

# Role of Interactive Whiteboard and Academic Achievement of Secondary School Students in Mathematics

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## ABSTRACT

*The present study was undertaken to investigate the effect of Interactive Whiteboard Instructional Methodology on academic achievement of secondary school students in the subject of Mathematics. The researcher used a pre-test, post-test control group quasi – experimental design for the present study. This experimental study was conducted on ninth class students in the subject of Mathematics for a period of 12 weeks. One private school CBSE affiliated of Patiala city was purposively selected for the present study. Total 60 students were taken up for the study. One section of 9<sup>th</sup> class students, called as experimental group (30 students) was taught with the help of interactive whiteboard and the other section called the control group (30 students) was taught with the traditional instructional methodology. Data was analyzed using *t*-test. The findings disclosed that there was no significant difference in the academic achievement of 9<sup>th</sup> class students of both the experimental and control group in the subject of mathematics. The use of interactive whiteboard has not significantly affected student's achievement in the subject of Mathematics. Practical subjects like Mathematics should be taught with blackboards when its application part is to be done, when only concepts are explained to students' then interactive whiteboards can also be used along with blackboards. Both the methodologies should be used side by side by the teachers depending upon the subject topics.*

**Key Words:** *Interactive Whiteboard, Academic Achievement and Mathematics.*

## I. Introduction

Education plays a vital role for the upbringing of a child; it makes him or her good citizen, a good human being, self-sufficient, tolerant, independent etc. But nowadays due to advancement of technology both information and knowledge equally play vital role for the growth and upliftment of human beings. Not only education, but knowledge and skills both are important for building a human capital with good morals and ethics so as to bring more and more technical and economical innovations.

In the present scenario, due to the upcoming of science and technology in the field of education, every teacher wishes to make its teaching learning process up to date and effective. Now days every parent wants that his or her child should be educated from the school which is equipped with latest technology, so that their children become all-rounder and update their knowledge to survive in the society. With the upcoming of technology and new inventions in the field of education, teacher's role has become tough and crucial. New expectations always come up with new challenges. This also made necessary for teachers to update him or herself with new methodologies in the field of education. Thus, it becomes the major objective of the teacher to choose an appropriate instructional methodology for the development of a child. With this new invention of technology in the field of education, blackboard is replaced by smart board or interactive whiteboard to make teaching and learning process more effective (Chamundeswari, 2014).

### 1.1 Interactive Whiteboard Instructional Methodology

Although the first smart board (interactive whiteboard) was introduced in business world in early nineties. But it took some time to establish its potentialities in the field of education (Walker, 2005). Interactive

Whiteboard (IWB) is one of the technologies which transform classroom activities and teachers' role. Chalkboard has been developed into interactive electronic board also called 'Smart Board'.

A teacher now a day makes use of interactive whiteboard to make teaching interactive, effective, student centered, more presentable. A teacher can bring the outside world inside the classroom through interactive whiteboard (Al-Faki, 2014).

An interactive whiteboard is a large, touch –sensitive board which is connected to a digital projectors and a computer. The projector displays the image from the computer screen on the board. The computer can then be controlled by touching the board, either directly or with a special pen called stylus. The Board is easy to use and have benefits for both the teachers and students. Interactive white board has made the lesson more enjoyable and fun. (BECTA, 2003).

## 1.2 Academic Achievement in Mathematics

Academic achievement is a product attained through the process of learning. It is the total performance or attainment of students in the scholastic subjects prescribed for the course at a particular grade level. In the present study, academic achievement was the scores obtained by the students of 9<sup>th</sup> class students of both the groups in the achievement test prepared by the investigator at two occasions- before and after the experiment i.e. pre-test scores and post-test scores.

## II. Review of Related Literature

The purpose of the investigation is to study the effect of interactive whiteboard methodology on the academic achievement of senior secondary school students in the subject of Mathematics. A number of studies have been carried out to study the effect of interactive whiteboard on academic achievement of students in foreign countries. But fewer studies are carried out in India. Few studies among those are in favour of usage of interactive whiteboard in schools, which reveals that academic achievement of students increases with interactive whiteboard than the traditional board methodology.

