

EFFECTIVENESS OF DIGITAL TECHNOLOGY ON BIOLOGY LEARNERS AT THE SECONDARY LEVEL

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Development and usage of digital classroom for teaching and learning process is one of the key areas for development of ICT in schools. An Interactive White Board (IWB) facilitates teaching in digital classroom and is an instructional tool that allows computer images to be displayed onto a board using a digital projector. The study was an attempt to investigate the effect of digital classroom on learning biology concept of secondary school learners of government and private schools of Delhi. It was a Pre-test Post-test Control Group Design. Using digital classroom, the experimental group was taught. Five chapters of Class IX Biology, i.e., 35 lessons were delivered using interactive white board while the control group was taught by traditional chalk and talk method. Pre-test was consisting of 30 items and post-test consisting of 100 items. Data was collected and analysed by using t-test. Result showed that digital classroom has positive impact on learning process as the learners of digital classroom have higher achievement level in biology in comparison to the learners of traditional classroom. In both, government as well as in private school, the learners taught through digital classroom have higher achievement level in the post-test in comparison to learners taught in traditional method.

Key words: *Digital classroom, interactive board, achievement level, ICT, chalk and talk method*

Introduction

Technology has substantially changed the nature of education. Now the classrooms are no more learning islands, they become collaborative learning centres. 21st century is called the era of ICT based education. It has been claimed that ICT in education has a huge potential. It can bring enrichment in the formal education system. There are different ways in which ICT has been used in the field of education. Use of digital classroom in the school is one of the ways of ICT integration in formal school education. Digital classroom is also called smart class, it consists of interactive white board and teaching is done by using e-content. An interactive whiteboard is an instructional tool that allows computer images and videos to be displayed onto a board using a digital

projector. The instructor can then change the elements on the board by using his finger as a mouse, directly on the screen. It has been said that this digital classroom technology has brought about a complete transformation in the traditional rote methods of learning as it provides innovative learning solutions using digital instruction material. Most of the schools in Delhi are opting and has opted digital classroom because students get to learn a lot and it makes the learning process pleasurable. In this paper the researchers tried to study the influence of this digital classroom on biology learning among secondary school learners of the government and private schools of Delhi.

Objectives

1. To compare the academic achievement of secondary school learners of

traditional and digital classes in government (Kendriya Vidyalaya) and private schools.

2. To compare the academic achievements of secondary school learners of traditional and digital classes.

Hypothesis

1. There is no significant difference in academic achievements of secondary school learners of traditional and digital classes in government (Kendriya Vidyalaya) and private schools.
2. There is no significant difference in academic achievement of secondary school learners of traditional and digital classes.

Methods and Procedure

Quasi experimental with pre- and post-test design was adapted for the present study. Investigator through purposive random sampling selected two schools, one is a central government school, i.e. Kendriya Vidyalaya and one private school in west Delhi. After the selection of the school, investigator randomly selected two sections of Class IX, one section taken as experimental group

and the other as control group. In Kendriya Vidyalaya there were 43 students and in private school 30 students were present in both groups— experimental as well as control. The entire biology syllabus of Class IX was taught to the experimental group by the investigator by using digital classroom, where e-content and interactive white board was used. Whereas the control group was taught in traditional classroom using chalk and talk method. The design comprised of three stages. The first stage has involved pre-testing of all the students of both the groups, i.e., control and experimental in both the schools. The second stage involved treatment of 5 months during which control group was taught by traditional method and experimental group was taught by using digital content. During this period, total 35 lessons was delivered in both the groups. During the third stage, the students were subject to post-test which consists of an achievement test of 100 items based on entire Class IX syllabus of biology. Description of experimental procedure has been given in Table 1.

Result and Discussion

The data obtained from the achievement test was quantitative in nature. The researcher has analysed the data by using t-test. The

Table 1
Experimental Procedure

S. No.	Phase	Duration	Control Group	Experimental Group
1.	Pre-Test	1 Day	Achievement Test	Achievement Test
2.	Treatment	5 Months	Teaching Biology Using Chalk and Talk Method	Teaching Biology using Digital Content and Digital Board
3.	Post-Test	1 Day	Achievement Test	Achievement Test

Table 2

Post-test data (based on biology lesson) of experimental/digital and traditional classroom of the government school

S. No.	Group	Treatment	Mean	N	S.D.	t	df	Sig. (2-tailed)
1.	Digital Classroom (Experimental)	Post-Test	60.26	43	13.26	2	42	0.05
2.	Traditional Classroom (Control)	Post-Test	55.12	43	10.25			

