

Effectiveness Of Digital Teaching System In Physics Among Xi Standard Boys Students

Mrs. V. MARY HILDA¹, Dr. P. C. NAGA SUBRAMANI²

¹Ph.D. Research Scholar, Department of Pedagogical Sciences, Tamil Nadu Teachers Education University, Karapakkam, Chennai, Tamil Nadu.

²Associate Professor, Department of Pedagogical Sciences, Tamil Nadu Teachers Education University, Karapakkam, Chennai, Tamil Nadu.

ABSTRACT

This study is attempted to evaluate effectiveness of digital teaching system in physics among XI standard boys students. The sample of the study consists of 80 XI standard boys students and they are drawn from St. Sebastian Matriculation Higher Secondary School, Pallavaram and St. Vincent Pallotti Matriculation Higher Secondary School, Zamin Pallavaram Chengalpattu district of Tamil Nadu. In order to study the objectives, Solomon four group experimental design has employed. The XI standard students in control group were taught Properties of Matter in Physics by using Conventional Teaching System. The XI standard students in experimental group were taught Properties of Matter in Physics by using Digital Teaching System. The results reveal that the XI Standard boys in experimental groups of both PPT design and PT design have performed well in learning Properties of Matter in Physics by means of Digital Teaching System than control groups have gone through in learning Properties of Matter in Physics in Conventional Teaching System in both PPT design and PT design. It is concluded that Digital Teaching System is highly effective for learning Properties of Matter in Physics among XI standard boys students.

Key Words: Digital Teaching System, Effectiveness, Solomon Four Group Design,

1. INTRODUCTION

In present era of digital age, digital technology is a main component of modern education at school and college levels (Facer and Selwyn, 2013) and it is an innovative way of teaching and learning for most of nations across the world. Governments of almost all nations have formed clear and policies and programmes for encouraging and effective user of digital teaching systems in universities, colleges and schools (Jain and Getis, 2003). Digital learning system is specialized method of teaching by using various digital technological tools in order to improve efficacy of teaching and learning among teachers and students,

thus, educational institutions including schools are steadily adopting their teaching methods in combination with digital technologies (Neo, 2003).

Teachers are viewed as effective learners particularly those who are working in schools (Wallace, 2004) and most of modern day teachers are literate digitally and they are capable of using instructional design along with digital technologies or tools for their teaching (MacKenzie, 2016). Besides, present day higher secondary school students are growing up with digital contest and they are highly benefiting academically and personally by using digital teaching and learning system (Nam & Smith-Jackson,

2007). The use of digital teaching system in classroom is an exciting phenomenon for teachers and students for effective teaching and efficient learning among them. Hence, an attempt is made to study effectiveness of digital teaching system in physics among XI standard boys students.

2. REVIEW OF RELATED LITERATURE

Pan and Cheng (2022) found that digital oriented interactive teaching system had reinforced motivation of school students positively and it had also generated enjoyable and positive teaching and learning experience among teachers and school students and teachers had also received visualized feedback and information from school students.

Khan et al (2021) concluded that digital technology in the form of instruction through computer had increased attitude and achievement of IX standard students in the mathematics subject and no significant difference was found in achievement in the mathematics subject among government and private school IX standard students.

Nalini et al (2020) revealed that the improvement in prescription writing in the post-test and pre-test was higher in online learning method as compared to conventional learning method and the improvement in prescription writing among second year MBBS students was significant. It was concluded that online learning method for prescription writing was better as compared to conventional learning method for second year MBBS students.

Carpenter (2019) indicated that the use of digital tools for learning subject among middle school students had increased their attitude for learning and engagement in use of digital practices and the digital learning method had increased academic performance of middle school

students in comparison with traditional learning method.

Neufeld (2018) showed that digital learning tools had positive and significant effect on learning skills, ownership of learning, self efficacy and academic performance of 10 grade students as compared to traditional learning tools and 10 grade students had also improved their analytical and using digital tools and learning interest and engagement in their learning.

