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Toward Smart School: A Comparison between Smart School and Traditional School for Mathematics Learning

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Abstract

The quality of nation's political, social and economic future will depend on the capabilities of their young generation. Smart schools have been proposed as a solution to increase the capabilities of the new generation in the era of ICT. Recently, many smart schools have been established in Iran and other developing countries. The aim of this study is to compare smart training method and traditional training method in learning-retention processes of Mathematics. Among 9724 grade 3 students in Yazd, 60 students were selected from a traditional school by using cluster random sampling method. They randomized into two equal classes. After getting a pre-exam, the multiplying section of grade 3 Mathematics was presented in six sessions every week by using the researcher-made multimedia software in "smart class" and traditionally in other class. The "learning score" was assessed at the end of every session, while the "retention score" was assessed two weeks after each session. Independent-samples T test was used to compare learning and retention scores between two groups and paired-samples T test to compare retention and learning scores in each group. The mean learning score is significantly higher in the smart training group (19.33±0.9 vs. 17.66±0.68; P<0.001) than traditional group. Also, the mean retention score is significantly higher in the smart training group (18.57±1.91 vs. 16.65±1.95; P<0.001) than traditional group. We propose that developing and using appropriate educational technology could enhance Mathematics learning and retention in primary schools

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Key word: Smart School; Traditional School; Mathematics; Learning; Retention

Introduction

Industrial society of the twentieth century has given its place to the information society of the 21th century. Therefore, the use of new technologies, including information and communication technology (ICT) in different

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fields of the life such as education is inevitable (Malek, 2010). The information society, with the advent of ICT, has brought changes in education and leads to new teaching-learning approaches characterized with the changing role of the teachers and learners (Niki & Avril, 2011). Entering information era and increasing the use of IT, entails a new smart schools that doesn't conform to prevalent traditional schools in Iran.

A Smart School is an educational establishment that adopts instructional processes and educational management practices that foster systemic changes that are intended to enable learners to surmount the challenges posed by the information technology era (Wan, Mohd, and Alwi, 2009). Smart schools have been systemically reinvented in terms of teaching and learning practice and school management in order to prepare students for the Information Age. In the Information Age, a Smart School will evolve over time continuously developing its professional staff, educational resources and its administrative capabilities to adapt to changing condition, while continuing to prepare student for his/her future life (Markov Hayes, Chapple & Ramirez, 2014). Smart schools will seek to make learning more interesting, motivating, stimulating and meaningful. Smart schools are using an appropriate mix of learning strategies to ensure mastery of basic competencies and promote holistic development, accommodate individual different learning styles, to boost performance and foster a classroom atmosphere that is compatible with different teaching-learning strategies. Smart School pedagogy will seek to make learning more interesting, motivating, stimulating and meaningful for students. It is also involve students mind, spirit and bodies in the learning process (Sani, Zabidi & Banu, 2013). Smart schools are great step for virtual learning and online learning and similar methods are modern forms of learning methods in present century (Kalantarnia, Rostamy, Shahvarani,, Behzadi, 2012)**.** The prevalent education in the schools of the Iran is by traditional method that is via auditory training only. However, many smart schools have been recently established in Iran.

