THE EFFECT OF VIRTUAL VERSUS TRADITIONAL LEARNING IN ACHIEVING COMPETENCY-BASED SKILLS

Leili MOSALANEJAD (Corresponding author)
Nursing Department,
Jahrom University of Medical Sciences, Jahrom, IRAN

Sakine SHAHSAVARI
Nursing Department,
Jahrom University of Medical Sciences,
Jahrom, IRAN

Saed Sobhanian
Nursing Department,
Jahrom University of Medical Sciences, Jahrom, IRAN

Mehdi DASTPAK
Foreign Language Department,
Jahrom University of Medical Sciences, Jahrom, IRAN

ABSTRACT

Background: By rapid developing of the network technology, the internet-based learning methods are substituting the traditional classrooms making them expand to the virtual network learning environment. The purpose of this study was to determine the effectiveness of virtual systems on competency-based skills of first-year nursing students. Materials and methods: In this quasi-experimental study, 86 freshman nursing students were recruited. Nursing Fundamentals and Skills (including theoretical and practical credits) was decided as the teaching course. The theory and practical contents were taught in one group by conventional method (face to face teaching, demonstration on moulage) and for another by virtual simulation and interactive multimedia. The two groups were the same for the content being taught, the instructor and the final evaluation. Paired t-test and independent sample t-test was used for statistical analysis. Results: In theoretical exam, the mean score in virtual teaching group was higher than traditional group (P<0.001); however, there was no significant difference between the two groups in the result of objective structured clinical examination.

Conclusions: Using virtual systems is beneficial in enhancing student learning. Both traditional and virtual methods can be used in teaching skills in nursing students; however, it seems that combination of the two can facilitate knowledge transfer.

Keywords: Competency-Based Education; Computer Simulations; Nursing.

INTRODUCTION

Development of information technology and distance learning by mass communication have resulted in the development of new instruments and teaching methods for knowledge transfer (McKenzie & Murray 2010). Accompanied by the rapid development of multimedia systems and network technologies, the internet-based teaching and e-learning methods, as a new paradigm in the field, have developed resulting in traditional learning to also expand to the virtual learning environments (Wu *et al* 2006).

Virtual learning, as a modern method, helps the learners to acquire skills at higher levels. Researchers have shown that institutions cannot retain their traditional structure in facilities, formal lectures and class-based activities (Sloman & Russell 2003) and e-learning seems to threaten the fundamental structure of the universities. Hence, dynamic changes are necessary for universities to accommodate the demands in response to global competition with virtual universities (O'Neill, Singh G & O'Donoghue 2004).

The competency-based education is a concept used for developing students potential abilities, which focuses on outcomes of learning. Competency-based education addresses what the learners are expected to learn. Virtual simulators help learners practice the techniques spontaneously, while reducing the possible errors; using these methods, standards are better respected and procedures are improved (Gobbi *et al* 2004). Various studies have shown the useful effect of competency-based virtual curriculum on different fields (Watkinson *et al* 2004; Enriquez 2010; Hansen 2008; Windsor 2009; Rutledge *et al* 2008; Williams 2008; Holubar *et al* 2009; Yom 2004; Chehrzad *et al* 2004; Green *et al* 2006). Online courses are useful in developing skills in the application of theoretical knowledge (Hansen 2008), opening opportunities for team skills training (Windsor 2009), providing a safe non-threatening environment for unskilled students to reduce their probable mistakes (Rutledge *et al* 2008).

Considering the development of internet network and digital libraries at universities, we decided to compare modern technologies of teaching with traditional methods and evaluate the efficiency on students' learning and competency.

MATERIALS AND METHODS

In a quasi-experimental study, we recruited 43 freshman nursing students of Jahrom University of Medical Sciences in a virtual learning program; the controls included a matched group of 43 sophomores, Nursing Fundamentals and Skills course, including 3 theoretical and 1 practical credits, was chosen to be taught. Theoretical subjects were taught through face to face method in traditional teaching group and by using digital systems (digital libraries) and virtual animations by the same instructor in virtual teaching group.

