Effectiveness of Smart classes on academic achievement. A study regarding private schools in Punjab.

Author: Jagdeep Singh Arora

Research Scholar, Punjabi University, Patiala

Jagdeep_bgiet@yahoo.in

Co-Author: Dr. Upasna Joshi Sethi

Professor, Punjabi University Regional Centre, Mohali

upasnajoshi.sethi@gmail.com

Abstract. Over the years, technology has proved to be a big factor in improving the quality of instruction by helping in delivering better teaching-learning experience. However, effective use of technology to enhance the quality of teaching is a challenging issue. This experimental study covers 25 private schools in Punjab involving 466 students. The experimental research design was chosen to measure the impact of the smart classroom learning environment on academic achievement This study is focused on measuring the impact of the smart classroom with a non-smart classroom on student's achievement i.e. marks.

Keywords: Academic achievement, Information and Communication Technology, Smart Class.

Introduction

The adoption of smart classrooms in India is driven by the need to improve the standard of education in the country and enable it to be on par with the global education standards. Smart classrooms charge investment for the buy of hardware and software products. End-users comprises of schools, colleges, universities, and contrasting institutions that toil professional and vocational courses. Smart classrooms consider eke out living videos and pictures making classrooms more interactive and learning more enjoyable. In this terrain, students have the facility to study materials even after a perpetual piece of action hours in school. Students' convenience is further highlighted using online libraries at their will. Competitive exams in India are further as conducted at the hand of online platforms. Smart classrooms are transforming the way education was imparted by integrating information technology into its portfolio. However, conflict to critical point along by all the unquestionable infrastructure challenges is creating issues in the accustom to feign the technology. The analysts conclude the Smart Classroom market is growing very fast in India and would be in the range of around compound annual growth rate of 15.89 percent till 2020. With 1.4 million schools in our country, the addressable business is very much possible with 200000 odd private/unaided schools in the country. Even if a school takes a setup for 10 smart classrooms which would replicate into a business of around 2000000 digital classroom demand pointing towards huge business opportunity. Along with this some of the State governments in India are also changing the way the education being imparted in government schools with the introduction of smart classrooms in their respective states. One such example is the tie-up between Private Digital company with Government of Kashmir for 100 such schools. The smart classroom is now seen as a tool to bring global education standards in India. "Government's "Digital India" Initiative Aims to Overhaul India's Education System".

Review of Literature

Meyer and Rowan (1991) state, a prevailing theory of institutionalism deals with the increased complexity of internal relations and labor division due to technology use. Within this complex internal relationship of labor division, Meyer and Rowan (1991) propose that the creation and implementation of rules also play an important role in legitimizing institutionalism. This dependence on rules has solidified the perception that a good organization runs well when more rules are implemented. A formal institution then, according to the authors, is one that is defined by well-structured rules and that is driven by a desire to increase outcomes based on the execution and following of those implemented rules.

Chen, Lin, Yeh & Lou, (2013) Perceived Ease of Use and Perceived Usefulness are the most important factors in the technology acceptance model. Perceived Ease of Use refers to "the degree to which a person believes that using a particular system would be free of effort". Perceived. Many researchers have extended TAM with different external factors to underpin eLearning acceptance or use (including Cheung & Vogel, 2013; Hidayanto, Febriawan, Sucahyo & Purwandari, 2014; Lee & Lehto, 2013. Rege, Pratima(2017) Augmented reality (AR), a technique that enables superimposing digital objects over physical ones, thanks to its high levels of engagement and the 'intrigue' factor, is one of the emerging trends in the nascent education technology space in the country. Chauhan, Prithvi (2018) The conventional Indian classroom with hour-long teacher's monologues have evolved into smart classes. It has provided students with easy access to technology-enhanced learning via interactive videos, textbooks, and customized learning modules. Nikolić (2018) Application of information and communication technologies (ICT) and e-learning in the education system could serve as a potential improvement of lectures and learning process. It is essential to introduce the ICT in the teaching process as soon as possible because of the rapid development of information systems and technologies. Bajaj, Richa (2018) Smart education is about taking learning outside the traditional classrooms; and is an activity that can be done anywhere and anytime. Internet-enabled tablets to browse personalized learning content that could be text, images or multimedia, internet-enabled watches to listen to recorded lectures are some of the devices that can be used. A A Syahid (2019), ICT competence is the potential for creating an ICT-based classroom management. Teachers will be able to optimize several forms of ICT-based classroom management if they possess good ICT competence. Continuous practice and habituation of ICT utilization in learning will bring about a change and maximize the benefits of ICT for learning. C, Radhakrishnan (2020) We need to put the 'learner' at the Centre of our educational policies, programs, and practices. Educational institutions should become 'living centres' which cater to the intellectual, physical, and emotional needs of the learners.