Throughout a student's education, Mathematics is one of the subjects they will encounter time and time again. Teaching math skills to primary level students should be done using multiple teaching strategies to optimize student learning and engender students with a love of learning. NCTM (National Council of Mathematics Teachers) emphasizes on using technology in Mathematic classes. Using new IT could create potential ability in the technology oriented training which is influential in process of teaching-learning. These technologies make to increase life-time and deep learning (Ferguseon, 2001). Technology-based knowledge is available at many developed countries today. Therefore, The new teaching strategies will need teaching-learning materials designed that will accommodate student differing needs and abilities. The smart school project in Iran has been inspired by a similar project undertaken by the Malaysian Ministry of Education (Behrangi, & Asadi 2010). In Malaysia, the idea of smart schools was proposed in 1997 and became operational in 1999. Patterned on the Malaysian model, the smart school project in Iran was launched in 2004. At the pilot stage, the Iranian Ministry of Education implemented the project in four high schools in the capital city of Tehran. Following the publication of "The Road Map of Iranian Smart Schools" in 2011, the project was extended to other educational districts. The main focus at the present stage has been providing the hardware and network facilities while developing the appropriate softwares. Like many other countries, an implicit assumption seems to be dominant in the project: that by equipping schools with computer hardware, ICT integration will turn into a mainstream trend (Salimia, Ghonoodi, 2011). Hamzah, Embi & Ismail (2010) found that the attitudes of Malaysian students are very positive towards the current change in Smart Schools. Most of the students use computers weekly or monthly (61%), 12% of them can be categorized as heavy users as they use computer every day. However, Attaran and Siraj (2010) showed that Iranian teachers and students do not hold a positive attitude towards teaching and studying in Iranian smart schools. Studies of Eng Tek & Ruthven (2010) show that even though smart school projects intended to prepare the younger generation for scientific and technological careers, they have failed to accord with expectations. Thang , Hall, Azman, & Joyes (2011) attribute this to ineffective teacher training. According to their study, teachers in smart schools have not been fully instructed to manage the process of ICT integration into education. Research findings of Wan, Mohd & Alwi (2009) show that time, course content and technical malfunction were the main problems teachers faced during the process of ICT integration in Malaysian smart

schools. In their research, Mahmoudi, Nalchigar, and Ebrahimi (2008) proposed that the basic challenges of Iranian smart schools were the lack of necessary rules and regulations in the Ministry of Education and the traditional structure of Iranian schools. In a recent randomized trial on Mathematics education, using technology couldn't improve the learning outcomes (Berlinsky et al 2013). In a meta-analysis Cheung (2013) reviewed different studies of educational technology applications for enhancing Mathematics achievement in K-12 classrooms. He showed that in general, educational technology is making a modest difference in learning of Mathematics. There is no study exists for comparison between smart educational method and traditional method in Mathematics in the Iranian schools. We propose with developing appropriate multimedia software and training of the teacher, using educational technology could improve Mathematics learning and retention in the primary school students.

2. Methodology

A multimedia software for teaching multiplying section of the grade 3 Mathematics was developed by one of the researchers using ActiveInspire (Promethean Planet), Quiz maker 6.2 (iSpring solution), and multimedia tools. Among 9724 grade 3 students in Yazd in 2013, 60 students were selected from a traditional school by using cluster random sampling method. They randomized to two equal classes. After training the teacher and getting a pre-exam, the multiplying section of grade 3 Mathematics was presented in six sessions every weeks by using the researcher-made software in "smart class" and traditionally in other class. The "learning score" was assessed at the end of every session, while the "retention score" was assessed two weeks after each session. Independent-samples T test was used to compare learning and retention scores between two groups and paired-samples T test to compare retention and learning scores in each group using PASW statistics 18. P value less than 0.01 is considered significant.

3. Results

The pre-exam student scores in two class were not different (P=0.912). Table 1 shows the result of Mathematics learning scores in two groups.

Table1. Mathematics learning scores (range 0 to 20) in two smart and traditional groups.

Group	Number	Minimum	Maximum	Mean	Standard deviation	t	P value
Smart	30	16.2	20	19.33	0.897		
Traditional	30	16.2	20	17.66	0.684	8.11	<0.001

As shown in Table 1, minimum learning score of Mathematics in both groups is 16.2 and maximum score is 20, but the mean score is significantly higher in the smart training group (19.33 vs. 17.66). Table 2 shows the result of Mathematics retention scores in two groups.

Table2. Mathematics retention scores (range 0 to 20) in two smart and traditional groups.

Group	Number	Minimum	Maximum	Mean	Standard deviation	t	P value
Smart	30	11	20	18.57	1.91		
Traditional	30	10	20	16.65	1.95	3.85	<0.001

As shown in Table 2, minimum retention scores of Mathematics in smart and traditional group are 11 and 10 respectively and maximum score is 20 in both groups, but the mean score is significantly higher in the smart training group (18.57vs. 16.65). Table 3 shows learning and retention scores in each group.