Lin et al (2017) found that digital learning method had positive and significant impact on learning motivation and learning outcome of school students and its effects were higher and significant as compared to traditional learning method and it has also increased learning effect and gain among school students.

Sun and Chen (2016) concluded that online and digital technologies had increased access for learning, skills, cost effectiveness and experience in learning and they had also increased engagement in learning and academic performance of college and school students significantly.

Montrieux et al (2015) revealed that the use of tablet devices in teaching had increased interaction, interest and engagement in learning among secondary students and it had also increased their academic performance and interest in learning features of tablet devices and technical skills among them.

3. OBJECTIVES OF THE STUDY

1. To find out the significant difference between experimental group (Digital Teaching System for Properties of Matter in Physics) boys and control group (Conventional Teaching System for Properties of Matter in Physics) boys in XI Standard students.

4. HYPOTHESES OF THE STUDY

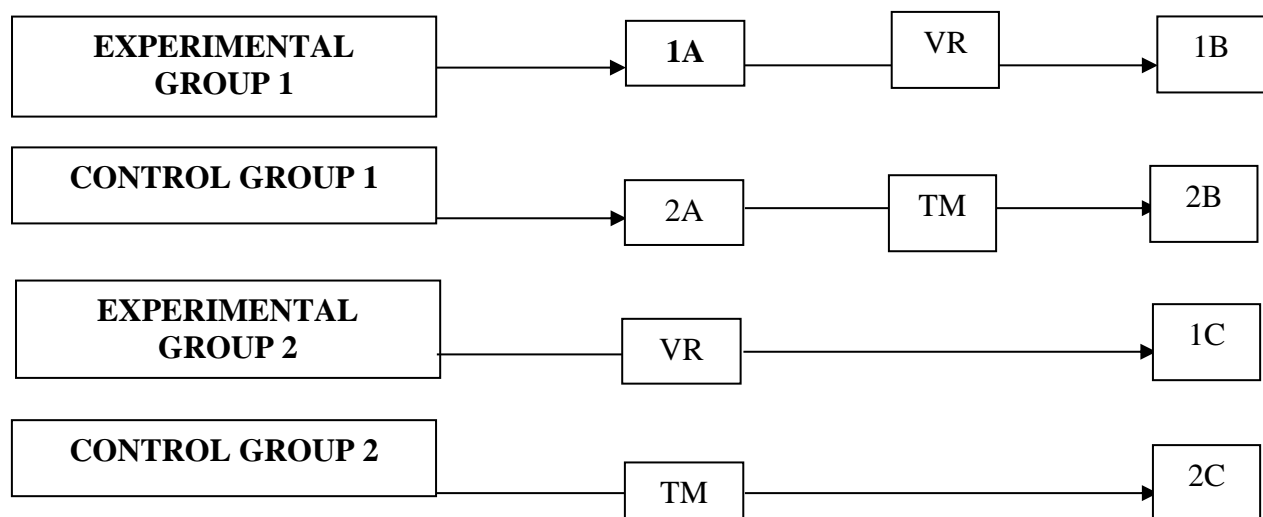
1. There is no significant difference between the pre test and post test scores of experimental group boys in PPT design.
2. There is no significant difference between the pre test scores of control group boys in PPT design and post test scores of control group boys in PPT design.
3. There is no significant difference between the pre test scores of experimental group boys in PPT design and pre test scores of control group boys in PPT design.
4. There is no significant difference between the post test scores of experimental group boys in PPT design and post test scores of control group boys in PPT design.
5. There is no significant difference between the post test scores of experimental group boys in PT design and post test scores of control group boys in PT design.
6. There is no significant difference between the pre test scores of control group boys in PPT design and post test scores of control group boys in PT design.
7. There is no significant difference between the post test scores of experimental group boys in PPT design and post test scores of experimental group boys in PT design.

8. There is no significant difference between the post test scores of control group boys in PPT design and post test scores of control group boys in PT design.