Considering the above review of literature emphasizing upon the importance of smart class and their variables were identified along with assessment, its objectivity and usefulness the present research work were carried out. The major reason behind this study was to know whether smart classes lead to an impact on the academic achievement of the students.

Rationale of the Study

With millions of dollars being put into the business of Smart-classroom and with ever-increasing the size of this industry, there is a definitive requirement to understand the consumer of these technologies in a better way. The study-specific to use of Smart class has not been undertaken in a major way in India whereas schools are spending heavy amounts in setting up systems to ensure that digital classrooms are used as a medium of teaching. There is no study undertaken to assess whether the digital classes impact positively on the academic achievement of students grade-wise or not. So, the study is very important to unveil this aspect of teaching. Although few studies have been done on a global scale but still need to be tried and tested in the Indian setup. This study will have some inputs to identify the problems in the area under discussion.

Objectives of the Study

1. To study the impact of mode of teaching and grade of student on marks.

2. To measure the impact of the use of smart classes on academic achievement.

Hypothesis of the Study

1. There is no significant difference between the academic achievement who got and who did not get instructions in the smart-classroom learning environment.

Delimitation of the Study

The study is limited to private schools in Punjab where smart classes are used as a medium of instruction. Private schools where a minimum of 50% classes are smart classes were taken to reduce the effect of extraneous variables.

Methodology

7.1 Research Design

The study involved the use of experimental research design for establishing cause and effect relationships. Post-test Only Design was deployed in this study with two randomly assigned groups: an experimental group and a control group. Neither group is pretested before the implementation of the treatment. The treatment is applied to the experimental group and the post-test is carried out on both groups to assess the effect of the treatment or manipulation.

The details of Post-test conducted in this study:

Definition of symbols for experimenting.

X: Exposure of Test Units to I.V.(Treatment). Exposure to experimental treatment.

O: The measurement or observation of the dependent variable.

R: Random assignment of test units (Students) to separate treatments.

The vertical arrangement of symbols means events or activities occur simultaneously.

Like: O1(prior to treatment) X O2(after treatment) O3(Specific time periods)

So, in our case it was:

R   Q1(Post Test): Control Group

R X Q2(Post Test): Experimental Group

Since the above events were done at the same time to reduce the effect of extraneous variables.

Population of Study

The population under will comprises of private schools Punjab where Tata classedge smart classrooms are deployed. A total of 25 schools were selected. Secondary students of these schools formed the population. These were approx. 10000 students

Sampling Method

Probability sampling design methods were used.

Measurement Instruments

In this study for measuring the performance of the smart-classroom on students' academic achievement Post-test is employed and analysis was done using a t-test.

Methods of Data Collection

For this study, primary data was collected after the run of Post Test analysis/experimentation. For assigning the students to random groups for experimentation, marks were taken as a base from the school's academic records.

Method of Data Analysis

Analysis of the data was done using statistical methods or techniques such as descriptive statistics and inferential statistics. ANOVA, t-test was used for analysis in addition to the descriptive statistical tools.

Results and Discussion

Test units in both the experimental and control group are selected at random. The test units were first selected based on the sampling frame (comprises all the elements of the population with proper identification that is available to us for selection at any stage) available to us from school records. The performance of a student in terms of percentage of marks scored in the previous class was taken as a base for taking the sample (a subset of the population) which became our sampling unit. Once the sample was selected based on the Random selection method these sample units were allocated to each of the class I.e. one class with a smart class setup and other with a blackboard (Traditional Setup). As pre-test measurement is absent, the effect of instrumentation and interactive testing effect is ruled out. As there is a random assignment of test units to both the groups, it can be assumed that both the groups were equal before the application of treatment to the experimental group. The class test was conducted at the end of lesson teaching. The analysis of marks was done for evaluation. Further, one can always assume that the test unit's mortality affects each group equally.

