

**EFFECT OF INTERACTIVE WHITEBOARD  
TECHNOLOGY ON ACHIEVEMENT IN ENGLISH  
IN RELATION TO LINGUISTIC APTITUDE**

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**Abstract**

The present study investigates the effect of interactive whiteboard technology on achievement in English in relation to linguistic aptitude. The sample of 400 students was drawn from X<sup>th</sup> class taken from four different schools of Ambala District in Haryana affiliated to CBSE, New Delhi. Interactive whiteboard technology instructional material was prepared and implemented to the experimental group after pre- testing and gain scores were computed after post-test for all the students. The linguistic aptitude scale was also administered. The data obtained were analyzed statistically with the help of mean, standard deviation and analysis of variance. An analysis of variance (2×2) was used to arrive at the following conclusions: (i) The achievement of group taught through interactive whiteboard technology was found significantly higher than that of conventional method of teaching, (ii) The achievement of high linguistic aptitude group was found better than that of low linguistic aptitude group. (iii) There was significant interaction effect was found between instructional strategies and linguistic aptitude group on achievement in English..

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## Introduction

Nowadays, just chalk and board are not enough to attract attention of the students who are intensely exposed to external stimulus like television and computer. In the presence of a changing society, the only way to provide more effective education is redesigning teaching and learning processes systematically and using human and technological resources mutually by integrating learning and communication (Reiser, 1987). Thus, well educated individuals as the products of applied modern education system have the ability to represent societies in which they live in an international arena (Ozsoy, 2003). The influence of sense organs on learning is indisputably tremendous. The learning is more effective and permanent, when the teaching is more appealing to the sense organs. Several theories of learning assert that technological tools have an influence, which words cannot achieve alone, on directing individuals, focusing their attention, and their capability to analyze and synthesize. Interactive whiteboard creates multiple learning environments (Erduran & Tataroglu, 2009). Thus, interactive whiteboard technology is appropriate for entire class teaching (Bennett & Lockyer, 2008; Glover, Miller & Averis, 2001). An interactive whiteboard is an interactive display system that is commonly used in educational settings. The interactive whiteboard forms a link between a teaching surface and a digital projector and computer. The 'teaching surface' is most frequently a large wall mounted panel that allows the user to operate the computer via interacting with the projected image. This type of tool promotes creative teaching and motivates students into absorbing information. Teaching with an interactive whiteboard allows lecturers to accommodate all different learning styles: Tactile learners get to touch and move things around the board. They can also make notes and highlight elements, Visual learners benefit from a clear view of what is happening on the board, Audio learners can participate in a class discussion. Interactive whiteboards promote group discussion and participation. They are an effective tool for brainstorming as notes made on the screen can be turned into text, and saved to be shared and distributed later. They are an ideal tool for small group work and collaborative learning, as students can huddle around the board developing ideas, and then save the work for sharing over a network or by email (Wikipedia, 2015).

Interactive whiteboards are an effective way to interact with digital content and multimedia in a multi-person learning environment. Learning activities with an interactive whiteboard may

include : Manipulating text and images , making notes in digital ink , saving notes for later review by using e-mail, the web or print , viewing websites as a group , demonstrating or using software at the front of a room without being tied to a computer, creating digital lesson activities with templates, images and multimedia ,writing notes over educational video clips, using presentation tools that are included with the whiteboard software to enhance learning materials and showcasing student presentations ([Wikipedia](#), 2015).

Interactive white board can also be used in increasing students' information communication skills, thinking skills, software utilization skills, and general learning skills such as note-taking and note preparation. Interactive white board technology increases students' interest in searching information on internet and processing information (Hodge & Anderson, 2007). It allows for using games that can support learning process and makes lessons more entertaining (Wall, Higgins & Smith, 2005; Erduran & Tataroglu, 2010). It makes it possible to use and combine a wide variety of multimedia resources such as articles, pictures, videos, websites, and sounds (Levy 2002). It allows for a student-centered approach and provides an opportunity for participants' interaction (Geer & Barnes, 2007 ).