5. METHODOLOGY

The current research is made in Chengalpattu district. The sample of the study consists of 80 XI standard boys students and they are drawn from St. Sebastian Matriculation Higher Secondary School, Pallavaram and St, Vincent Pallotti Matriculation Higher Secondary School, Zamin Pallavaram Chengalpattu district of Tamil Nadu. In order to study the objectives, Solomon four group experimental design has employed and it is shown in Figure-1 and it is a mixture of the pre test-post test control group design and the post test only control group design. The XI standard boys students in control group were taught Properties of Matter in Physics by using Conventional Teaching System. The XI standard boys students in experimental group were taught Properties of Matter in Physics by using Digital Teaching System and the measures were taken to minimize or control the threats to internal and external validity at a rational level.

FIGURE-1 SOLOMON FOUR GROUP EXPERIMENTAL DESIGN



1. 1A - EG1 - Pre test
2. 2A - CG1 - Pre test
3. 1B - EG1 - Post test
4. 2B - CG1 - Post test
5. 1C - EG2 - Post test
6. 2C - CG2 - Post test

The tools namely Criterion test on Properties of Matter in Physics for XI Standard Students and digital materials are used for teaching Properties of Matter in Physics in the current study. The Pre and Post- tests are conducted among Group I and Group II. The post test only design (PT design) is conducted for Group III and Group IV. The investigator has developed the digital materials for teaching

Properties of Matter in Physics. The two Experimental groups' with sample of 40 XI standard boys students and each of them are subjected to treatment and these students are taught Properties of Matter in Physics through Digital Teaching System, The two Control groups' with sample of 40 XI standard boys students and each of them are subjected to Conventional Teaching System.

6. RESULTS –HYPOTHESES

TESTING

Hypothesis-1: There is no significant difference between the pre test and post test scores of experimental group boys in PPT design.

Table-1. Pre Test and Post Test Scores of Experimental Group Boys in PPT Design

Variable	N	Mean	SD	t-Value	Significance
PPT(Experimental Boys) - Pre Test	20	13.75	4.12	20.144	.000
PPT(Experimental Boys) - Post Test	20	34.80	1.64		

From the above table, it is seen that the calculated 't' value of 20.144 is higher than the critical value of 2.86 in 1% level of significance. Hence, it is concluded that there exists significant difference between the pre test and post test scores of experimental group boys in PPT design. The mean value of the post test (34.80) scores of experimental group boys in PPT design is higher than the mean value of pre test (13.75) scores of experimental group boys in PPT design. Thus, the hypothesis is rejected. The

experimental group boys in PPT design has performed very well after the experiment. It is interpreted that the Digital Teaching System is having better impact on XI Standard Boys' students in learning Properties of Matter in Physics in PPT design.

Hypothesis-2: There is no significant difference between the pre test scores of control group boys in PPT design and post test scores of control group boys in PPT design.

Table-2. Pre Test Scores of Control Group Boys in PPT Design and Post Test Scores of Control Group Boys in PPT Design

Variable	N	Mean	SD	t-Value	Significance
PPT(Control Boys) - Pre Test	20	18.25	1.65	8.038	.000
PPT(Control Boys) - Post Test	20	24.50	3.04		

From the above table, it is observed that the calculated 't' value of 8.038 is higher than the critical value of 2.86 in 1% level of significance. Hence, it is concluded that there exists significant difference between the pre test and post test scores of experimental group boys in PPT design. The mean value of the post test scores of control group boys (24.50) in PPT design is higher than the mean value of pre test scores of control group boys (18.25) in

PPT design. Thus, the hypothesis is rejected. The pre test scores of control group boys in PPT design is smaller than the post test scores of control group boys in PPT design.

Hypothesis-3: There is no significant difference between the pre test scores of experimental group boys in PPT design and pre test scores of control group boys in PPT design.