Table 1

Tests of Between-Subjects Effects

Dependent Variable: Marks

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	621.042[a]	3	207.014	71.358	.000	.569
Intercept	18463.836	1	18463.836	6364.531	.000	.975
Mode	210.413	1	210.413	72.530	.000	.309
Class	180.738	1	180.738	62.301	.000	.278
Mode * Class	234.749	1	234.749	80.918	.000	.333
Error	469.970	162	2.901			
Total	19582.00	166				
Corrected Total	1091.012	165				

a. R Squared = .569 (Adjusted R Squared = .561)

The main purpose of the test conducted was to check the impact of mode i.e. teaching pedagogy on academic achievement i.e. marks (Dependent variable) and the impact of class i.e. when the student moves from one particular class to another class than whether the mode along with class factor comes in play and impact the academic achievement i.e. measured by the performance of the student on the bases of marks scored in the test. The basic objective was to check what impact does mode i.e. TCE digital Vs Traditional way of teaching has on academic achievement. For the treatment, students were divided into classes with and without a smart classroom. One group was exposed to smart classroom

pedagogy methods of teaching and others were exposed to traditional blackboard and lecture delivery methods. To reduce the effect of extraneous variables we have controlled the delivery by ensuring that the instructor is clear on which chapter to be taught and was given sufficient time to prepare before delivering the same in the classroom. Students were not informed in advance as to what they going to learn and in which class, they will be sitting in that particular day for a few hrs. Once the students were exposed to certain no of hr`s on specific/predefined topics for both with and without smart class, a test was taken to measure the outcome i.e. academic achievement (Marks). Since the test/evaluation was taken on standardized questions and no break were given to students after delivery of lecture which helped to reduce the effect of extraneous variables. Classes chosen were 7th and 8th for this study with science and social studies subjects, respectively. The results will show whether the students' performance in terms of academic achievement i.e. marks depends on the mode of teaching and class as they move to higher classes. The objective was to check the influence of mode and class on students' achievement when both the independent variable i.e. mode and class in combination work leading to academic achievement. The results were as follows. The main effect of teaching mode on the marks was highly significant ($p<.01$). The effect size of .309 (31%) was mediocre. The main effect of class on marks was also highly significant ($p<.01$) and effect size = .278 (28%) was low. The interaction effect or joint effect of mode and class on marks was also significant ($p<.01$) and the effect size was moderate. As per the above joint effect which is .309 (Partial ETA Squared) it is approx. 31% impact of mode (Normal + TCE) on the student outcome i.e. dependent variable Marks. It is a significant relationship here which means are not the same and it's not by random and we can say with a 95% confidence level as per matrix above. When we talk about class features (i.e. Whether class impact on marks) impact is .278 which approx. 28% which is significant which says that students are more sincere towards getting good marks as their grade increases.

R Squared is .569 which approx. 57% which shows that the impact of mode (Normal + TCE) along with class (Grade) is 57 % on marks. This shown that out of 100 marks 57% depends on the mode + class and rest other factors which could be tuition, extra practice etc. This clearly shows the importance of using a combination of digital technology and its own method of teaching. Further, we have noticed that if mode and class are taken individual than the effect is not significant which clearly shows that the impact of mode and class have on each other when working in tandem i.e. together they make each other significant and not standalone.

Table 2

Descriptive Statistics

Dependent Variable: Marks

Mode		Mean	Std. Deviation	N
Normal	7th class	9.5814	2.28069	43
	8th Class	9.2895	1.69112	38
	Total	9.4444	2.01866	81
TCE Digital	7th class	9.4545	1.53190	44
	8th Class	13.9268	1.05807	41
	Total	11.6118	2.60537	85
Total	7th class	9.5172	1.92814	87
	8th Class	11.6962	2.71442	79
	Total	10.5542	2.57142	166

Descriptive analysis shows the importance of TCE digital (Independent Variable) on the dependent variable (Marks). In case of class 7th (Science) the impact of using TCE digital is minimal but when we compare the 8th class results (Normal Mode of teaching) with TCE digital than the variation in the

mean score is 13.92 Vs 9.28 which clearly shows that the impact is high on marks with the use of TCE digital when students move to higher classes.

Table 3

| Descriptives					
Mode				Statistic	Std. Error
Marks	Normal	Mean		9.4444	.22430
		95% Confidence Interval for Mean	Lower Bound	8.9981	
			Upper Bound	9.8908	
		5% Trimmed Mean		9.5624	
		Median		10.0000	
		Variance		4.075	
		Std. Deviation		2.01866	
		Minimum		3.00	
		Maximum		13.00	
		Range		10.00	
		Interquartile Range		3.00	
		Skewness		-.744	.267
		Kurtosis		.670	.529
	TCE Digital	Mean		11.6118	.28259
		95% Confidence Interval for Mean	Lower Bound	11.0498	
			Upper Bound	12.1737	
		5% Trimmed Mean		11.7190	
		Median		12.0000	
		Variance		6.788	
		Std. Deviation		2.60537	
		Minimum		6.00	
		Maximum		15.00	
		Range		9.00	
		Interquartile Range		4.00	
		Skewness		-.273	.261
		Kurtosis		-.952	.517

The above analysis shows that TCE(Tata Classedge) digital way of teaching is better if we take overall results in term of marks i.e. dependent variable. The mean marks scored are more when use TCE digital(i.e. 11.61) vis a vis 9.44 when normal way of lecture delivery or teaching learning process is done.

