



Effect of web-based education on nursing students' urinary catheterization knowledge and skills



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SUMMARY

Background: Nursing is a practice-based discipline that requires the integration of theory and practice. Nurse educators must continuously revise educational curricula and incorporate information technology into the curriculum to provide students with the necessary knowledge and skills.

Objectives: The aim of this study was to assess the effect of web-based education on students' urinary catheterization knowledge and skills.

Design: A convenience sample of 111 first year nursing students enrolled at two universities in Ankara during the academic year of 2011–2012 participated in this quasi-experimental study.

Method: The experimental group ($n = 59$) received a web-based and web-enhanced learning approach along with learning and practicing the required material twice as much as the control group, whereas the control group ($n = 52$) received traditional classroom instruction. A knowledge test of 20 multiple-choice questions and a skills checklist were used to assess student performance.

Results: There was no difference between the experimental group and the control group in knowledge scores; however, students in the web-based group had higher scores for urinary catheterization skills. The highest scores in knowledge and skills were obtained by students who experienced web-based education as a supplement to traditional instruction.

Conclusion: Web-based education had positive effects on the urinary catheterization skills of nursing students, and its positive effect increased for both knowledge and skills when it supplements classroom instruction. Based on these results, we suggest the use of web-based education as a supplement to traditional classroom instruction for nursing education

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Introduction

The past decade has seen rapid changes in science and technology and technological knowledge has kept pace. Education plays a pivotal role in preparing the individual to be an effective and constructive participant in knowledge society (Soran et al., 2006; Turgut, 2009). Thus, nursing curricula must continuously be revised and updated to prepare students who can be adaptive and productive using technology. However, nursing education faces a number of challenges, including inadequate infrastructure and resources, the shortage of qualified nurse educators, and a high student/faculty ratio, which limit the effectiveness of the teaching–learning process in the classroom (National Advisory Council on Nurse Education and Practice, 2010; McNett, 2012). These challenges are compounded by the realities and demands of clinical

practice. Although clinical practice is an integral component of nursing education, the limited number of clinical sites for student placement, shortage of nursing faculty for clinical supervision, and nurses' reluctance to facilitate clinical learning of students due to staff shortages and heavy workload, are obstacles (McNett, 2012; Fitzgerald et al., 2012).

For students, especially during their initial clinical practice, the lack of clinical experience, unfamiliar situations, fear of making mistakes, and negative attitudes of professional staff can result in stress and anxiety, which in turn affect their clinical learning (Sharif and Masoumi, 2005; Elcigil and Sari, 2007; Moscaritolo, 2009). Consequently, the translation of basic knowledge into practice, particularly the development of psychomotor skills, remains a primary concern for nurse educators and students. A further concern is that involving real patients in the development of these skills might result in the invasion of patient privacy and dignity.

Urinary catheterization is a basic nursing skill that cannot be practiced on real patients without some embarrassment or discomfort to the patient or students, even when performed by a nurse or doctor of the same gender as the patient. Yoo et al. (2010) argue that urinary

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catheterization is affected by culture and often stigmatized due to the necessity of handling sexual organs, which can limit the acquisition of knowledge and skills. In an integrative review of literature regarding urinary catheterization, Balduino et al. (2012) state, “the manipulation of the genitalia brings embarrassment, because it has the idea of invasion of privacy, something sexual and dirty” (p. 2250). Moreover, urinary catheterization is a complex and invasive procedure that poses serious risks to patients, including trauma to the urethra or bladder from incorrect insertion and introduction of microorganisms into the urinary system that can result in infection. Therefore, the procedure of urinary catheterization requires knowledge, strict adherence to aseptic technique, and technical skills. Hoseini et al. (2009) found a significant difference between professors' and graduated students' opinions about the frequency of performing skills of urinary catheterization. The authors concluded that urinary catheterization is often performed by interns or urology residents in educational wards due to possible complications, leaving little practice opportunities for nursing students.

To provide safe clinical practice opportunities and reduce cultural and practical barriers, nurse educators must use skill laboratories and clinical simulations more effectively to enhance psychomotor skill development. In the meantime, nurse educators must view learning as an on-going process, not confined to classroom or skill laboratories. A lifelong learning approach should be adopted to encourage students to be educationally proactive. Computer-assisted instruction, e-learning, or web-based learning supplements traditional didactic instruction and live clinical education and encourages students to assume responsibility for their own learning needs (Krautscheid and Burton, 2003; Karaağaçlı, 2008). The appropriate use of multimedia, such as self-instructional CD-ROMs and videos with visual representations of psychomotor skills, can enrich web-based/web-enhanced learning (Demir, 2000) and promote “meaningful learning” (Karppinen, 2005).