Table-3. Pre Test Scores of Experimental Group Boys in PPT Design and Pre Test Scores of Control Group Boys in PPT Design

Variable	N	Mean	SD	t-Value	Significance
PPT(Experimental Boys) - Pre Test	20	13.75	4.12	4.579	.000
PPT(Control Boys) - Pre Test	20	18.25	1.65		

From the above table, it is clear that the calculated 't' value of 4.579 is higher than the critical value of 2.86 in 1% level of significance. Hence, it is concluded that there exists significant difference between the pre test scores of experimental group boys in PPT design and pre test scores of control group boys in PPT design. Thus, the hypothesis is rejected. The mean value of the pre test scores of control group boys (18.25) in PPT design is higher than the mean value of pre test scores of

experimental group boys (13.75) in PPT design. Thus, the hypothesis is rejected. The pre test scores of control group boys in PPT design is higher than the pre test scores of experimental group boys in PPT design.

Hypothesis-4: There is no significant difference between the post test scores of experimental group boys in PPT design and post test scores of control group boys in PPT design.

Table-4. Post Test Scores of Experimental Group Boys in PPT Design and Post Test Scores of Control Group Boys in PPT Design

Variable	N	Mean	SD	t-Value	Significance
PPT(Experimental Boys) - Post Test	20	34.80	1.64	11.400	.000
PPT(Control Boys) - Post Test	20	24.50	3.04		

From the above table, it is evident that the calculated 't' value of 11.400 is higher than the critical value of 2.86 in 1% level of significance. Hence, it is concluded that there exists significant difference between the post test scores of

experimental group boys in PPT design and post test scores of control group boys in PPT design. The mean value of the post test scores of experimental group boys (34.80) in PPT design is higher than the mean value of post test scores of control

group boys (24.50) in PPT design. Thus, the hypothesis is rejected. The post test scores of control group boys in PPT design is lesser than the post test scores of experimental group boys in PPT design. It is interpreted that the Digital Teaching System is having better impact on XI Standard Boys' students in learning Properties of Matter in Physics than

Conventional Teaching System in PPT design.

Hypothesis-5: There is no significant difference between the post test scores of experimental group boys in PT design and post test scores of control group boys in PT design.

Table-5. Post Test Scores of Experimental Group Boys in PT Design and Post Test Scores of Control Group Boys in PT Design

Variable	N	Mean	SD	t-Value	Significance
PT(Experimental Boys) - Post Test	20	46.15	1.93	7.294	.000
PT(Control Boys) - Post Test	20	38.25	3.32		

From the above table, it is apparent that the calculated 't' value of 7.294 is higher than the critical value of 2.86 in 1% level of significance. Hence, it is concluded that there exists significant difference between the post test scores of experimental group boys in PT design and post test scores of control group boys in PT design. The mean value of the post test scores of experimental group boys (46.15) in PT design is higher than the mean value of post test scores of control group boys (38.25) in PT design. Thus, the hypothesis is rejected. The post test scores of control

group boys in PT design is lesser than the post test scores of experimental group boys in PT design. It is interpreted that the Digital Teaching System is having better impact on XI Standard Boys' students in learning Properties of Matter in Physics than Conventional Teaching System in PT design.

Hypothesis-6: There is no significant difference between the pre test scores of control group boys in PPT design and post test scores of control group boys in PT design.

Table-6. Pre Test Scores of Control Group Boys in PPT Design and Post Test Scores of Control Group Boys in PT Design

Variable	N	Mean	SD	t-Value	Significance
PPT(Control Boys) - Pre Test	20	18.25	1.65	19.208	.000
PT(Control Boys) - Post Test	20	38.25	3.32		

From the above table, it is observed that the calculated 't' value of 19.208 is higher than the critical value of 2.86 in 1% level of significance. Hence, it is concluded that there exists significant difference between the pre test scores of control group boys in

PPT design and post test scores of control group boys in PT design. The mean value of the post test scores of control group boys (38.25) in PT design is higher than the mean value of pre test scores of control group boys (18.25) in PPT design. Thus,

the hypothesis is rejected. The pre test scores of control group boys in PPT design is lesser than the post test scores of control group boys in PT design. It is interpreted that the usual difference is there between the scores of XI Standard boys students before and after the subject has taught.

Hypothesis-7: There is no significant difference between the post test scores of experimental group boys in PPT design and post test scores of experimental group boys in PT design.