Interactive white board utilization reduces teachers' class preparation time since it enables saving lessons and using them again (Bennett & Lockyer, 2008). It reduces the need to use the board and increase the pace of teaching through facilitating the usage of available material (Wood & Ashfield, 2008; Ball, 2003; Glover, Miller & Averis, 2003; Bennett & Lockyer, 2008; Schmid, 2008). Teachers look for new ways and methods of teaching that they have already taught and thus their creativity has enhanced (Hodge & Anderson, 2007; Bennett & Lockyer, 2008). Moreover, it reduces the instructors' workload by giving an opportunity to save, to share and to reuse course materials (Wood & Ashfield, 2008; Glover, Miller & Averis, 2003). It also provides an opportunity for instructors to make effective presentations by combining multimedia resources with the course content (Geer & Barnes, 2007). On the other hand, dark classrooms can create negative influence on students during interactive whiteboard utilization (Erduran & Tataroglu, 2010). It can cause technological problems like other technological tools and latency time for calibration (Wall, Higgins & Smith, 2005; Erduran & Tataroglu, 2010). Furthermore, instructors teaching more rapidly can cause information overload on students. Since the entire

necessary course materials are given students without difficulty, this can encourage students to be lazy (Schmid, 2008).

Sivin-Kachala, Bialo and Rosso (2000) analysed 219 recent research studies to assess the effect of computer technology on learning and achievement across all learning domains and all ages. In addition to positive effects on achievement in major subject areas, they found effective use of technology fostered the development of more positive student attitudes toward themselves and toward learning. Qiu (2003) conducted a study integrating computer- based multimedia instructional design into teaching phonetic symbols. The study stated some theories and a tutorial computer program to support integrating computer based multimedia into teaching international English phonetic symbols (IEPS). The evaluation studies showed that participants do have positive attitudes towards this program and computer animation in it. Senteni (2004) found out that computer based instruction enabled the students to increase their motivation and achievements and to develop positive attitudes. Armstrong, Barnes, Sutherland, Curran and Simon (2005) reported that integrating interactive whiteboard technology into classes is a more complicated process than building interactive whiteboards and loading the software. Teachers should be educated on using interactive whiteboards and on-the-job training should be provided as well. Mechling, Gast and Krupa (2007) have analysed the effect of interactive whiteboard technology on teaching reading to students with mental disabilities Although none of the students could match the objects and photos with the target words before interactive whiteboard technology, after the application of the technology students have become 85.2% successful in matching objects with the words, 88.9% successful in matching words with the objects. Hodge and Anderson (2007) examined the effect of integration of interactive whiteboard technology to primary schools and they concluded that what is important is how the technology is used not presence of the technology. Successful utilization of the interactive whiteboard technology in class depends on the ability to use it.

Aptitude refers to a natural or acquired disposition or capacity for a particular purpose or tendency to a particular action or effect; as, oil has an aptitude to burn. Language learning aptitude refers to the prediction of how well, relative to other individuals; an individual can learn a foreign language in a given amount of time and under given conditions. As with many

measures of aptitude, language learning aptitude is thought to be relatively stable throughout an individual's lifetime. Language aptitude is relatively fixed over long periods of an individual's life span, and relatively hard to modify in any significant way (Carroll, 1981).

Pimsleur (1966) also known for the Pimsleur language learning system, spent time researching four factors that he believed to be related to language learning aptitude. Pimsleur included grade point average as an indication of general academic achievement as well as motivation in his factors. In addition, the verbal ability factor indicated how well a student would be able to handle the mechanics of learning a foreign language and the auditory factor indicated how well a student would be able to listen to and produce phrases in a foreign language. According to Skehan (1998) there seemed to be two sides of aptitude: a memory-based side and a language-based side. Lack of memory capability can be compensated for by greater grammatical sensitivity. Lack of grammatical sensitivity can be compensated for by better memory. Students do well if they have both attributes but they also do well if they have either of them. He further explains that aptitude provides a more accurate assessment of language processing ability and the ability to handle decontextualized language as compared to intelligence. Therefore, aptitude is a more powerful predictor of language learning success than intelligence. Aptitude for learning anything can be defined for operational purposes as the amount of time it takes an individual to learn the task in question. Thus, individuals typically differ not in whether they can learn a task or not learn it, but rather in the length of time it takes them to learn it or to reach a given degree of competency.

Reves (1983) studied the role of aptitude, motivation, cognitive style, and learning strategies as potential predictors of language learning success, in formal and informal situations. Her subjects were Arabic speakers in Israel acquiring Hebrew in informal settings and learning English under classroom conditions. She found that prediction was less effective in the formal learning environment. In informal situations, it was aptitude that was the most effective predictor of language learning success. This confirms the claim that the set of skills tapped by aptitude tests are relevant to both formal and informal settings.

Marc and Emily (2003) report on a study of the early lexical acquisition of two children who acquired Spanish and English simultaneously. Data provide strong counter evidence to proposal

that children acquiring languages not closely related tend to favor a reduction strategy, whereas those acquiring closely related languages favor a maintenance strategy.

