

Comparison of Effect of Using Intelligent Board Technology and Traditional Board on Mathematics Learning in Primary School Students, City of Bahar

¹Zohreh Esmaeili and ²Masoumeh Samadi

¹Department of Educational Science and Psychology,

Payame Noor University, P.O. Box 19395-3697, Tehran, IR of Iran

²Department of Education, Payame Noor University, Lalejin, Hamedan, Iran

Abstract: This study was performed with the purpose of evaluating the level of effect of intelligent boards on mathematical learning of girl students in primary school in the county of Bahar. The method of this research was quasi-experimental with pre and post-test along with an experimental group. Statistical population consisted of all girl students at the Majesty Roghieh (greetings to her) school during the 2014-2015 academic year in fifth grade of primary school in the county of Bahar. Statistical sample in this study were two classes of 20 individuals each from a girl school. One class with 20 students was taught using the interactive board and 20 students in the other class received traditional teaching for 5 weeks. The educational material in this study was mathematics (geometry, quotients, writing numbers, mixed numbers and decimals and proportions) for fifth grade of primary school and instruments used included a 20 question pre-test and 4 question tests from every topic, after the experimental teaching in the two groups which was researcher formulated. Additionally in this research for evaluation of the reliability of the test, retest method was used and reliability for the pretest was obtained at 0.79 and for the post-test it was 0.86. Data analysis using pre and post-test scores was performed with independent groups' t-test. Comparison of mean pre-test scores in the experimental and control groups showed that both were at the same level regarding topics in consideration in the course of mathematics and their pretest scores did not have meaningful difference. Comparison of mean scores of post-test between the two groups using independent t-test showed that group performance of students taught using the intelligent board in comparison with students taught traditionally in the mathematical academic progress test was significantly better.

Key words: Information technology, traditional teaching interactive (intelligent) board, learning math, analysis, progress

INTRODUCTION

Modern technology provides various tools for improving teaching and learning in classes. Information and communication technology has the potential to create change in the method of pedagogy and can play various roles in the processes of teaching and learning. Research has pointed that information and communication technology can have supportive role in face to face traditional teaching. Many researchers and theoreticians believe that use of this technology like the computer can help increase student information and teacher's opportunity for timely intervention with students in relation with their needs and special problems. Modern educational approaches are student centered. In these approaches, students are not considered as an empty ship

but from the beginning of their birth, they are born with knowledge, skill and outlooks which need development by way of guidance, encouragement and motivation. Therefore, the topic that quality of education is extensively dependent on the quality of facilities provided for classrooms is irrefutable. Undoubtedly information and communication technology has settled in today's school systems. Computer as one of the main tools of information and communication technology is not only used as an instrument for helping data analysis in schools but also as a inclusive tool for improving teaching students (Adeyemi, 2012). Presently, this technology has been able to gain access to schools of our country Iran as intelligent making of educational centers and has created a huge revolution in teaching and learning. Wide application of information and communication technology

in the process of teaching, concurrent with evolution of educational approaches in the world has created the platform for formation of intelligent schools. In these schools the processes of teaching-learning have been strengthened and a cohesive interactive environment has been provided by promotion of key skills in students of the knowledge centered era. One of the modern educational methods is use of information and communication technology. Application of this method in mathematics has led to students' interest in the curriculum. One of the methods of using information technology in education is use of intelligent board. In simple words intelligent board is an instrument that senses the image of a projector or demonstrator and with placement in windows environment it can manage information without a keyboard or mouse and only by touching. Taking advantage of a modern technology named I-board (intelligent board) has led to positive effects on pedagogy. Numerous studies have shown positive influence of this interactive teaching method on students. In these studies, results related to influence of use of this technology in teaching elite students, ability to understand concepts among primary school children and increase literacy among high school students has attained increased attention (Tertemiz *et al.*, 2015). Among studies in the context of effectiveness of intelligent boards is the study by Khatib and Golestan (2015). In this study of level of effect of interactive board (intelligent board) on academic progress of students, it was shown that teaching using interactive board in comparison with traditional method without use of interactive board has been effective on academic progress of students. Tertemiz *et al.* (2015) with the purpose of precise evaluation of intelligent boards from various points of view performed a study in a private school in Istanbul in the second semester of 2012. Results showed that intelligent boards in the view of both groups due to decreasing distraction and improving student attention are considered very effective. Yet, the two groups mentioned that technical and other negative aspects of using the internet such as low light level were intrusive. Vainoryte and Zygaitiene (2015) in a study with the purpose of identification of characteristics of use of intelligent boards in primary schools in Lithuania showed that the highest advantages of using intelligent boards are: access to multimedia resources, familiarity with and application of new technology and increased learning opportunities for new knowledge for learners. The most serious problems were: need for preparation of teaching material outside of the classroom by teachers and preparation of methodical teaching material by them. Seifan evaluated the effects of using intelligent boards in learning experimental sciences from the view point of