A second instructor taught the practical procedures in laboratory or practice room to the traditional teaching group. First, the instructor explained each procedure and demonstrated the practice; then students practiced the procedure. In virtual teaching group the same instructor taught the procedures using video systems and virtual animations. Then students practiced in the lab and their skill difficulties were analyzed by the instructor. Theoretical and practical contents, educational aims and instructors in theoretical and practical skills were the same in both groups. Eventually, the final theoretical exam was taken using multiple choice examination and performance skills were evaluated by objective structured clinical examination (OSCE); performance checklists were used in order to evaluate practical skills in laboratory environment (practice room).

The exam validity was considered based on educational aims mentioned in syllabus approved by ministry of Sience Research and Technology, and for reliability of the exam a Cronbach coefficient of 0.82 was calculated. Data were analyzed by SPSS statistical software version 11.5 (SPSS Inc., Chicago, IL) using descriptive statistics, student and paired t-test to compare the final scores in the two learning groups. Pearson's rho was used to find any correlation between the theoretical and practical scores in each group.

RESULTS

In virtual teaching group no statistically significant correlation was found between theoretical and practical scores (r=0.49, P =0.51); however, in traditional teaching group significant statistical correlation was found (r=0.49, P=0.001). A significant difference in theoretical scores of the two groups was found; students who were taught by interactive multimedia and virtual simulation had higher mean scores in comparison with traditional teaching group. However, there was no significant difference in the two groups in practical exam score evaluated by OSCE test; that is, both groups were similar in their ability to demonstrate the skills correctly.

Table: 1
Comparison of exam mean scores of the two learning groups

Exam	Group	Mean	P-value
Theory	Traditional	12.43±2.02	0.001
	Virtual	13.83±1.67	
Practice	Traditional	17.41±1.30	0.24
	Virtual	16.97±2.08	