### **Need and Significance**

Today's students are digital natives. Classrooms equipped for the 21st Century demand curriculums that integrate technology resulting in high standards, high expectations, and high results. With this in mind, teachers must acknowledge how students learn today and find every possible way to teach children and improve learning (Lutz, 2010). There is much excitement concerning interactive whiteboards and their ability to engage children. The importance of this study lies in its practical value and its contribution to the pedagogical body of knowledge. Technology utilization and proficiency are required of teachers and students as requisite 21st century skills. The interactive whiteboard is one type of technology that can be successfully integrated in schools' technology plans at low cost for the school. The idea for this research study began with the lived experience of the investigator as a Secondary school teacher using an interactive whiteboard. Though number of studies have been conducted abroad with students at high school and at primary level regarding mathematics achievement but fewer have focus in English subject and a very less number of researches have been done in India on individual differences like linguistic aptitude and achievement in English. This also fascinated the investigator to explore this area to find out the relevance of interactive white board in relation to linguistic aptitude.

### **Objectives**

1. To compare the achievement of groups taught through interactive whiteboard technology and conventional method of teaching in English.
2. To study the achievement of groups with high and low linguistic aptitude.
3. To examine the interaction effect of instructional strategies and linguistic aptitude on achievement in English.

### **Hypotheses**

H<sub>1</sub>: The achievement of group taught through interactive whiteboard technology will be significantly higher than that of conventional method of teaching in English.

H<sub>2</sub>: The achievement of high linguistic aptitude group will be higher than that of low linguistic aptitude group.

H<sub>3</sub>: There exists significant interaction effect between instructional strategies and linguistic aptitude group on achievement in English.

### **Sample**

The present study was conducted on an initial sample of 400 students of 10<sup>th</sup> class of English medium schools from Ambala District affiliated to Central Board of Education, New Delhi. The four schools were drawn randomly from senior secondary schools of Ambala District. The schools were compared with regards to the criteria that the schools have almost same class climate, physical facilities, computer labs etc. After selecting schools, the intact sections of each school were randomly taken for experimental and control group. After that, the test of English linguistic aptitude was administered and high and low groups on this variable were formulated according to the Kelley (1939) criteria of taking up top 27% and bottom 27% students as constituting the high and low groups respectively. So, the final sample consisted of 216 students for the experiment.

### **Design**

For the purpose of present investigation a pre-test and post-test factorial design was employed. In order to analyze the data a 2×2 analysis of variance was used for the two independent variables viz. instructional treatment and linguistic aptitude levels. The impact of teaching strategy was examined at two levels, namely interactive whiteboard technology and conventional teaching. The variable of linguistic aptitude was done at two levels viz. high and low linguistic aptitude groups. The main dependent variable was performance gain which was calculated as the difference in post- test and pre-test scores for the subject.

### **Tools used**

The following tools were used for the collection of data:

1. General Mental Ability Test (1972) by Jalota was used to assess the intelligence of the students for matching the groups.

2. An Achievement Test in English Grammar was developed by the investigators.
3. Instructional Material Based on Interactive Whiteboard Technology and Conventional Teaching Strategy in English Grammar was developed by the investigators.
4. English Linguistic Aptitude Test by Misra and Dubey (2014) was used.

### **Procedure**

After the selection of the sample and allocation of students to the two instructional strategies, the experiment was conducted in six phases. Firstly, the investigator made necessary arrangements with the Principal of the school selected for the experiment. Secondly, General Mental Ability Test to assess intelligence was administered for matching of the students. Thirdly, the English Linguistic Aptitude Test was administered on the total sample for the classification of the students. Fourthly, a pre-test was administered to the students of both the treatment and control groups. The answer-sheets were scored to obtain information regarding the previous knowledge of the students. Fifthly, one group was taught through interactive whiteboard technology and control group was taught through conventional method of teaching by the investigators. The duration of instructional treatment was 20 sessions in each group and time for the each session was 40 minutes. Sixthly, after the completion of the course, the same achievement test in English grammar was administered as post- test to the students of both the groups. 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**

The data was analyzed to determine the nature of the Distribution of Scores by employing mean and standard deviation. The two way analysis of variance was used to test the hypotheses related to strategies of teaching and linguistic aptitude levels. The mean and standard deviation of different sub groups have been presented in table- 1, 2, 3, 4 & 5.