Table-7. Post Test Scores of Experimental Group Boys in PPT Design and Post Test Scores of Experimental Group Boys in PT Design

Variable	N	Mean	SD	t-Value	Significance
PPT(Experimental Boys) - Post Test	20	34.80	1.64	21.236	.000
PT(Experimental Boys) - Post Test	20	46.15	1.93		

From the above table, it is clear that the calculated 't' value of is higher than the critical value of 2.86 in 1% level of significance. Hence, it is concluded that there exists significant difference between the post test scores of experimental group boys in PPT design and post test scores of experimental group boys in PT design. The mean value of the post test scores of experimental group boys (46.15) in PT design is higher than the mean value of post test scores of experimental group boys (34.80) in PPT design. Thus, hypothesis is rejected. It is interpreted that

both experimental group boys are having good impact in learning Properties of Matter in Physics through the Digital Teaching System. The pre test and post test effect in PT design has influenced the XI Standard boys students scores more than the scores of XI Standard boys students in PPT design.

Hypothesis-8: There is no significant difference between the post test scores of control group boys in PPT design and post test scores of control group boys in PT design.

Table-8. Post Test Scores of Control Group Boys in PPT Design and Post Test Scores of Control Group Boys in PT Design

Variable	N	Mean	SD	t-Value	Significance
PPT(Control Boys) - Post Test	20	24.50	3.04	13.146	.000
PT(Control Boys) - Post Test	20	38.25	3.32		

From the above table, it is evident that the calculated 't' value of 13.146 is higher than the critical value of 2.86 in 1% level of significance. Hence, it is concluded that there exists significant difference between the post test scores of control group boys in PPT design and post test scores of control group boys in PT design. The mean

value of the post test scores of control group boys (38.25) in PT design is higher than the mean value of post test scores of control group boys (24.50) in PPT design. Thus, the hypothesis is rejected. The post test scores of control group boys in PT design is higher than the post test scores of control group boys in PPT design. It is

interpreted that both control group boys are having good impact in learning Properties of Matter in Physics through Conventional Teaching System. The pre test and post test effect in PT design has influenced the XI Standard boys students scores more than the scores of XI Standard

boys students in PPT design. The criterion test for learning Properties of Matter in Physics by means of Digital Teaching System by XI standard boys students is shown in the following Table-9.

Table-9. Criterion Test for Learning Properties of Matter in Physics through Digital Teaching System among XI Standard Boys Students

Variables	Significance	Remarks
PPT(Experimental) - Pre Test	Significant	PPT(Experimental) - Post Test > PPT(Experimental) - Pre Test
PPT(Experimental) - Post Test		
PPT(Control) - Pre Test	Significant	PPT(Control) - Post Test > PPT(Control) - Pre Test
PPT(Control) - Post Test		
PPT(Experimental) - Pre Test	Significant	PPT(Experimental) - Pre Test < PPT(Control) - Pre Test
PPT(Control) - Pre Test		
PPT(Experimental) - Post Test	Significant	PPT(Experimental) - Post Test > PPT(Control) - Post Test
PPT(Control) - Post Test		
PT(Experimental) - Post Test	Significant	PT(Experimental) - Post Test > PT(Control) - Post Test
PT(Control) - Post Test		
PPT(Control) - Pre Test	Significant	PT(Control) - Post Test > PPT(Control) - Pre Test
PT(Control) - Post Test		
PPT(Experimental) - Post Test	Significant	PPT(Experimental) - Post Test < PT(Experimental) - Post Test
PT(Experimental) - Post Test		
PPT(Control) - Post Test	Significant	PPT(Control) - Post Test < PT(Control) - Post Test
PT(Control) - Post Test		

7. CONCLUSION

The XI Standard boys in experimental groups of both PPT design and PT design

have performed well in learning Properties of Matter in Physics by means of Digital Teaching System than control groups have

gone through in learning Properties of Matter in Physics in Conventional Teaching System in both PPT design and PT design. It is concluded that Digital Teaching System is highly effective for learning Properties of Matter in Physics among XI standard boys students.

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