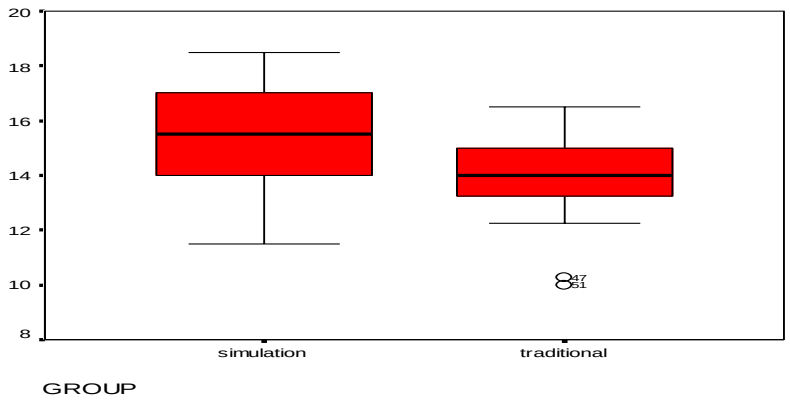

Figure: 1
Mean scores of the two learning groups in theory

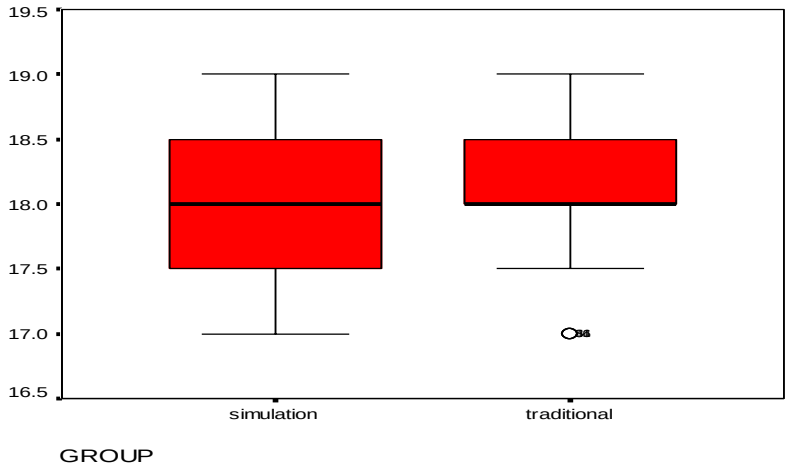

Figure: 2
Mean scores of the two learning groups in practice

DISCUSSION

This study was an attempt to evaluate the effects of virtual teaching methods in clinical skills on students. The results showed that there was a significant correlation between theoretical and practical scores in traditional teaching group suggesting that the students being educated in a face-to-face relationship learned the as much practical skills as theoretical knowledge.

However, such a correlation was not observed in virtual teaching group. We also found that the students in virtual teaching group recorded a higher score in their theoretical exam; however, the practical score was not significantly different between the two groups. Engum et al also reported the same results in their study (2003). In another study conducted by Wu et al also it was found that there was significant difference in students' theoretical scores (2006). Others stated that technology has the potential to enhance the learning process, but not to replace the lecturer or tutor (O'Neill 2004).

Virtual teaching does not make significant differences between the two kind of learning groups in terms of learning experience or satisfaction (Ashkeboussi 2001) and psychomotor skills (Aggarwal *et al* 2006); though, it would not replace conventional training methods (Quinn *et al* 2003). Many evidence indicated that students preferred the traditional education and that it should not be replaced by the virtual methods (Quinn *et al* 2003; Quinn *et al* 2009). However, they also indicated that they enjoyed the different type of interactivity offered by the computer based learning and would like to use both approaches together to complement one another and reinforce their knowledge (Quinn *et al* 2009). The most common difficulties were lack of direct contact and technical hardware difficulties (Quinn *et al* 2003).

Many researches showed that virtual environments can be used as a part of blended learning; they provide situations for independent and self directed learning (Green *et al* 2006; Retrouvey & Finkelstein 2008; Ireland *et al* 2009; Monguet, Fabregas & Delgado 2006). However, in these studies no strong correlation was found between using virtual learning environments and final exam scores.

As a result, traditional and virtual teaching methods are not separately reliable in achieving educational aims; however, other studies suggest that if they are used together can improve prerequisite skills prior to entering the clinical ward, and students can put them directly into practice (Aggarwal *et al* 2006; Reilly & Spratt 2007; D'Alessandro, Lewis & D'Alessandro 2004; Siddiqui, Khan & Akhtar 2008; those who could frequently access web-based learning, had higher scores (Mitchell *et al* 2007).

Rapid development of medical sciences and the necessity for learning new methods of taking care of the patients, besides the need for life-long learning of clinical practice necessitates use of e-learning methods and virtual instructions combined together, as e-learning makes information available at anytime and anyplace.

CONCLUSION

The results suggest the benefits of using virtual system in enhancing student learning. So, we can use both traditional and virtual methods in teaching skills, but it seems that combination of these two can facilitate knowledge transfer to the students for acquiring more skills.

BIODATA and CONTACT ADDRESSES of AUTHORS

Leili MOSALANEJAD received B. A. degree on nursing in 1992 from Jahrom University of medical science and M. A. degree on mental health education in 1996 from Shiraz University of medical science. Currently she is PhD in Distance Learning Educational Curriculum Development, in Tehran university of Payame noor ,she is also full time faculty member of jahrom university of medical science since 1997.her interests are eduction, e learning,distance learning and educational psychology.