Table3. Comparing degree of mathematics learning and mathematics retention in students

Group	Exam	Number	Mean	Standard deviation	t	P value
Smart	Learning	30	19.33	0.90		
	Retention	30	18.57	1.91	-2.32	0.028
Traditional	Learning	30	17.66	0.68		
	Retention	30	16.65	1.95	-3.05	0.005

4. Discussion and Conclusion

In the modern era of rapid changes of information and technology, the process of teaching and learning is changing. Using ICT in education has been proposed to be led to increase in education quality, expansion of learning chances and accessibility of education beyond the classroom. This study showed that Mathematics learning could be improved by smart training method (Table 1). The result of this study is consistent with the result of Zameni (2011) work that ICT use in education is effective on active learning of Mathematics. It also is consistent with the result in other courses such as English language test scores in Iran (Heidari, 2011). Our results is consistent with Hanizar (2005), that smart learning environment has been led to pedagogical and academic achievement in Malaysia and students who were at a lower level of class were more successful in better learning of lessons than those at the moderate level (Table 1). The difference could be due to the context and level of students in our study. Williams (2006) argued that training via multimedia software including audio, video clip and animation has been effective on strengthening of students' curriculum in 90% of students and he proposed to use such technologies for education. The consistency among the results of the current study and previous researches indicates that the relationship between using of smart training and degree of mathematics learning has an appropriate empirical support. Results of this survey and similar studies can be explained given to the fact that whatever modern techniques are utilized for teaching, students learn the lessons better and learning Mathematics will become more enjoyable for them. As a result, their learning status is improved and they will have a better performance in Mathematics. The study also shows that using smart training method will be led to more Mathematics retention in the students (table 2). This result is consistent with results of studies carried out by Arryo (2007), Sipila (2010) and Agha Barati (2012) on the effect of smart training on Mathematics retention. Agha Barati (2012) showed significant difference between scores of learning and retention in the smart and traditional training groups. 87% of students in Fritter (2011) study believe that smart training in Mathematics has helped them in better learning and more comfortable retention of lessons.

As shown in Table 3, smart training has led not only to higher learning scores, but the higher retention of the learned materials. It could be proposed that teachers in smart schools could be able to make the inappropriate and inflexible content of textbooks more attractive for students. Also, the teacher's role as the sole speaker is changed into a director where the former is resulted in presenting educational materials by emphasizing the memory and speed which is boring for students. In a research entitled "the effect of simulation software on learning and retention of lessons and comparing it with the traditional method" Khatiri (2011) showed that simulation software has a higher effect on students' learning and retention than the traditional method. However, in a recent randomized trial on Mathematics education, using technology couldn't improve the learning outcomes (Berlinsky et al 2013). Cheung (2013) reviewed different studies of educational technology applications for enhancing Mathematics achievement in K-12 classrooms. After meta-analysis of different studies he showed that in general, educational technology is making a modest difference in learning of Mathematics. He concluded "Undoubtedly, educational technology will continue to play an increasingly important role in the years to come. So the question is no longer whether teachers should use educational technology or not, but rather how best to incorporate various educational technology applications into classroom settings…So although the use of educational

technology is inevitable, new and better tools are needed to harness the power of technology to enhance Mathematics achievement for all children". Our result indicate that with developing appropriate multimedia software and training of the teacher, using educational technology could improve Mathematics learning and retention in the primary school students.