Academic achievement in biology of government school learners

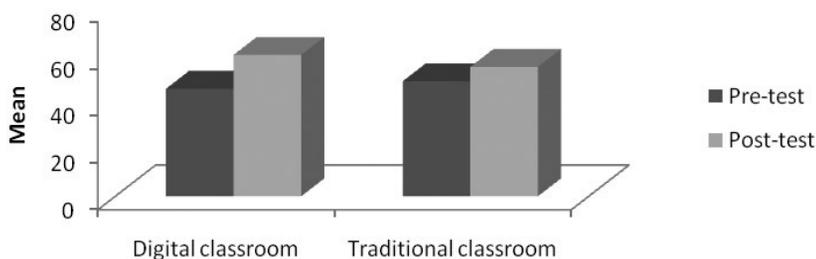


Fig 1. Mean score of digital and traditional classroom learners of the government school

statistical analysis of the pre-test scores of control and experimental groups indicated that both the groups were at equivalence in the beginning of the treatment. In government school the two-tailed p value (0.263) and the computed 't' value (-1.135) which is non-significant at 0.05 level and at 0.01 level, showing that both the groups are at equivalence. A similar kind of result was found in private school where the two-tailed p value (.69) is considered to be not statistically significant. The 't' value (-1.88) is also non-significant at 0.01 and 0.05 levels. Thus on the basis of this data it was clear that both

the groups (control as well as experimental) were equivalent in terms of their academic performance before the treatment.

The above data and the graph indicate that the mean score of the experimental group was higher than that of control group. The p value (.05) indicates that the performance of the two groups is extremely significant. The computed 't' value is significant at .05 level which suggests the effectiveness of treatment of teaching through digital board and digital content over traditional chalk and talk method.

Table 3

Post-test data (biology lesson) of digital and traditional classroom of private school learners.

S. No.	Group	Treatment	Mean	N	S D	T	df	Sig. (2-tailed)
1.	Digital Classroom (Experimental)	Post-test	58.23	30	8.58	1.88	29	0.05
2.	Traditional Classroom (Control)	Post-test	52.33	30	12.481			

Academic achievement in biology of government school learners

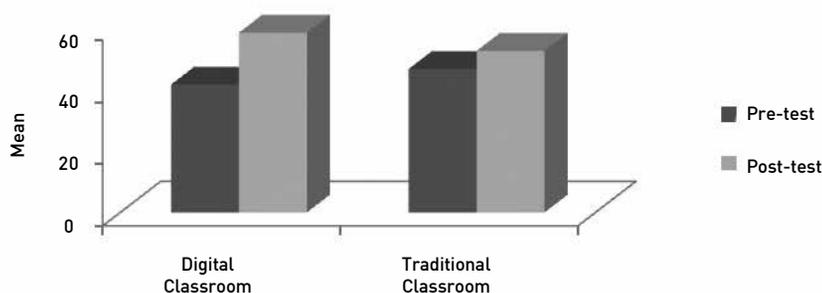


Fig 2. Mean score of digital and traditional classroom learners of private school

There is improvement in the academic performance of the experimental group over the control as indicated by the data and graph given above. The 't' value (1.88) which is significant at 0.05 level indicates that the digital technology is better than the traditional chalk and talk method. On the basis of this analysis the Hypothesis 1 there is no significant difference in academic achievement of secondary school learners of traditional class and digital class in government and private school is rejected.

A comparison of the pre-test data of experimental and control group learners of government and private school indicated that both the groups were at equal level of their academic performance. The two tailed p value (1.45) indicates that that the difference between the two groups is not statistically significant. The computed 't' value (1.4) for the mean of the two groups was also not significant at 0.05 and 0.01 level which indicates the equivalence of both the groups.

Table 4

Post-test data of digital and traditional classroom learners of government and private schools

S. No.	Group	Treatment	Mean	N	S D	T	df	Sig. (2-tailed)
1.	Digital Classroom (Experimental)	Post-Test	59.42	73	11.54	2.77	72	0.01
2.	Traditional Classroom (Control)	Post-Test	53.97	73	11.54			

Academic achievement of secondary school learners

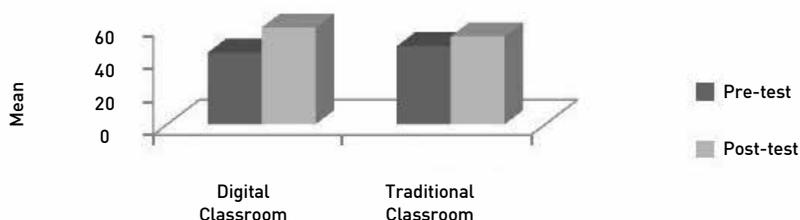


Fig 3. Mean score of digital and traditional classroom learners of both the schools together

