer anxiety and self-concept on achievement in English did not ascribe to significant difference in mean gain scores on achievement in English.

Discussion

The present study reveals that the achievement of group taught through computer based multimedia instructional strategy was more effective than that of conventional teaching strategy in English. Hence, the hypothesis **H₁**:The achievement of group taught through computer based multimedia instructional strategy will be significantly higher than that of group taught through conventional teaching strategy in English, is accepted. The result is supported by the findings of Vardhini (1983), Adams (1989), Williamson & Abraham (1995), Mackenzie & Jansen (1998), Malliga (2003), Rossler (2003), Sunder (2006), Vellaisamy (2007), Babu & Vimla (2008), Khirwadkar (2008), Srinivasalu & Vijayalakshmi (2010), Adogoke (2011), Serin (2011) who all favoured computer based multimedia instructional strategy over traditional method resulting in higher achievement in English.

The present study reveals that the achievement of low computer anxiety group will be significantly higher than that of high anxiety group of students in English. Hence, the hypothesis **H₂**:The achievement of low computer anxiety group will be significantly higher than that of high anxiety group of students in English, is accepted. For achievement in English with regards to computer anxiety, it was concluded that gain achievement score was higher for low computer anxiety group than that of high computer anxiety group.

The present study reveals that the achievement of high self-concept group will be significantly higher than that of average and low self-concept groups of students in English. Hence, the hypothesis **H₃**:The achievement of high self-concept group will be significantly higher than that of average and low self-concept groups of students in English, is accepted. For achievement in English with regards to self-concept that highest mean gain scores was found for high self-concept group. The findings were supported by Maqsud and Roudhani (1991) who revealed that self-concept was significantly positively correlated to measures of achievement in English. The finding is also contradictory to the finding of Kaur (2001) who reported no correlation between the variable of achievement and self-concept.

The present study reveals that there exists no significant difference in gain achievement scores in English due to interaction effect of instructional strategies and computer anxiety group. Hence, the null hypothesis **H₄**: There exists no significant interaction effect of instructional strategies and computer anxiety on achievement in English, is accepted. Interaction effect of instructional strategies and computer anxiety did not yield significant difference in mean gain scores on achievement in English. The investigator could not lay her hand on any study related to this result.

The present study reveals that there exists significant difference in gain achievement scores in English due to interaction effect of instructional strategies and self concept group. Hence, the null hypothesis **H₅**: There exists no significant interaction effect of instructional strategies and self-concept on achievement in English, is rejected. For the effect of interaction of instructional strategies and self-concept, it was concluded that gain in achievement was higher for average self-concept of experimental group followed by high and low self-concept groups taught by computer based multimedia instructional strategy. The findings were supported by Sangwan (1992) and Gakhar & Agarwal (2002) who revealed that mastery learning was found to be helpful in improving the achievement level of students which automatically improves their self-concept. The finding is contradictory to the finding of Gulati (2001) who found insignificant difference in gain mean self-concept scores of two groups of students taught by mastery learning model and conventional method of teaching.

The present study reveals that there exists no significant difference in gain achievement scores in English due to interaction effect of computer anxiety and self-concept group. Hence, the null hypothesis **H₆**: There exists no significant interaction effect of computer anxiety and self-concept on achievement in English” is accepted. Interaction effect of computer anxiety and self-concept did not yield significant difference in mean gain scores on achievement in English. The investigator could not lay her hand on any study related to this result.

The present study reveals that there exists no significant difference in gain achievement scores in English due to interaction effect of instructional strategies, computer anxiety and self concept group. Hence, the null hypothesis **H₇**: There exists no significant interaction effect among instructional strategies, computer anxiety and self-concept on achievement in English, is accepted. Further the interaction effect of instructional strategies, computer anxiety and self-concept did not yield significant difference in mean gain scores on achievement in English. It leads to the conclusion that students with different computer anxiety and different levels of self-concept achieved equal mean gain score when taught either with computer based multimedia instructional strategy or with conventional teaching strategy. The investigator could not lay her hand on any study related to this result.