**Table- 1: Means and SD of Achievement Scores for the Different Sub Groups**

Linguistic Aptitude Groups	Teaching				Total	
	Interactive Whiteboard		Conventional Teaching			
High Linguistic Aptitude	54	8.37	54	4.37	108	6.37
Low Linguistic Aptitude	54	4.98	54	4.30	108	4.64
Total Linguistic Aptitude	108	6.68	108	4.33	N=216	

Field Study, 2015

Table-1 shows that the mean scores of interactive whiteboard technology (M=6.68) is higher than the conventional method of teaching (M= 4.33). This shows that interactive whiteboard technology is more effective than the conventional method of teaching. It is also confirmed that the mean of the three groups' i.e. high, average and low linguistic aptitude group is 6.37 and 4.64 respectively. It is concluded that the gain mean with interactive whiteboard technology has shown significant differences for high, average and low linguistic aptitude students.

- **Analysis of Variance on Achievement Scores**

The mean of different sub-groups, sum of squares, degree of freedom, mean of sum of squares and the F - ratio have been presented in table-2

**Table -2: Summary of Analysis of Variance (2×2) Factorial Designs**

Source of Variance	Sum of Squares	df	Mean of Sum of Squares	F- ratio
Interactive Whiteboard Technology (A)	351.75	1	351.75	22.57**
Linguistic Aptitude (B)	149.84	1	149.84	9.62**
Interaction (A×B)	125.11	1	125.11	8.03**
Error Term	3302.96	212	15.58	

\*\* Significant at 0.01 level

(Critical Value 3.89 at 0.05 and 6.76 at 0.01 level, df 1/212)

### MAIN EFFECTS

- **Interactive Whiteboard Technology (A)**

Table-2 observed that the F-ratio for difference in mean gain scores of interactive whiteboard technology and conventional teaching group is 22.57, which in comparison to the table value was found significant at 0.01 levels of significance. It shows that the groups were not

different beyond the contribution of chance. Hence, the hypothesis  $H_1$ : The achievement of group taught through interactive whiteboard technology will be significantly higher than that of conventional method of teaching in English, is accepted. The result indicates that the performance on English of interactive whiteboard technology was more effective than conventional method of teaching.

In order to probe deeper, F-ratio is followed by t-test. The values of the t-ratio for different combination have been given in the table -3.

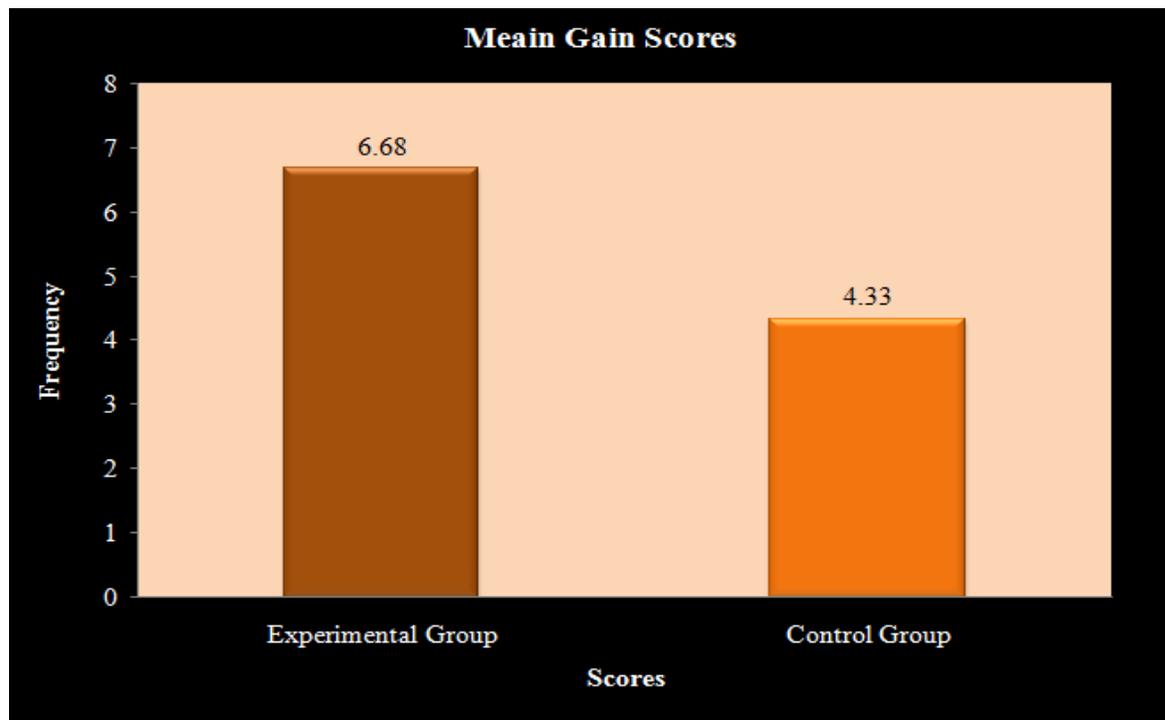
**Table-3: t-ratios for mean gain achievement scores of experimental and control group**

