

Effect of Smart Board Technology on Learning Environmental Science among Children with Intellectual Disability

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ABSTRACT

Background: This study was conducted to find out the effect of smart board technology on learning environmental science (EVS) among children with intellectual disability. *Objectives:* The present study was conducted to find out efficacy of smart board technology on learning environmental science among children with intellectual disability. *Sample:* 14 children with mild intellectual disability between age group of 12-16 years were selected as by using purposive cum convenient sampling technique. *Design:* Pre-test, Post-test control group design was used for the present study. There were two groups: experimental and control group. Subjects were randomly divided in two groups. Experimental group was given intervention through smart board and control group was taught the same content in their regular class by their class teachers. The intervention was given for 20 sessions excluding pre and post test and each topic was taught for 4 sessions. Duration of each session was of 45 minutes. During the intervention, animated activities related to environmental science has been used for with the help of smart board technology. *Tool:* A teacher made test was developed and validated by the investigator for 5 topics (body organs, food for health, means of transport, my green world and our animal friends) of EVS. Each topic consisted 10 questions. *Results:* Pre and post tests results indicated that the children who received the intervention with smart board technology made significant improvement in learning topics of EVS in comparison to control group. *Conclusion:* There is a significant effect of smart board technology on learning environmental science among children with intellectual disability.

Keywords: Smart Board Technology, Environmental Science, Children with Intellectual Disability.

Introduction

Children with intellectual disability have poor memory, slow learning rates, attention problems, difficulty generalizing what they have learned, and lack of motivation (Westwood, 2006). So they require additional resources to help them to achieve academic goals. 'The traditional method of presenting lessons through visual and auditory means is often not suited to children with intellectual disability. These children may have trouble with auditory lessons and often require more tactile lessons with increased visuals. They may also struggle with fine motor skills (Anderson, 2008). Children with intellectual disability often need functional curriculum in modified manner. The difficulty of providing needed curriculum in a modified manner is often aggravated by the lack of educational resources in classroom. Children with intellectual disability need variety of teaching tools and methods to develop their interest in environmental science subject. One such tool/technology is smart board technology. Technology enables students to engage with subject materials in a way that focuses on their individual strengths (Basilicato, 2005).

Smart board technology has large, touch sensitive, full colour displays on which teacher and pupils can write their own text, call up images, objects, sounds and video from a hard disk, internet or

intranet and run a range of software, including simulation software (Warwick and Mercer, 2011). Mc Claskey and Welch in 2009 conducted a study on students who were unable to manipulate traditional objects or write on a blackboard and were unable to actively participate along with their peers. Finally, the use of smart board has proven to increase the attention and engagement of all students, but especially for children with disability. Smart boards have resources for teaching any subject and can be applied in any subjects. This makes it easy to use in almost every aspect of the classroom including language arts, math, science, social studies, history, art, etc. All students can be accommodated with smart boards, because they can be classified as computer assisted instruction in which students with disabilities have the opportunity to use the board as well (Mechling, Gast & Krupa, 2007). Mechling et al. conducted a study on three students with intellectual disability, enrolled in a program to study the use of interactive white boards and the result showed improvement in mental capacity of the students. The students did improve in their knowledge of the particular area of study, because all students learned their target words. Students with disabilities can be accommodated in many other ways as well, because smart boards allow teachers to make text and images bigger for visually impaired students and emphasize certain data for students who are intellectually disabled. Since students are engaged in the lessons, behaviors problems are expected to diminish, because students are more focused on participatory learning.

Children with intellectual disability with the characteristics of attention deficit hyperactivity disorder or attention deficit disorder find it impossible to sit for even short periods of time. The use of the smart board allows these children to move throughout the lesson while still holding their attention (Ladislaw, 2007). Studies that have examined the relationship between the use of interactive white boards and student achievement have yielded mixed findings (Higgins et al., 2005; Lewis, 2003; Swan, Schenker and Kratcoski, 2008). Firstly, smart board positively influenced students' ability to understand complex concepts, for example, in math and science (Hennessey Deaney, Ruthven and Winterbottom, 2007; Mildenhall, Swan, Northcote and Marshall, 2008). Secondly, teachers reported that the multi-faceted technological presentation (that relates to a number of senses sight, hearing, and sometimes even touch, when the student nears the board) aids students who have difficulty developing mental images of complicated concepts (Kennewell, 2006).

Objective

The study was intended to find out efficacy of smart board technology on learning environmental science among children with intellectual disability.

Method

Sample:

Sample comprised of 14 students with mild to moderate intellectual disability, of age group 12-16 years, studying in a special school of Chandigarh. Firstly the desired subjects were selected purposively as per set inclusion and exclusion criteria and later they were randomly divided into two groups, i.e. experimental and control group. Finally, each group had 7 subjects. Following were the inclusion criteria for the sample selection:

1. Only Individuals with mild intellectual disability (IQ 50 -69).
2. Having no associated medical, neurological, sensory problems or mental illness.
3. Age between 12-16.
4. Parents and children willing to participate in the study.

Design:

Pre and post test control group design was used for the present study. The focus of the present investigation was to investigate whether smart board technology has effect on learning environmental sciences among children with intellectual disability.