Figure 1
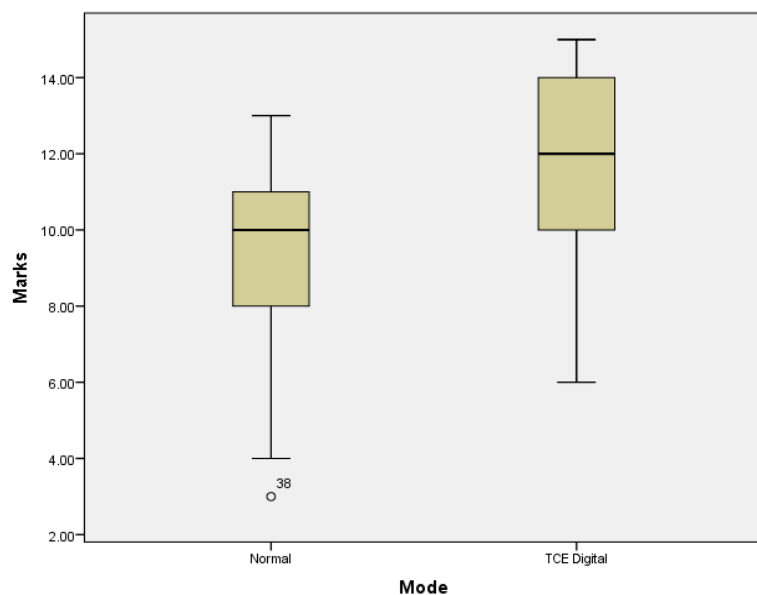
Above clearly shows the impact of TCE digital as compared to Normal mode of teaching on marks. Histograms clearly shows how marks are evenly distributed when teaching is done through TCE digital as compared to Normal mode of teaching. Students score more evenly marks when taught through TCE digital as compared to normal. This clearly shows the impact of TCE digital on covering maximum no of students which teaching-learning process is done through TCE digital.

Figure 2
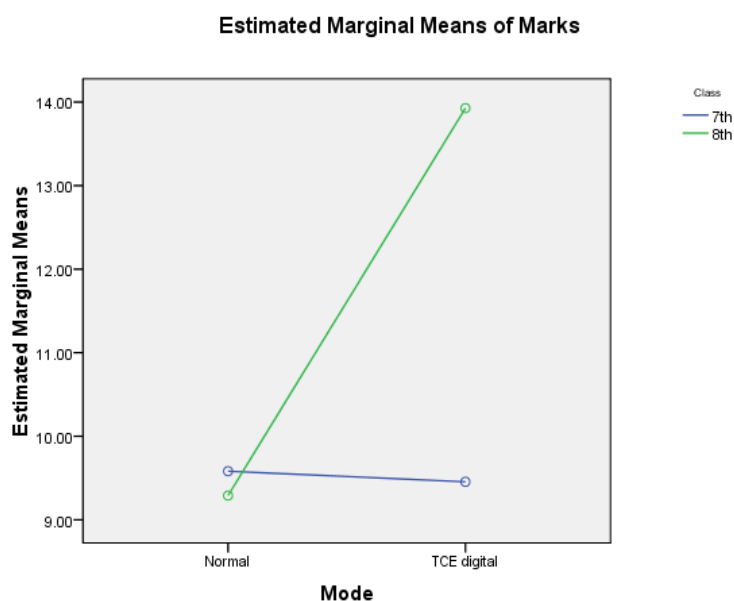
Again, the statistics (Graphically) show that TCE digital (Mode) impact Vs Normal (Mode) on marks is very high when we move from class 7th to class 8th.

Conclusion

Based on the analysis and interpretation of data, the following conclusion can be drawn. There exists a significant difference in the effect of a smart classroom learning environment on the academic achievement of secondary students. The results show that the students taught through the smart class have scored better academic achievement than students taught through the traditional method. The reasons for performing well by students taught through smart class may be:

- Smart class learning helped to develop the cognitive dimension.
- Reinforcement is given to all students on every improvement.
- Organization of the corrective activities o Formative tests conducted to find out the progress.
- Supplementary material provided to students.
- There exists a significant difference in the difference of the effect of the smart classroom learning environment on academic achievement of high achievers of secondary students in science.
- Motivation and Reinforcement given to all students on every improvement because smart class created much interest than the traditional method
- Organization of the corrective activities.
- Creation of enjoyable environment in class.

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