Variable	Experimental Group			Control Group			SE <sub>D</sub>	t-value
	N	Mean	SD	N	Mean	SD		
Gain Scores	108	6.68	4.84	108	4.33	3.42	0.571	4.12**

\*\*Significant at 0.01 level

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

A bar diagram has been drawn to depict the mean gain scores on achievement in English and has been presented in fig -1.



**Fig-1: Bar diagram showing comparison of mean gain achievement scores of experimental and control group**

It is observed from the table-3 and fig-1 that the mean gain achievement scores of experimental group i.e. group taught through interactive whiteboard technology based instruction is 6.68, which is higher than the corresponding mean gain scores of 4.33 for the control group i.e. group taught through traditional method of teaching. The t-value testing the significance of mean gain difference on achievement in English of experimental and control group is 4.12, which in comparison to the table value was found significant at 0.01 level of significance. Hence, the hypothesis H<sub>1</sub>: of significant difference is rejected in case of interactive whiteboard technology based instruction and traditional method of teaching irrespective of grouping across other variables. The result indicates that the students taught through interactive whiteboard technology based instruction perform significantly better than that of students who taught through traditional method of teaching.

- **English Linguistic Aptitude (B)**

Table-2 shows that the F-ratio for difference in means of the three groups of linguistic aptitude are 9.62, which in comparison to the table value was found significant at 0.01 level of significance. It suggests that the three groups were different in respect of achievement scores. Hence, the hypothesis H<sub>2</sub>: The achievement of high linguistic aptitude group will be higher than that of low linguistic aptitude, is accepted. The result indicates that the performance of students in English through interactive whiteboard technology has significant differences for high, average and low linguistic aptitude students.

To investigate further, F-ratio is followed by t-test. The values of the t-ratio for different combination have been given in the following table- 4.

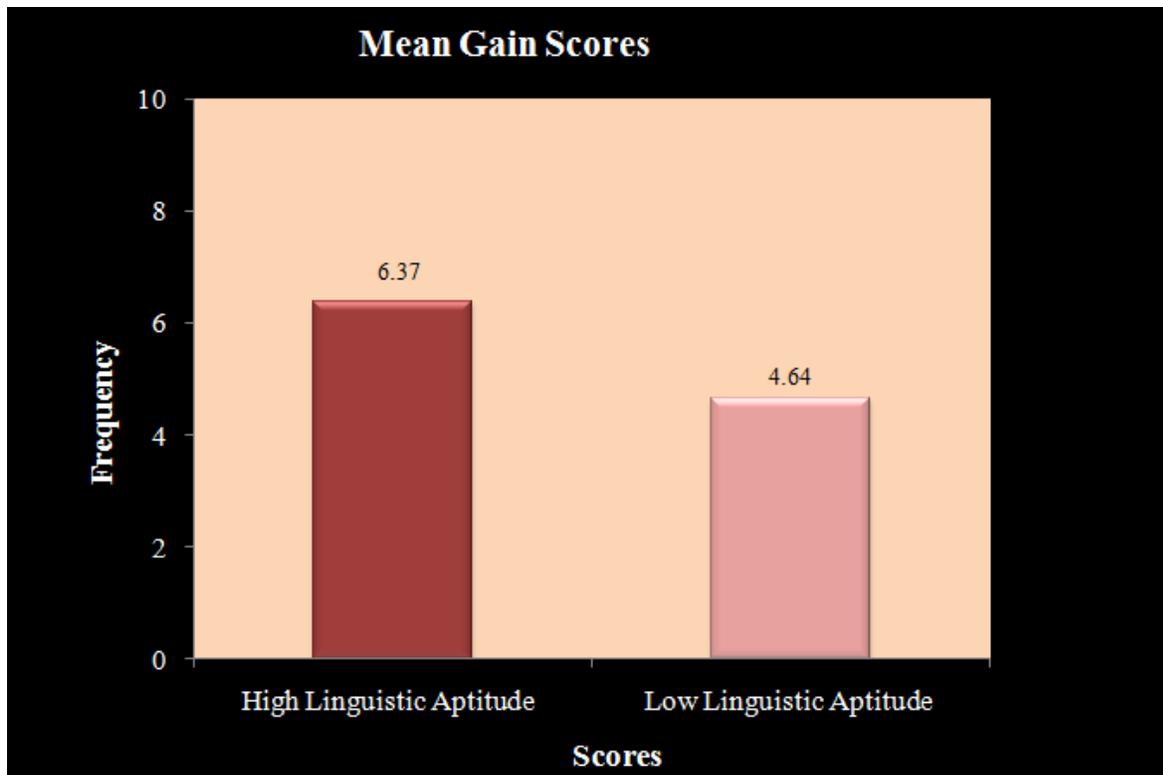
**Table- 4: t-ratio for high and low English linguistic aptitude groups on mean gain achievement scores**