Students of primary level who taught with interactive whiteboard have better academic achievement and retention than the students who taught with traditional methodology (Robinson (2004), Decker (2010), Aytac (2013), Chamundeswari (2014), Nejam and Muhanna (2014)). Interactive whiteboard is helpful in better engagement, longer attention, better focus, pace and visual representation at preschool and primary education (Hennery (2007), Stoica et. al. (2012), Drigas and Papanastasion (2014)). Interactive Whiteboard being an interactive device is very effective for enhancing communication among the students in the classroom (Greiffenhagen (2000), BECTa (2003)). Interactive whiteboard is helpful in drilling of subject, illustrating examples, motivation of students at primary level in all subjects (M and M (2012)). Teachers face many difficulties regarding their professional training, technical support and co-operation of teachers and students while using interactive whiteboard (Aytac (2013), Faki and Khamis (2014)). Teachers' attitude towards use of interactive whiteboard in the classroom is quite high (Robinson (2004), Cavus and Gelur (2017)).

Whereas some of the studies are not in favour of interactive whiteboard being an expensive tool which may not have any special feature like enhancing academic achievement due to it only. There is no significant difference between academic achievement of experimental and control groups (Akbas and Pektas (2011), Ajelabi (2015), Stanley (2016), Kyriakou and Higgins (2016)). There is no difference between teachers' and students' attitudes towards interactive whiteboard in elementary and secondary school classroom (Decker (2010), Aytac (2013), Balta and Duran (2015), Kyriakou and Higgins (2016)).

## III. Rationale of the Study

Many studies were traced, which examined the effect of interactive whiteboard methodology on the academic achievement of primary school students. Few of the studies were found to be conducted in countries other than India to study the effectiveness of interactive whiteboard methodology on academic achievement of students of elementary and secondary school students in the subject of sciences, however very few rather no study was found to be conducted in India, to see the effectiveness of interactive whiteboard methodology on academic achievement of students of secondary school students in the subject of Mathematics. Thus the proposed study seems justified.

### 3.1 Objective of the study

To study the significance of difference in the Academic Achievement of Secondary School Students taught with Interactive Whiteboard and Traditional Instructional Methodology in the subject of Mathematics.

### 3.2 Hypothesis

There is no significant difference between the Academic Achievement of Secondary Students in the subject of Mathematics of both the groups who taught with Interactive Whiteboard and Traditional Instructional Methodology in the subject of Mathematics.

## IV. Experimental Design

The present study was an experimental study in nature. Its design was pre-test, post-test control group quasi experimental design. In this study, Instructional Methodology was an independent variable. Two sections of 9<sup>th</sup> class were taken up for the two groups of present study i.e. one was experimental and other was control group. Equal numbers of male and female were there in both the groups. Treatment was given to the experimental group i.e. experimental group was taught with interactive whiteboard and control group was taught with traditional instructional methodology. In this study, Academic achievement of students being a dependent variable was measured at two occasions- before and after the experiment i.e. pre and post tests of both the groups were administered by the investigator herself.

### 4.1 Sample of the Study

Being an experimental study, only one private school, CBSE affiliated of Patiala City was purposively selected where investigator went for conducting an experiment. That school was selected by keeping in mind where interactive whiteboard was never or least used before. This school did not use smartboards for Mathematics at Secondary level. They were using Smart boards at Primary level only. The school was ready to co-operate with investigator. They agreed to give their one class students for experimentation on one condition only- without disturbing their routine learning and section arrangements. 9<sup>th</sup> class was given to the investigator. Total 60 students were there in 9<sup>th</sup> class. One section of 9<sup>th</sup> class which was taught with interactive whiteboard methodology was treated as experimental group and the other group which was taught with traditional board was treated as control group of the study. 30-30 students were there in both the groups.

### 4.2 Steps taken to control the extraneous variables

- Age and Class- All the students of this research were of same class and of same age i.e. class ninth students of 14-15 year age group were chosen for the study.
- Achievement test- Same criterion test was used as Pre-Test, Post-Test to measure achievement of students in Mathematics.
- Physical Environment of the School- Same classrooms were chosen for experimental and control group students on daily basis.
- Subject- Only Mathematics subject was chosen for the present study.
- Gender- Equal number of girls and boys were there in both the groups of study.
- Medium of instruction- Same medium of instruction i.e. English was kept to teach to both the groups.

### 4.3 Tools Used

In this study, two tools were used by the investigator- Instructional and Measuring Tool.

#### 4.3.1 Instructional Tool

For imparting instructions to the students, instructional tool was used by the investigator. Equal number of lesson plans was prepared by the investigator for both the groups. Same content of mathematics was taught to both the groups daily. Students of experimental group were taught with interactive and control group of students were taught with traditional board instructional methodology.