References

- Agha Barati, N. (2012). "*Effect of multimedia training on degree of mathematics learning and retention in disappointed boy students*" (Master's thesis, Islamic Azad University).
- Arryo et al. (2007). The effectiveness of educational technology applications for enhancing mathematics achievement in K-12 classrooms.article/technology-education-research-says.
- Attaran, M. (2004). Information technology; a ground for reform in education system, Tehran: education technology development agency for smart schools, 20 (5)393-401.
- Behrangi, M., & Asadi, A. (2010). Builder multimedia software accompanied by picture word induction teaching pattern for English language teaching at the first grade junior high school. *Journal of Education*, 97 (1), 9-28.
- Berlinski, S., & Busso, M. (2013). Pedagogical Change in Mathematics Teaching: Evidence from a Randomized Control Trial. Washington, DC: Inter-American Development Bank
- Cheung, A. C., & Slavin, R. E. (2013). The effectiveness of educational technology applications for enhancing mathematics achievement in K-12 classrooms: A meta-analysis. Educational Research Review, 9, 88-113.
- Eng Tek .O, Ruthven, K. (2010). The distinctiveness and effectiveness of science teaching in the Malaysian'Smart school', Research in Science & Technological Education, 28(1), 25-41.
- Ferguseon, D. (2001). Technology in a constructivism Classroom, Information Technology in childhood Education Annual, 45.
- Hamzah, M.I, Embi, M.A., Ismail ,A.(2010). ICT and Diversity in Learners' Attitude on Smart School Initiative. International Conference on Learner Diversity. Procedia Social and Behavioral Sciences 7(C) (2010) 728–737
- Hanizar,A,Zair,M.(2005).Taxonomical Analysis of scienceThe Educational soft ware in Malaysia Smart Shcools.Malaysian online journal of instructional technology(Mojt).
- Heidari, A. (2011). "*Comparing the effect of English language teaching via educational software and traditional method on students' academic achievement*" (Master's thesis, Islamic Azad University, Sari branch).
- Kalantarnia, Z., Rostamy, M., Shahvarani, A., Behzadi, M. (2012). The study of application of algebrator software for mathematical problems solving, Mathematics Education Trends and Research, 1-7. http://dx.doi.org/10.5899/2012/metr-00003.
- Khatiri, KH. (2010). "*Effect of educational simulation software on students' learning and retention and comparing it with traditional teaching method*" (Master's thesis, Islamic Azad University, Sari branch).
- Maleck, H .(2010). ICT for teachers. Gaj international publishers (in Persian).
- McNeese, E. (2006). The 2006 report on the highly visible undergraduate classrooms (HVUCs) Survey at the University of Southern Mississippi.
- Mahmudi, J., Nalchigar, S., & Ebrahimi, S. B. (2008). Challenges of Smart Schools in Iran. Quarterly Journalof Educational Innovations, 7(27), 78-61.
- Markoe Hayes S, Chapple S, Ramirez C, (2014). Strong, Smart and Bold Strategies for Improving Attendance and Retention in an After-School Intervention. Journal of Adolescent Health, Volume 54, Issue 3, Supplement, March 2014, Pages S64-S69
- Mirhosseni, H. (2011). "*Comparing the effect of education via educational software and traditional method on mathematics learning in fourth grade elementary school students*" (Master's thesis, Islamic Azad University, Sari branch).
- Mohammed Sani, I, Ahmad Zabidi, A, Husaina Banu, K.(2013). SMART PRINCIPALS AND SMART SCHOOLS.
- Procedia - Social and
- Niki, D., & Avril, L. (2011). Technology, Pedagogy and Education: Reviewing the landscape of ICT and teacher education over 20 years and looking forward to the future Volume 20, Issue 3, p: 247-261. Special Issue: 20th Anniversary Special Issue: Reviewing the Landscape.
- NITC Malaysia .(2012). NITC Malaysia. Retrieved January 12, 2012, from http://www.nitc.my/index.cfm?&menuid=15.
- Rutherford, T., Farkas, G., Duncan, G., Burchinal, M., Kibrick, M., Graham, J., ... & Martinez, M. E. (2014). A Randomized Trial of an Elementary School Mathematics Software Intervention: Spatial-Temporal (ST) Math. Journal of Research on Educational Effectiveness, (just-accepted).
- Sipila, C. (2010). Predictors of teacher-directed student use of technology in elementary classrooms: a multilevel SEM approach using data from the USEIT study. Journal of Research on Technology in Education, 43(4), 301-323.

- Wan Ali, W., Mohd Nor, H., Hamzah, A., & Alwi, N. (2009). The conditions and level of ICT integration in Malaysian Smart Schools. International Journal of Education and Development using ICT [Online], 5(2).
- Zameni, F., & Kardan, S. (2011). "Effect of using the information and communications technology on mathematics learning". *Journal of Information and Communications Technology in Educational Sciences*, 1, autumn 2011.