Leili MOSALANEJAD (Corresponding author)
Nursing Department,
Jahrom University of Medical Sciences, Jahrom, IRAN.
Tell: 09177920813
Fax: 098-0791-3341508
Email: mossla_1@yahoo.com

Sakineh SHAHSAVARI received B.A degree of nursing in 1985 and M.S degree of medical – surgical nursing education in 1995 from Shiraz University of medical sciences.Currently she is Dean of Jahrom School of nursing and paramedicine. Her interests are education, research and educational curriculum development.

Sakine SHAHSAVARI
Nursing Department,
Jahrom University of Medical Sciences, Jahrom, IRAN.
Tell: 098-0791-3331523-24
Fax: 098-0791-3341508
Email:sashahsavari@yahoo.com

Saeed SOBHANIAN B.A degree of nursing in 1989 and MS degree community health nursing education in 1992 from Esfahan University of medical science. Currently his interests are education and research

Saeed SOBHANIAN
Nursing Department,
Jahrom University of Medical Sciences, Jahrom, IRAN.
Tell: 098-0791-3331523, Fax: 0791-3341508
Email: s_mor@yahoo.com

Mr. DASTPAK is presently a Ph.D student and the Faculty Member of the University of Medical Sciences. He is also a translator for Nokia Company. He started teaching English at different universities in 2004 and has taught English to the students of English and English Translation and Medicine and Nursing. He designs tests for different institutes and companies for different levels and has interviewed over 1000 interviewees. He is keen in different areas of research such as Teaching English, Education, Linguistics, and Medicine

Mehdi DASTPAK
Foreign Language Department,
Jahrom University of Medical Sciences, Jahrom, IRAN
Tell: 098-0791-331523, Fax: 0791-3341508
Email: md-dataforce@YAHOO.COM

REFERENCES

Aggarwal, R.; Grantcharov, T.; Moorthy, K.; Hance J.; & Darzi, A. (2006). A competency-based virtual reality training curriculum for the acquisition of laparoscopic psychomotor skill, *American Journal of Surgery* ,191(1), 128-133.

Ashkeboussi, R. (2001). A comparative analysis of learning experience in a traditional vs. virtual classroom setting, *MAHE Journal* , 24, 5-21.

Chehrzad, M.; Shafiei, P. Z.; Mirzaei, M.; & Kazemnejad, E. (2004). Comparison between two methods: Objective structured clinical evaluation (OSCE) and traditional on nursing students' satisfaction, *Journal of Guilan University of Medical Sciences* , 13, 8-13.

D'Alessandro, D. M.; Lewis, T. E.; & D'Alessandro, M. P. (2004). A pediatric digital storytelling system for third year medical students: the virtual pediatric patients, *BMC Medical Education*, 4:10.

Engum, S. A.; Jeffries M. P.; & Fisher, L. (2003). Intravenous catheter training system: computer-based education versus traditional learning methods, *American Journal of Surgery,* 186(1), 67-74.

Enriquez, A. G. (2010). Enhancing student performance using tablet computers, *College Teaching* ,58(3), 77-84.

Gobbi, M., Monger, E.; Watkinson, G.; Spencer, A.; Weaver, M, Lathlean, J.; & Bryant, S. (2004). Virtual interactive practice: a strategy to enhance learning and competence in health care students, *Studies in health technology and informatics,* 107(Pt 2), 874-878.

Green, S. M.; Weaver, M.; Voegeli, D.; Fitzsimmons, D.; Knowles, J.; Harrison, M.; & Shephard, K. (2006). The development and evaluation of the use of a virtual learning environment (Blackboard 5) to support the learning of pre-qualifying nursing students undertaking a human anatomy and physiology module, *Nurse Education Today,* 26(5), 388-395.

Hansen, D. E. (2008). Knowledge transfer in online learning environments, *Journal of Marketing Education*, 30(2), 93-105.

Holubar, S. D.; Hassinger, J. P.; Dozois, E. J.; Camp, J. C.; Farley, D. R.; Fidler, J. L.; Pawlina, W.; & Robb, R. A. (2009). Virtual pelvic anatomy and surgery simulator: an innovative tool for teaching pelvic surgical anatomy, *Studies in health technology and informatics,* 142,122-124.