students. Results showed that intelligent boards do not have much effect in learning experimental sciences, because many students do not know the method of using this technology correctly yet. Aghili and Fotouhinia evaluated the effect of intelligent technology (classes equipped with intelligent board) on motivation and academic progress of boy students in example high school in the county of Gonbade Kavous. The results showed that academic motivation in the experimental group which use intelligent boards was increased compared to the control group. Considering prior studies and theoretical bases, use of intelligent technology can be effective on student motivation and academic progress. It can prepare the learning environment for teachers and students such that teachers without fear and worry of computers and internet have used it in their pedagogy in the best way and students have shown increased motivation towards learning science and improving their educational status. Use and application of up to date intelligent technology, on the one hand has led to improved teaching-learning of teachers and students and on the other hand, teachers and students with best and correct use of the world wide web network can promote their scientific level and advance the country. Yet, maybe with courage it can be stated that applying active method based on information and communication technology in the subject of math has not yet become common place and behaviorism and traditional teaching, specially by teachers due to various reasons such as habit of using tested old ways, fear of risk taking in pedagogy, problems of deficiency in time and preference for teacher centism and the lecture method over active teaching, deficiency in instruments and necessary and useful softwares and lacking necessary standards is still prevalent. Therefore, in this research considering the mentioned issues and because primary school and its quality has important role in the process of stable development of the country information and communication technology should be used in teaching courses particularly in the primary school years of official teaching and as a result in this research it will be endeavored with use of scientific and statistical methods to evaluate level of effectiveness of these technologies (intelligent board) on learning math among students in fifth grade of primary school and in this way the role and importance of the technology used will be evaluated. Considering the mentioned purpose, the following hypotheses are presented.

Main hypothesis: Difference exists between learning and academic progress in the subject of math in teaching using intelligent board and the traditional method in fifth grade students.

Minor hypotheses:

- Difference exists in learning and academic progress in the subject of geometry in teaching with the use of intelligent board and traditional method in students
- Difference exists in learning and academic progress in the subject of quotients in teaching with the use of intelligent board and traditional method in students
- Difference exists in learning and academic progress in the subject of number writing, proportions and percent in teaching with the use of intelligent board and traditional method in students
- Difference exists in learning and academic progress in the subject of mixed numbers and decimals in teaching with the use of intelligent board and traditional method in students
- Difference exists in learning and academic progress in the subject of proportions in teaching with the use of intelligent board and traditional method in students

MATERIALS AND METHODS

Considering topic and purpose, this research is quasi-experimental. The quasi-experimental method was implemented using pre and post-test design in two groups of experimental and control. Statistical population included girl students in the Majesty Roghieh (greetings to her) primary school studying in the 2014-2015 academic year in the county of Bahar. Statistical population in this study included two classes of 20 individuals from a girl school. One class with 20 students was taught using the interactive board and 20 students in the other class received traditional teaching for 5 weeks. The educational material in this study was mathematics (geometry, quotients, writing numbers, mixed numbers and decimals and proportions) for fifth grade of primary school and instruments used included a 20 question pretest and 4 question tests from every topic after the experiment in the two groups which was researcher formulated. Additionally in this research for evaluation of the reliability of the test, retest method was used and reliability for the pretest was obtained at 0.79 and for the post-test it was 0.86. It should be noted that intelligent boards were used with mathematical content software. The software is a content program based on instruments which has been specifically designed for teaching math concepts. It includes programs for teaching quotients, geometry, measurements, decimals, percentages, shapes and problem solving for primary school students. This software is certified and is compatible for use with any computer.

Method of implementation: After determination of the classes, the experimental group with a math teacher with training in intelligent board use and the control group, before the experiment a test named pretest with similar questions were administered to the two groups on the topics of interest which included 20 questions with 20 points. The time of implementing the educational program was 5 weeks. Topics under consideration for teaching were determined and coordination was made with the relevant teachers where the experimental group was taught these topics using intelligent board and software with content of math for fifth grade of primary school. The teacher in the other class was requested to teach the same topics by using regular boards with the traditional method. After teaching sessions were completed for each topic in the following week the test related to the topic was administered and scores recorded. Data analysis was performed using descriptive statistics (number, percent, mean, standard deviation, tables) and inferential statistics with the help of the SPSS Software.

RESULTS

To compare previous knowledge level (pretest) of students of the tested topics, two dependent groups t-test was used to evaluate the effect of teaching with the use of intelligent boards on learning math among fifth grade primary school students (Table 1).