### 4.3.2 Measuring Tool

To measure the academic achievement of students of both the groups, measuring tool like criterion reference test (Achievement Test) was constructed and standardised by the investigator herself. This achievement test was administered at two levels: pre-test i.e. before the treatment and other is post-test i.e. after the treatment. Achievement test was of objective type test. This test consisted of 60 objective type questions. Questions were of various types like fill ups, multiple choice type, matching type and true/false type questions. While preparing the achievement test, Bloom's taxonomy was kept into consideration. For the standardization of achievement test, test was given to the subject and language experts too. On the basis of their opinions and suggestions, amendments were done in the test. Content validity of the test was calculated by the experts and reliability of the test was also calculated by split half method. Thus the test was made valid and reliable tool to measure the academic achievement of 9<sup>th</sup> class students in the subject of Mathematics.

### V. Procedure/ Method

Before execution of treatment, pre-test of both the groups were administered with the achievement test. After its administration, treatment was given to the experimental group. Both the groups were taught with interactive and traditional instructional methodologies respectively for 12 weeks. At the end of the 12<sup>th</sup> week, same achievement test was administered on both the groups that were termed as a post-test.

### 5.1 Interpretation of the Data

After collecting pre and post test scores, its analysis was done by the investigator. Scores were displayed in the form of tables. Table 1 showed the pre-test and post-test mean scores and standard deviation.

**Table 1**  
Pre-test and Post-test Mean Scores and Standard Deviation values of two groups

Occasions	Groups	N	M	SD
Pretest	Control	40	9.25	1.93
	Experimental	40	9.66	2.43
Posttest	Control	40	14.31	6.55
	Experimental	40	14	6.28

Table 1 indicated the academic achievement mean scores of both the groups. Before the execution of experiment, pre-test score, their means were also calculated. It came out to be 9.25 and 9.66. These mean scores showed that both the groups were same at the start of the study. The difference between the mean scores was just 0.41. Post-test mean scores of control and experimental groups are 14.31 and 14 respectively. The difference between post-test mean scores of both the groups was just 0.31. In order to find out significant or insignificant mean difference between both the groups, t-test was applied; it is shown in table 2.

**Table 2**  
Results of t- test of pre-test and post-test Mean Scores of both the groups

Occasions	Groups	N	M	SD	T	df
Pre-test	Control	40	9.25	1.93	2.02 <sup>NS</sup>	28
	Experimental	40	9.66	2.43		
Post-test	Control	40	14.31	6.55	0.14 <sup>NS</sup>	28
	Experimental	40	14	6.28		

Table 2 indicated that there was no significant difference between pre-test mean scores of both the groups. This shows that before the treatment, academic achievement of both the groups were similar. And even, there was no significant difference in the post-test mean scores of both the groups. Thus, we see that null hypothesis stating; "There is no significant difference between the academic achievement of secondary students in the subject of Mathematics of both the groups who taught with interactive whiteboard and



traditional instructional methodology.” is accepted. So, we can say that interactive whiteboard did not significantly enhance the academic achievement of senior secondary students in the subject of Mathematics.

## VI. Discussion

From the findings, it is clear that there is no significant difference in the academic achievement in the subject of Mathematics of both experimental and control group who taught with interactive and traditional instructional methodology respectively. Both the groups-experimental and control group exhibited equally same growth in the academic achievement in Mathematics. Even traditional methodology indicated wonderful results in the academic achievement of students in the subject of Mathematics at secondary level. This finding is well supported by Akbas and Pektas (2011), Ajelabi (2015), Stanley (2016), Kyriakou and Higgins (2016).

### 6.1 Conclusion

Present study focused on comparative effectiveness of interactive whiteboard methodology on the academic achievement of senior secondary students in the subject of Mathematics. But results revealed no significant difference between the academic achievements of senior secondary students of both the groups in the subject of mathematics. Thus, it can be concluded that it depends upon the teacher how and when teacher uses which teaching aid to impart the education to the student. Teacher must have sufficient training to use appropriate technology in education. Only one teaching aid is not complete to give full knowledge of the subject to the students.

### 6.2 Implication

The result of the study revealed that both the group of secondary school students exhibited same academic achievement in mathematics who taught with smartboard and traditional instructional methodology. Smartboard instructional methodology has no statistically significant academic achievement than traditional instructional methodology in the subject of Mathematics. Secondary school students of Mathematics perform well when they learn through blackboard because mathematics is a practical subject it need paper and pen to solve problems of Mathematics. Until teacher does not use black board for solving and explaining mathematical problems to the students, they will not be able to understand and solve the problems. Thus smartboard should be used as a teaching aid by the teachers to explain the concepts to the students theoretically but as the practical or application aspect of the subject arises then blackboard can give step by step knowledge to the students than smartboard to solve mathematical problems.

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