Variable	High Linguistic Aptitude			Low Linguistic Aptitude			SE <sub>D</sub>	t-value
	N	Mean	SD	N	Mean	SD		
<b>Gain Scores</b>	108	6.37	4.83	108	4.64	3.62	0.58	2.98**

\*\*Significant at 0.01 level

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

A bar diagram has been drawn to depict the mean gain scores of high and low English linguistic aptitude group on achievement in English and has been presented in fig -2.



**Fig-2: Bar diagram showing comparison of mean gain achievement scores of high and low English linguistic aptitude groups**

It is evident from the table-4 and fig-2 that the mean gain scores of high English linguistic aptitude group is 6.37, which is higher than the corresponding mean gain scores of 4.64 for the low English linguistic aptitude group. The t-value testing significance of mean difference of high and low English linguistic aptitude group of students is 2.98, which in comparison to the table value was found significant at 0.01 levels of significance. Hence, the hypothesis  $H_2$ : of significant difference is rejected in case of high and low English linguistic aptitude irrespective of grouping across other variables. The result indicates that high English linguistic aptitude group of students perform significantly better than that of low English linguistic aptitude group of students.

- **Interaction Effect (A×B)**

Table-2 shows that the F-ratio for interaction between interactive whiteboard technology based instruction and English linguistic aptitude group is 8.03, which in comparison to the table value was found significant at 0.01 levels of significance. It indicates that instructional teaching strategies interact with English linguistic aptitude group to yield significant difference in respect of gain achievement scores. Hence, the null hypothesis  $H_3$ : There exists significant interaction effect of instructional strategies and English linguistic aptitude on achievement in English, is accepted. The result indicates that there is a significant difference in gain scores on achievement in English due to interaction effect of instructional strategies and English linguistic aptitude.

To ascertain significance of difference among means of various combination groups, t-ratios are calculated which have been shown in table-5.

**Table-5 : t-ratio for difference in mean gain achievement scores of instructional strategies and different levels of Linguistic Aptitude**

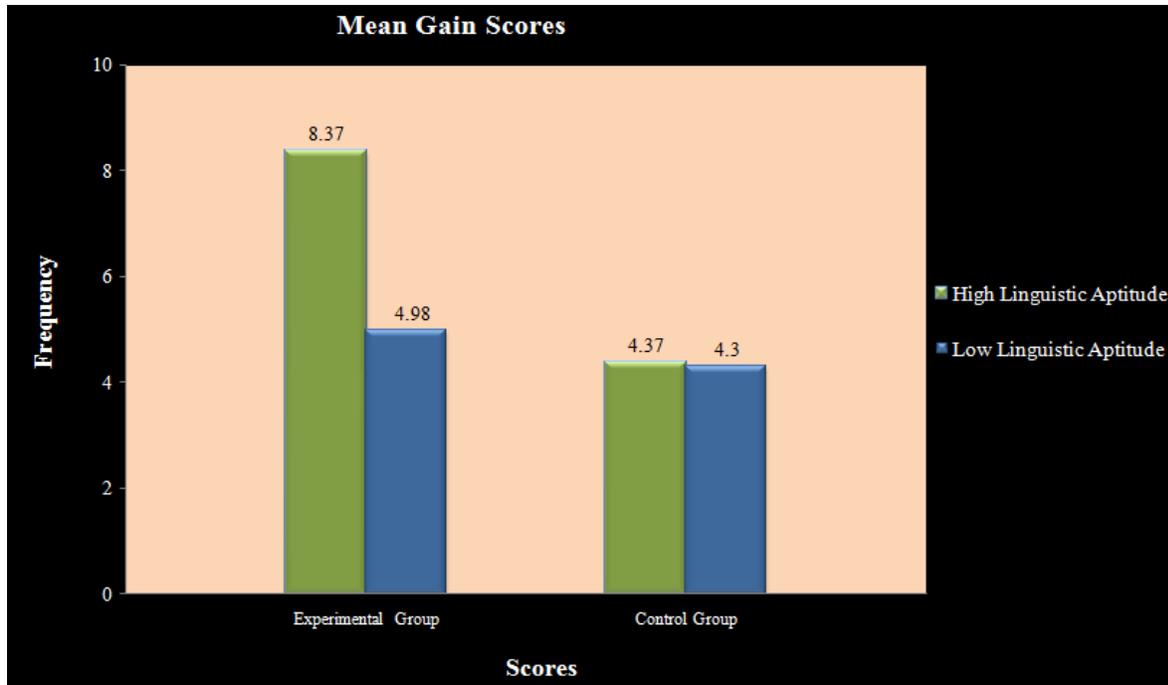
Variables		Experimental Group						Control Group					
		B <sub>1</sub>			B <sub>2</sub>			B <sub>1</sub>			B <sub>2</sub>		
		N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
		54	8.37	5.19	54	4.98	3.82	54	4.37	3.46	54	4.3	3.40
Experimental Group	High Linguistic Aptitude	--			3.86**			4.70**			4.82**		
	N Mean SD	54	8.37	5.19									
Experimental Group	Low Linguistic Aptitude	--			--			0.87			0.98		
	N Mean SD	54	4.98	3.82									
Control Group	High Linguistic Aptitude	--			--			--			0.11		
	N Mean SD	54	4.37	3.46									
Control Group	Low Linguistic Aptitude	--			--			--			--		
	N Mean SD	54	4.3	3.40									