Findings

- 1 The performance of students taught through computer based multimedia instructional strategy was significantly higher than that of conventional teaching strategy group on achievement in English.
- 2 The performance of low computer anxiety group was found significantly higher than that of high anxiety computer group on achievement in English.
- 3 The performance of students with different self-concept was found significantly different from one another on achievement in English. Further analysis revealed that:
 - (i) The mean gain achieve scores was not found significantly for high and average self- concept group.
 - (ii) The mean gain achieve scores was found significantly higher for high self- concept group than that of low self- concept group.
 - (iii) The mean gain achieve scores was not found significantly for average and low self- concept group.
- 4 There was no significant interaction effect of instructional strategies and computer anxiety group on achievement in English.
- 5 There was significant interaction effect of instructional strategies and self-concept on achievement in English. Further analysis revealed that:
 - (i) The high self-concept of experimental group exhibited higher mean gain scores than that of high, average and low self-concept of control group.
 - (ii) The average self-concept of experimental group exhibited higher mean gain scores than that of high, average and low self-concept of control group.
 - (iii) The low self-concept of experimental group exhibited higher mean gain scores than that of average and low self-concept of control group.
 - (iv) The high self-concept of control group exhibited higher mean gain scores than that of average and low self-concept of control group.
 - (v) The average self-concept of control group exhibited higher mean gain scores than that of low self-concept of control group.
 - (vi) Rest of the combinations of instructional strategies and self concept groups did not yield significant difference in mean gain achievement scores.
- 6 There was no significant interaction effect of computer anxiety and self-concept on achievement in English.

- 7 There was no significant interaction effect among instructional strategies, computer anxiety and self-concept on achievement in English.

Hence, the study recommends the use of computer based multimedia instructional strategy for better performance of students.

References

- Adams, S. M. (1989). *The development of a computer based interactive multimedia program for teaching interpretive aspects of wind instrument notation*. Unpublished Doctoral Dissertation, Los Angeles, California: University of South California.
- Adegoke, B. A. (2011). Effect of multimedia instruction on senior secondary school students' achievement in physics. *European Journal of Educational Studies*, 3 (3), 537- 550.
- Babu, R., & Vimla, T. S. (2008). Impact of multimedia method in accountancy learning at higher secondary level. *Journal of Educational Research and Extension*, 45 (4), 51-58.
- Cambre, M. A., & Cook, D. L. (1985). Computer anxiety: Definition, measurement and correlates. *Journal of Educational Computing Research*, 1 (1), 37-54.
- Chang, M. M., & Lehman, J. D. (2002). Learning foreign language through an interactive multimedia program: An experimental study on the effects of the relevance component of the ARCS model. *The Computer Assisted Language Instruction Consortium Journal*, 20 (1), 81-98.
- Chua, S. L., Chen, D. T., & Wong, A. F. L. (1999). Computer anxiety and its correlated: A meta-analysis. *Computers in Human Behavior*, 15 (5), 609-623.
- Fenrich, P. (1997). *Practical guidelines for creating instructional multimedia applications*. Fort Worth: Dryden Press.
- Deepak-Agarwal, B. (2002). *Effect of mastery learning on achievement in environmental science, self concept and classroom trust behavior of grade V students*. Unpublished Ph.D. Thesis, Chandigarh: Panjab University.
- Gulati, V. (2001). *Effectiveness of inquiry training model, mastery learning model and conventional methods of teaching accountancy on students achievement, self-concept, adjustment and cognitive styles*. Unpublished Ph.D., Thesis, Chandigarh: Panjab University.
- Heinssen Jr, R. K., Glass, C. R., & Knight, L. A. (1987). Assessing computer anxiety: Development and validation of the computer anxiety rating scale. *Computers in Human Behavior*, 3 (1), 49-59.
- Howard, G. S., & Smith, R. D. (1986). Computer anxiety in management: Myth or Reality? *Communications of the ACM*, 29 (7), 611-615.
- Kaur, M. (2001). Self-concept in relation to intellectual variables. *Journal of Educational Research and Extension*, 38 (1), 31-32.
- Khirwadkar, A. (2008). Integrating multimedia package at pre-service level: A technopedagogy for smart schools. *Indian Journal of Open Learning*, 17 (1), 25-33.