Ireland, J.; Johnson, N.; Adams, D.; Eboh, W.; & Mowatt, E .(2009). Blended learning in education: effects on knowledge and attitude, *British Journal of Nursing,* 18(2), 124-130.

McKenzie, K.; & Murray, A. (2010). E-learning benefits nurse education and helps shape students' professional identity, *Nursing Times*,106(5), 17-19.

Mitchell, E. A.; Ryan, A.; Carson, O.; & McCann, S. (2007). An exploratory study of web-enhanced learning in undergraduate nurse education, *Journal of Clinical Nursing,* 16(12), 2287-2296.

Monguet, J. M.; Fabregas, J. J.; & Delgado, D. (2006). Effect of blended learning on students', motivation and learning performance, *Interciencia* , 31(3), 190-196.

O'Neill, K.; Singh, G.; & O'Donoghue, J. (2004). Implementing eLearning programmes for higher education: A review of the literature, *Journal of Information Technology Education*, 3, 313-323.

Quinn, F.; Keogh, P.; McDonald, A.; & Hussey, D. (2003). A pilot study comparing the effectiveness of conventional training and virtual reality simulation in the skills acquisition of junior dental students, *Search ResultsEuropean Journal of Dental Education* ,7(1), 13-19.

Quinn, J. G.; King, K.; Roberts, D.; Carey, L.; & Mousley, A. (2009). Computer-based learning packages have a role, but care needs to be given as to when they are delivered, *Bioscience Educ*ation, 14,15.

Reilly, A.; & Spratt, C. (2007). The perceptions of undergraduate student nurses of high-fidelity simulation-based learning: a case report from the University of Tasmania, *Nurse Education Today* ,27(6), 542-550.

Retrouvey, J. M.; & Finkelstein, A. B. (2008). Blended learning in orthodontic diagnosis: an interactive approach, *Journal of the Canadian Dental Association,* 74(7), 645-649.

Rutledge, C. M.; Barham, P.; Wiles, L.; Benjamin, R. S.; Eaton, P.; & Palmer, K. (2008). Integrative simulation: a novel approach to educating culturally competent nurses. *Contemporary Nurse* ,28(1-2),119-128.

Siddiqui, A.; Khan, M.; & Akhtar, S. (2008). Supply chain simulator: A scenario-based educational tool to enhance student learning, *Computers & Education*, 51(1), 252-261.

Sloman, M.; & Russell, J. D. (2003). The E-Learning revolution: How technology is driving a new training paradigm, *Performance Improvement,* 42(10), 46-47.

Watkinson, G., Spencer, A.; Monger, E.; Weaver, M.; Gobbi, M.; Lathlean, J.; & Bryant, S. (2004). Virtual interactive practice: utilizing healthcare information systems to contextualize the skills associated with clinical decision making within nurse education, *Studies in health technology and informatics,* 107(Pt 1), 746-752.

Williams, M. S. (2008). Pilot study of the effects of supraliminal bipolar primes on occupational educators' viewing time and perceived confidence with desktop virtual reality, *Journal of Industrial Teacher Education,* 45(2), 27-53.

Windsor, J. A. (2009). Role of simulation in surgical education and training, *ANZ Journal of Surgery*, 79(3),127-132.

Wu, P. H.; Kuo, C. H.; Wu, P. L.; & Wu, T. H. (2006). Design a competence -based networked learning system: using sequence control as example, in Méndez-Vilas A, Solano Martín A, Mesa González JA and Mesa González J (eds) *Current Development in Technology-Assisted Education* 1st edn, pp.787-792. Formatex, Badajoz, Spain.

Yom, Y. H. (2004). Integration of Internet-based learning and traditional face-to-face learning in an RN-BSN course in Korea, *Computers, Informatics, Nursing* 22(3): 145-152.