Therefore, considering the significance level (0.611) and the t-value obtained, it can be concluded that meaningful difference does not exist in pretest scores for the control and experimental group and students in both group regarding math scores in the mentioned topics are at the same level before implementation of the program.

- Hypothesis one: is there a difference in learning the subject of geometry using teaching with the help of intelligent board and traditional board among students?

As shown in Table 2, mean score of learning geometry by the method of intelligent board is higher than the traditional method and considering the t calculated, at a confidence level of 99 % with a significance level of (0.001) since it is larger than (2.00), it can be concluded that meaningful difference exists in use of intelligent

Table 1: Statistics for t-test comparison of pretest scores in the two groups of experiment and control

Statistical index	Degrees of freedom	Significance level	Mean difference	Standard deviation difference	t-value
Pretest	38	0.611	-0.37888	0.69887	-0.49

Table 2: Mean scores of the two groups of traditional and intelligent board teaching and statistics of t-test for the subject of geometry

Statistical index	Number	Mean of scores	SD	Calculated t	Degrees of freedom	Significance level	Difference of means
Experiment	20	18.866	1.44465	3.89	38	0.001	0.47167
Control	20	17.181	2.14122				

Table 3: Mean scores of the two groups of traditional and intelligent board teaching and statistics of t-test for the subject of quotients

Statistical index	Number	Mean of scores	SD	Calculated t	Degrees of freedom	Significance level	Difference of means
Experiment	20	18.75	2.330	0.15000	38	0.988	0.054831
Control		20.0	18.74	1.89428			

Table 4: Mean scores of the two groups of traditional and intelligent board teaching and statistics of t-test for the subject of number writing

Statistical index	Number	Mean of scores	SD	Calculated t	Degrees of freedom	Significance level	Difference of means
Experiment	20	18.933	2.21567	0.742000	38	0.462	0.56246
Control		20.000	18.51000	2.140472			

Table 5: Mean scores of the two groups of traditional and intelligent board teaching and statistics of t-test for the subject of decimal numbers

Statistical index	Number	Mean of scores	SD	Calculated t	Degrees of freedom	Significance level	Difference of means
Experiment	20	17.658	1.15311	3.12700	38	0.003	1.46667
Control		20.000	16.11100	2.29569			

Table 6: Mean scores of the two groups of traditional and intelligent board teaching and statistics of t-test for the subject of proportions and percentages

Statistical index	Number	Mean of scores	SD	Calculated t	Degrees of freedom	Significance level	Difference of means
Experiment	20	17.658	1.15311	3.95100	38	0.000	0.33325
Control		20.000	16.11100	2.29569			

board and traditional method of teaching in the subject of geometry. In other words, the method of intelligent board is more effective on learning geometry and the first hypothesis is confirmed.

- Hypothesis two: is there a difference in learning the subject of quotients using teaching with the help of intelligent board and traditional board among students?

As shown in Table 3, mean score of learning quotients by the method of intelligent board and the traditional method do not differ much and considering the t calculated (0.15), at a confidence level of 95% and degrees of freedom of 38 with a significance level of (0.988) since it is smaller than the critical table t-value (2.00), it can be concluded that meaningful difference does not exist in use of intelligent board and traditional method of teaching in the subject of quotients. In other words, the method of intelligent board has not been more effective on learning quotients and the second hypothesis is not confirmed.

- Hypothesis three: is there a difference in learning the subject of number writing using teaching with the help of intelligent board and traditional board among students?

As shown in Table 4, mean score of learning number writing by the method of intelligent board and the traditional method do not differ much and considering the t calculated, at a confidence level of 95 % and with a significance level of (0.462) which is smaller than the value

(2.00), it can be concluded that meaningful difference does not exist in use of intelligent board and traditional method of teaching in the subject of number writing. In other words, the method of intelligent board has not been more effective on learning number writing and the third hypothesis is not confirmed.

- Hypothesis four: is there a difference in learning the subject of decimal numbers using teaching with the help of intelligent board and traditional board among students?

As shown in Table 5, mean score of learning decimal numbers by the method of intelligent board is higher than the traditional method and considering the t calculated, at a confidence level of 99% with a significance level of (0.003) since it is larger than (2.66), it can be concluded that meaningful difference exists in use of intelligent board and traditional method of teaching in the subject of decimal numbers. In other words, the method of intelligent board is more effective on learning decimal numbers and the fourth hypothesis is confirmed.

- Hypothesis five: is there a difference in learning the subject of proportions and percentages using teaching with the help of intelligent board and traditional board among students?