The data and graph given above show that the academic performance of the experimental group has improved much more than the control group. The two-tailed p value (.01) indicates that the performance of the two groups is extremely significant. The computed 't' value (2.77) is highly significant at both 0.05 level as well as 0.01 level. This indicates that those learners taught by using digital technology has better performance than the learners taught through traditional chalk and talk method. On the basis of this analysis, it is clear that the Hypothesis 2 (there is no significant difference in academic achievement of secondary school learners of traditional class and digital class) is rejected.

Conclusion

The result of this study showed that learning in teaching of biology through digital technology is more effective in comparison to traditional classroom. It is because the digital technologies appeal to all the three senses, i.e., viewing, hearing and touch, which help the students to learn best through these dominant senses. In the present study, effectiveness of the digital content was studied by giving intervention and assessing the level of achievement in biology. In the study, after conducting the pre-test on learners of both the schools the group with low mean score was taken as experimental

group and taught with digital content in digital classroom although statistically there was no significant difference between the two groups. The other group, i.e., control group of both the schools were taught with lecture method. In the independent variable of t-test of both the government and private schools, it was found that there is a significant difference on the post-test scores of learners of biology taught with digital content. Thus the null hypothesis is rejected. Although there is difference in both the groups but the mean score of post-test of experimental group is higher than the control group. The difference of mean value indicates that the learners taught with digital

technology have better performance than the learners taught with traditional method. This is because the multi-media aspects of digital board increase the engagement and attention span of learners. As biology is the subject, full of diagram, through digital technology teacher can show the 3D images of different organisms and their different parts which increase the concept clarity. In this digital world digital things fascinates students a lot which proves that teaching through digital content enhances their learning. It can be concluded on the basis of the findings that digital technology enhances learning in biology.

References

- AYTAC, T. 2013. Interactive Whiteboard Factor in Education: Students' Points of View and their Problems. *Educational Research and Reviews, Academic Journal*. Vol. 8, No. 20. pp. 1907-1915.
- BRITISH EDUCATIONAL COMMUNICATIONS AND TECHNOLOGY AGENCY (BECTA). 2010. *Interactive Whiteboards Significantly Affect Teaching and Learning*. Retrieved May, 2010, from http://downloads01.smarttech.com/media/research/smart_research_summary.pdf
- GASHAN, A.K. AND Y.A. ALSHUMAIMERI. 2015. Teachers' Attitudes toward Using Interactive Whiteboards in English Language Classrooms. *International Education Studies*. Vol.8, No.12. pp. 176-184.
- GLOVER, D. AND D. MILLER. 2001. Running with Technology: The Pedagogic Impact of the Largescale Introduction of Interactive Whiteboards in One Secondary School. *Journal of Information for Teacher Education*. Vol. 10, No. 3. pp. 257-276.
- GLOVER, D., D. MILLER., D. AVERIS AND V. DOOR. 2005. The Interactive Whiteboard: A Literature Survey. *Technology Pedagogy and Education*. Vol. 14, No. 2. pp. 155-170.
- HALL, I. AND S. HIGGINS. 2005. Primary School Students' Perceptions of Interactive Whiteboards. *Journal of Computer Assisted Learning*. Vol. 21, No. 2. pp. 102-117. Retrieved February 2, 2007, from EBSCOhost Professional Development Collection.
- JONES, K. 2004. Using Interactive Whiteboards in the Teaching and Learning of Mathematics: A Research Bibliography. *Micromath*. Vol. 20, No. 2. pp. 5-6. *Micromath*. Vol. 21, No. 2. pp. 11-15.

- SCHROEDER, R. 2007. Active Learning with Interactive Whiteboards. *Communication in Information Literacy*. Vol. 1, No. 2. pp. 64–72.
- SEETHA, S. 2013. Smart Class: Need of an Hour. *Paripex— Indian Journal of Research*. Vol. 3, No. 4. pp. 81–83.
- SMITH, H.J., S.E. HIGGINS., K. WALL AND J. MILLER. 2005. Interactive Whiteboards: Boon or Bandwagon? A Critical Review of the Literature. *Journal of Computer Assisted Learning*. Vol. 21, No. 2. pp. 91–101.