\*\*Significant at 0.01 level

(Critical Value 1.98 at 0.05 and 2.63 at 0.01 level, df 106)

Note: Here B<sub>1</sub> stands for High Linguistic Aptitude and B<sub>2</sub> for Low Linguistic Aptitude

A bar diagram has been drawn to substantiate the results and has been given in fig.-3.



**Fig-3: Bar diagram showing mean gain achievement scores for interaction effect of instructional strategies and English linguistic aptitude**

Table-5 and fig-3 indicates that high English linguistic aptitude group with mean of 8.37 of experimental group exhibits high mean gain scores than that of low English linguistic aptitude group with mean 4.98 of experimental group. The t-ratio for difference in mean gain scores of high and low English linguistic aptitude of experimental group is 3.86 which in comparison to the table value was found significant at 0.01 levels of significance. The result indicates that the high English linguistic aptitude of experimental group exhibits high mean gain scores than that of low English linguistic aptitude of experimental group.

Table-5 and fig-3 shows that high English linguistic aptitude group with mean of 8.37 of experimental group possesses high mean gain scores than that of high English linguistic aptitude group with mean 4.37 of control group. The t-ratio for difference in mean gain scores of high English linguistic aptitude of experimental and control group is 4.70, which in comparison to the table value was found significant at 0.01 levels of significance. The result indicates that the high English linguistic aptitude of experimental group possesses high mean gain scores than high English linguistic aptitude of control group.

Table-5 and fig-3 illustrates that high English linguistic aptitude group with mean of 8.37 of experimental group exhibits high mean gain scores than that of low English linguistic aptitude group with mean 4.3 of control group. The t-ratio for difference in mean gain scores of high English linguistic aptitude of experimental group and low English linguistic aptitude of control group is 4.82, which in comparison to the table value was found significant at 0.01 levels of significance. The result indicates that the high English linguistic aptitude of experimental group possesses high mean gain scores than low English linguistic aptitude of control group.

Table-5 and fig-3 indicates that the rest of combination groups i.e. low English linguistic aptitude of experimental group with high and low English linguistic aptitude of control group, high and low English linguistic aptitude of control group do not yield significant difference on achievement in English even at 0.05 level of significance. It can be concluded that interactive whiteboard technology based instruction do not show any effect on achievement of students.

### **Discussion of the Results**

The present study reveals that interactive whiteboard technology based instructions were more effective on achievement in English than that of traditional method of teaching. Hence, the hypothesis **H<sub>1</sub>**, is accepted. The findings were supported by Malliga (2003) studied the relative effectiveness among different strategies of computer mediated multimedia presentation in teaching and learning of chemistry at higher secondary stage and concluded that Interactive individualized learning supported by multimedia presentation (IILMMP) was found to be the most effective strategy. Hwang, Chen and Hsu (2004) showed that Interactive Whiteboard Technology have significant effect on achievement of students. Sunder (2006), Schut (2007) and Liao (2007) found out that computer based instruction had a positive effect on individuals. Morgan (2008) examined that use of the interactive whiteboard as an instructional tool has a beneficial effect on student engagement in classroom lessons and leads to improved student behavior. Schmid (2008) in his study analyzes the integration of interactive whiteboard technology to lectures conducted on the doctoral program students taking English course. According to the questionnaire, interactive whiteboard enhances the students' learning, increases their interest to the course and helps them better understand the course content. Lewin, Somekh and Steadman (2008) describes when students between 7 and 11 years of age are educated by