Tool:

A teacher made test for environmental science was developed in consultation with the teacher of elementary school and experts in the area of intellectual disability. This teacher made test was based on five topics of environmental science (body organs, food for health, means of transport, my green world and our animal friends). Items have been pooled after reviewing the different books of environmental science of elementary schools. For face validity of the tool it was given to the seven experts of the field of individual disability and ten subject teachers, teaching EVS at different elementary school. Pilot study was also done on fine students with intellectual disability. There were five domains and each domain had ten items. In each domain maximum score was 30. Yardsticks had been decided on the basis of prompt needed. As prompt increased, score decrease.

Procedure:

Before starting intervention, investigator took 15 days training from professional trainer, who were using smart board in the special classes for teaching children with intellectual disability. After selection of sample and division in two groups i.e. experimental and control group, the investigator conducted pre test for both the groups to know the base line score on five different topics of EVS, i.e. body organs, food for health, means of transport, my green world and our animal friends. The Investigator delivered these five lessons of environmental science through smart board technology to experimental group. Control group was not given any intervention other than their regular class by their class teachers. Each lesson was taught for 4 days and the intervention was completed in 20 sessions. During intervention, students in experimental group were provided instruction with smart board technology to explain the topic of EVS. Different activities related to the topics like matching the words with related pictures, draw a line between similar object, tick on do's and don'ts and drag the body part to make human body etc., were also carried out by subjects of experimental group on smart board. After intervention, investigator re-administered post test for both groups to evaluate student's performance. The obtained scores were compared and interpreted by using SPSS.

Results

Table: 1 Showing Mean and SD of Control and Experimental Groups on Overall Environmental Sciences

Environmental Sciences	Groups	Mean	SD	N	df	t-Value
Overall Environmental Sciences	Experimental	101.86	6.61	7	12	5.64 **
	Control	32	32.09	7		

** -Significant at 0.01 level

Table-1 depicts the comparison of mean scores and SD obtained by the control and experimental groups on the overall environmental science. It is inferred that there is significant difference between the mean scores of control and experimental groups of overall environmental science.

Table: 2 Showing Mean and SD of Control and Experimental Groups on Environmental Sciences

Areas wise	Groups	Mean	SD	N	df	t- value
Parts of body	Experimental	21.57	7.46	7	12	4.96**
	Control	6.29	3.30	7		
Food For Health	Experimental	17.14	7.82	7	12	3.04*
	Control	7.71	2.5	7		
Means of Transport	Experimental	20	7.33	7	12	4.68**
	Control	6.43	2.5	7		
My Green World	Experimental	20.43	7.33	7	12	4.84**
	Control	6.86	2.3	7		
Our Animal Friends	Experimental	22.71	3.302	7	12	13.67**
	Control	4.71	1.113	7		

**-Significant at 0.01 level, *-Significant at 0.05 level

The paired sample test was applied to find out the effect of smart board technology on different topics of environmental science i.e. parts of body, food for health, means of transport, my green world and our animal friends. The result depicts that there is significant difference between the mean scores of control and experimental groups for parts of body, means of transport, my green world and our animal friends, at 0.01% level and there is significant difference between the mean scores of control and experimental groups for food for health, at 0.05 level.

Discussion

The result of the present study indicate that smart board technology is an effective method for teaching environmental science to individuals with intellectual disability. It has been inferred that intervention positively mediated because the topics of environmental science, selected for the intervention were interesting, achievable and attractive for the participants. Participants actively participated in the class of environmental science through smart board technology and learned the topic. On the last day of intervention, the participants in the experimental group were able to perform nearly all the activities on smart board independently. Using an electronic pen on smart board and dragging pictures towards related text was a new and interesting activity for them. They were very excited in doing these activities. Children with intellectual disability can learn in better way if topic is presented in attractive and active way by the use of multisensorial approach. Prior research study, conducted by (Hall

and Higgins, 2005) supports the study, who found that students learning through interactive white board are more attentive and have greater motivation to learn. In addition, Hall and Higgins pointed out that presenting learning material using multimedia clarifies the material and enhances learning. The investigators in the current study reported similar findings.

An example for the support of present study appears in studies where the use of the smart boards' visual aids improved understanding of concepts in math (Mildenhall, Swan, Northcote and Marshall, 2008), and in science (Hennessy, 2007). The study by (Hennessy, 2007) on high school students learning with the interactive white board demonstrated that a better understanding of science concepts stems from the fact that students evaluated and developed scientific ideas on their own during the course of the lesson through the use of the interactive capabilities of the interactive white board. Similarly in the study of (Mechling, Gast and Krupa, 2007), the effectiveness of smart board technology improved learning sight words among students with moderate intellectual disability. Participants included 3 young adult learners, 2 females and 1 male, with moderate intellectual disabilities in small group instruction. Results showed positive effects of using smart board technology to instruct students with moderate intellectual disability. Similarly, teachers contended that the multi-faceted technological presentation (that relates to a number of senses sight, hearing, and sometimes even touch, when the student are near the board) aids students who have difficulty developing mental images of complicated concepts (Kennewell, 2006). Effects of these studies support the use of the large screen on the smart board by making images larger, more visible, and increasing interest to learn the topics of EVS among children with intellectual disability.

Conclusion

Students with intellectual disability can improve their performance in learning the subjects other than functional academics also, which is necessary for inclusive education in real sense. While planning the curriculum for children with intellectual disability, generally we stress only on functional curriculum and the subjects like science, language on and geography are avoided. Present study indicates that smart board technology is significantly effective in learning environmental science among children with intellectual disability. Use of appropriate technology can expand the area of learning and if this program is continually provided, it could possibly assist students in learning that will benefit them in understanding of the context in environmental science, as well as other academic areas.

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