As shown in Table 6, mean score of learning proportions and percentages by the method of intelligent board is higher than the traditional method and considering the t calculated (3.951), at a confidence level

Table 7: Mean scores of the two groups of traditional and intelligent board teaching and statistics of t-test for the subject of math

Statistical index	Number	Mean of scores	SD	Calculated t	Degrees of freedom	Significance level	Difference of means
Experiment	20	18.98	1.34465	3.60900	38	0.001	0.27167
Control		20.00	17.1810	2.13122			

of 95% and degrees of freedom of 38 is larger than the critical table value ($t = 2.66$), it can be concluded that meaningful difference exists in use of intelligent board and traditional method of teaching in the subject of proportions and percentages. In other words, the method of intelligent board is more effective on learning proportions and percentages and the fifth hypothesis is confirmed.

Main research hypothesis:

- Is there a difference in learning the subject of math using teaching with the help of intelligent board and traditional board among students?

As shown in Table 7, mean score of learning math by the method of intelligent board is higher than the traditional method and considering the t calculated (3.603), at a confidence level of 99% and degrees of freedom of 38 and significance level of (0.001) is larger than the critical table value (2.66), it can be concluded that meaningful difference exists in use of intelligent board and traditional method of teaching in the subject of math. In other words, the method of intelligent board is more effective on learning math and the main hypothesis is confirmed.

DISCUSSION

In this research, effect of teaching with the help of intelligent boards and traditional teaching in the subject of math was evaluated in the fifth grade of primary school. Results of this study showed that use of educational software is not effective in the subjects of quotients and number writing and was effective in the subjects of proportions, quotients, mixed numbers and geometry. In total, results showed that use of intelligent boards is more effective on learning math compared to the traditional method. This finding agrees with the results of Zameni and Safarian based on positive effect of information technology on learning math and the research by Tertemiz based on effectiveness of intelligent board on ability to understand math concepts by students. Additionally, it can be stated that the results of this research is compatible with results of studies that have evaluated effect of intelligent board on other subject areas such as the research by Hajforoush and Owrangi (2004), Najafi (2006), Shachar and Fischer (2004) and Deryakulu *et al.*

(2009), based on application of technology and its effect on educational progress and motivation in students.

CONCLUSION

Overall, use of intelligent board creates effective interaction between users. The application of intelligent board in teaching and learning is mediated by enhancing understanding of new concepts and promotion of preparation and presentation of curricula. The level of participation of students and their motivation towards learning is increased. Professors and teachers who dislike technology are helped in presentation of their courses for a large number of audiences. It helps extensive use of electronic teaching technologies. Cases such as pictures, graphs and wide pages are combined with courses and as a result quality of courses presented by professors is increased. Various topics and resources are combined and adapted to educational needs at time of presentation of content. It permits students to understand information easily and to have active participation in group discussions without need for carrying hand written notes. Overall, the purpose of intelligent board is not to distant students with learning from traditional books, raising their hands to respond to questions or take paper tests. On the other hand, these boards have been designed for the purpose of adding diversity to teaching, moving students and presenting new methods for responding to questions, awakening students and making them more aware. Considering the deficiency of computers in our schools relative to the number of students intelligent boards are appropriate choices, because they can present a big picture very rapidly. These boards with connection to computers and projectors provide the opportunity for access of the whole group to educational websites, strong softwares for evaluation and contents that teachers prepare proportionate to class needs.

REFERENCES

Adeyemi, B.A., 2012. Effects of Computer Assisted Instruction (CAI) on students achievement in social studies in Osun state, Nigeria. *Mediterranean J. Social Sci.*, 3: 269-277.

Deryakulu, D., S. Buyukozturk and H. Ozcinar, 2009. Predictors of academic achievement of student ICT teachers with different learning styles. *Int. J. Hum. Social Sci.*, 3: 10-22.

- Hajforoush, A. and A. Owrangi, 2004. Results of the application of ICT in the schools of Tehran. *J. Educational Innovation*, 3: 11-31.
- Khatib, Z.N. and T.F.A. Golestan, 2015. Evaluation of the level of effect of use of interactive white board (Intelligent board) on educational progress of students in primary school in the county of Khoshab in the subject of sciences. *VISI J. Akademik*, 2: 57-61.
- Najafi, H., 2006. The impact of it on the academic achievement of high school students in ardabil. *J. Peyke Noor*, 6: 82-93.
- Shachar, H. and S. Fischer, 2004. Cooperative learning and the achievement of motivation and perceptions of students in 11th grade chemistry classes. *Learn. Instruction*, 14: 69-87.
- Tertemiz, N.I., D. Sahin, B. Can and S. Duzgun, 2015. Views of primary school teachers and students about the interactive white board. *Procedia Soc. Behav. Sci.*, 186: 1289-1297.
- Vainoryte, B. and B. Zygaitiene, 2015. Peculiarities of interactive whiteboard application during lessons in lithuanian general education schools. *Procedia Soc. Behav. Sci.*, 197: 1672-1678.