- Mackenzie, D. S., & Jansen, D. G. (1998). Impact of multimedia computer based instruction on students comprehension of drafting principles. *Journal of Industrial Teacher Education*, 35 (4), 61-81.
- Malliga, T. (2003). *Relative effectiveness among different strategies of computer mediated multimedia presentation in teaching and learning of chemistry at higher secondary stage*. Unpublished Ph. D. Thesis, Coimbatore: Bharthiar University.
- Maqsud, M., & Rouhani, S. (1991). Relationship between socio-economic status, locus of control, self-concept and academic of Batswana adolescents. *Journal of Youth and Adolescence*, 20 (1), 107-114.
- Mayer, R. E. (1999). Multimedia aids to problem-solving transfer. *International Journal of Educational Research*, 31 (7), 611-623.
- Mayer, R. E. (2003). The promise of multimedia learning: Using the same instructional design methods across different media. *Learning and Instruction*, 13(2), 125-139.
- Mayer, R. E., & Moreno, R. (2002). Aids to computer-based multimedia learning. *Learning and Instruction*, 12 (1), 107-119..
- Phillips, R. (1997). *The developer's handbook to interactive multimedia: A practical guide for educational application*. London: Kogan Page.
- Purkey, W. W. (1998). *Self-concept and school achievement*. New York: Prentice Hall.
- Reddi, U. V. (2003). Multimedia as an educational tool. In U. V. Reddi, & S. Mishra (Eds.), *Educational multimedia: A handbook for teacher-developers*. New Delhi: Commonwealth Educational Media Centre for Asia.
- Rosen, L. D., & Weil, M. M. (1990). Computers, classroom instruction and the computerphobic university student. *Collegiate Microcomputer*, 8 (4), 275-283.
- Rosen, L. D., & Weil, M. M. (1995). Computer anxiety: A cross cultural comparison of university students in ten countries. *Computers in Human Behavior*, 11 (1), 45-64.
- Rosler, L. Y. (2003). *The effects of hypertext in a multimedia environment on the achievements in Judaic studies of elementary and junior high school students*. Unpublished Ph.D. Thesis, New York, US: Yeshiva University.
- Sangwan, R. (1992). *Effect of mastery learning strategy on pupils achievement in science, their self-concept, adjustment and classroom trust behavior*. Unpublished Ph.D., Thesis, Rohtak: Maharishi Dayanand University. Retrieved November 12, 2011 from http://www.sulb.unisaarland.de/uni/zeitschriften/JIAAP/4_JIAAP%20Abstracts%201985-%202010.pdf
- Saraswat, R. K. (1999). *Self-concept questionnaire*. Agra: National Psychological Corporation.
- Serin, O. (2011). The effects of the computer-based instruction on the achievement and problem solving skills of the science and Technology students. *Turkish Online Journal of Educational Technology*, 10 (1), 183-201.
- Srinivasalu, G. N., & Vijayalakshmi, S. (2010). Effectiveness of computer multimedia package (SLM) on achievement in social sciences: An experimental study. *Journal of Educational Research and Extension*, 47 (4), 35-48.

- Sunder, S. (2006). *Effect of computer based multimedia instructional strategy on achievement in English language in relation to anxiety and parent child relationship*. Unpublished Ph. D. Thesis, Chandigarh: Panjab University.
- Sutton, J. (1999). *A comparison of image and textual annotations of vocabulary items in multimedia based reading passages and their respective effects on vocabulary acquisition*. Unpublished Master Thesis, Guilford, Surrey: University of Surrey. Retrieved December 21, 2012 from http://www.surrey.ac.uk/ALRG/dissertations/pdf/Sutton_J_1999.pdf
- Vardhini, V. P. (1983). *Development of multimedia instructional strategy for teaching science (physics and chemistry) at secondary level*. Unpublished Ph.D. Thesis, Baroda: Maharaja Sayajirao University.
- Vellaisamy, M. (2007). Effectiveness of multimedia approach in teaching science at upper primary level. *Indian Educational Review*, 43 (1), 125-132.
- Velleman, P. F., & Moore, D. S. (1996). Multimedia for teaching statistics: Promises and pitfalls. *American Statistics*, 50 (3), 217-226.
- Williamson, V. M., & Abraham, M. R. (1995). The effects of computer animation on the particulate mental models of college chemistry students. *Journal of Research in Science Teaching*, 32 (5), 521-534.