interactive whiteboard, there are advantages that are directly related to time of reading, writing, mathematics, and science. Ekici (2008) examines whether interactive whiteboard technology has an influence on the success of the students in the 6th grade of the primary school in mathematics and Akdemir (2009) compare the influence of using interactive whiteboard technology and blackboard in geography courses. The study points out that interactive whiteboard technology increases the success of the students and for this reason it can be preferred over blackboard. Winkler (2011), who all favoured interactive whiteboard technology based instructional strategy over conventional teaching strategy resulting in higher achievement in English. To analyze this, experimental group has used interactive whiteboard and control group has learned the course by means of traditional methods.

The study also revealed that the achievement of students with high linguistic aptitude will be higher than that of low linguistic aptitude. Hence, the hypothesis **H<sub>2</sub>**, is accepted. The findings were supported by Alderman (1982), Reves (1983), Masny and Anglejan (1985), Dreher and Zenge (1990), Skehan (1998), Sparks, Artzer, Ganschow, Siebenhar, Plageman and Patton (1998), Abrahamsson and Hyltenstam (2008), Sparks, Patton, Ganschow and Humbach (2009), Vincent (2009), Bain, McCallum, Bell, Cochran and Sawyer (2010), Omar (2010) and Fakeye (2010) who revealed that linguistic aptitude was significantly positively correlated to measures of achievement in English.

The study also revealed that the interactive whiteboard technology was significant interaction effect between linguistic aptitudes on achievement in English. Hence, the hypothesis **H<sub>3</sub>**, is accepted. The finding is supported by Alderman (1982), Reves (1983), Masny and Anglejan (1985), Dreher and Zenge (1990), Sparks, Artzer, Ganschow, Siebenhar, Plageman and Patton (1998), Skehan (1998) showed that aptitude has an influence on the success of foreign language learning. He also found positive correlations between first language development and foreign language aptitude. Abrahamsson and Hyltenstam (2008), Sparks, Patton, Ganschow and Humbach (2009), Vincent (2009) described that one of the speculated reasons for student underachievement is the inability to solve math word problems. Word problems are the most challenging problems in math because word problem solving requires the use of skills in language, reasoning, and computation. Because the focus of present curriculum and standardized

achievement tests are on word problems, inability to solve these problems can hinder the achievement of students in math. Bain, McCallum, Bell, Cochran and Sawyer (2010), Omar (2010) and Fakeye (2010) who showed that English linguistic aptitude affects the achievement of students. Therefore, the purpose of this quantitative non-experimental study was to examine some of the linguistic factors affecting the correct responses to math word problems. The study recommends math educators and decision makers to incorporate activities into the curriculum that could integrate math with reading and develop vocabulary skills among students so that word problem solving does not become a major hindrance in the achievement of students in math.

### **Finding**

The following conclusions were drawn which are described below such as:

1. The performance of group taught through interactive whiteboard technology was found to be significantly higher than that of conventional teaching strategy in English.
2. The performance of high English linguistic aptitude group was found to be significantly higher than that of low English linguistic aptitude group of students in English.
3. There was significant interaction effect of instructional strategies and English linguistic aptitude on achievement in English. Further analysis revealed that:
  - The high English linguistic aptitude of experimental group exhibits high mean gain scores than low English linguistic aptitude of experimental group.
  - The high English linguistic aptitude of experimental group possesses high mean gain scores than high English linguistic aptitude of control group.
  - The high English linguistic aptitude of experimental group exhibits high mean gain scores than low English linguistic aptitude of control group.
  - Rest of the combinations of instructional strategy and English linguistic aptitude group did not yield significant difference in mean gain achievement scores.

### **Conclusion**

The present study reveals that achievement score in English of students taught through Interactive whiteboard technology based instructional strategy was significantly higher than those which were taught through conventional teaching strategy. Further, the gain means with

Interactive whiteboard technology based instructional strategy was more for high linguistic aptitude group as against the average and low linguistic aptitude group. The difference in mean gain scores for interaction effect of instructional strategies and linguistic aptitude turned out to be significant. The study recommends the use of interactive whiteboard technology based instructional strategy for better performance of students.

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