Although there is a large amount literature on the effects of web-based education, few studies have investigated the effect of web-based learning on the psychomotor skills of nursing students. Cook et al. (2012) demonstrated a positive impact of a web-based interactive simulation game (PULSE) on nursing students' life-support skills. Salyers (2007) compared a web-enhanced lecture plus a three-hour lab session with a three-hour traditional lecture and demonstration for teaching nasopharyngeal suction, catheter insertion, and wet-to-dry dressing change, and found that the web-enhanced/demonstration group performed significantly better on the comprehensive cognitive final exam. A study by Lu et al. (2009) compared web-based with traditional classroom instruction with traditional classroom instruction for teaching intramuscular injection, and found that the web-based group had significantly higher knowledge and skill performance ratings. Results of these studies demonstrate the value of web-based education in teaching psychomotor skills to students; however, to date, no study has specifically investigated the effect of web-based education on the urinary catheterization skills of nursing students. To address the aforementioned challenges in nursing education, the potential contribution of web-based and web-enhanced learning to the knowledge and skills of nursing students should be explored in empirical studies.

Background/Literature

Web-based education is an individualized education system using computers (Manochehr, 2001). Web-enhanced learning is defined as the “supplement of web technologies to education activities in order to support the learning–teaching process in increasing the learning of students in a subject” (Uzunboylu, 2002).

Web-based education and web-enhanced learning are usually used interchangeably. In fact, the two have some common characteristics, including incorporating all possibilities of computer-assisted education and synchronous or asynchronous lessons. Both in synchronous and asynchronous learning, the student and teacher are at different places; but synchronously conducted lessons take place in real time, whereas

asynchronously learning takes place outside of real time. However, web-based education and web-enhanced learning are different in that the former can be used outside of traditional formal institutions, whereas the latter is used to supplement traditional classroom education. Another point of divergence is associated with the educator conducting the lesson: in web-based education, a group composed of different specialists may lead and regulate the learning–teaching process, while web-enhanced education is completely controlled by one instructor (Uzunboylu, 2002).

The findings of several studies suggest positive effects of web-based education in the training of nursing students (Woo and Kimmick, 2000; Kearns et al., 2004; Dwyer and Searle, 2009; Cooke et al., 2010). For example, Woo and Kimmick (2000) found that students who took nursing lessons via the Internet were more satisfied with and enthusiastic about their lessons. Kearns et al. (2004) investigated the effect of web-based education and web-enhanced education on the achievement and satisfaction of second-year nursing students in the USA. The achievement scores of the students receiving web-based education were higher than those of students receiving traditional classroom education with web-enhanced supplements. However, there have been few studies focusing on the psychomotor skills of nursing students. Nursing is a practice-based discipline, and skilled and competent nurses are a requirement of quality health care. Therefore, developing the psychomotor skills of nursing students is important to the quality and safety of care.

The aim of the present study was to evaluate the effect of three modes of education—web-based education, web-enhanced education, and traditional in-classroom education—on the urinary catheterization knowledge and skills of nursing students. The following hypotheses were tested in this study:

- H1.** There are differences between web-based education and traditional in-classroom education in increasing urinary catheterization knowledge.
- H2.** There are differences between web-based education and traditional in-classroom education in increasing urinary catheterization skills.
- H3.** There are differences between web-based education and web-enhanced education in increasing urinary catheterization knowledge.
- H4.** There are differences between web-based education and web-enhanced education in increasing urinary catheterization skills.

Methods

Study Design and Sample

A quasi-experimental design was used in this study. A convenience sample of 160 first-year nursing students was recruited from the health sciences areas of two universities. At the time of this study, students were enrolled in the Fundamentals of Nursing course during the spring semester of the academic year 2011–2012. Students who had easy access to computers and the Internet were assigned to the experimental group, while those who had limited access formed the control group. The experimental group received web-based and web-enhanced learning while the control group experienced traditional classroom learning. Five students who had continuous absenteeism and 18 students taking the course again due to failure were not included in the study. In addition, five students who had graduated from vocational health school and transferred vertically to higher education were excluded due to their previous urinary catheterization knowledge and skills. Twenty-one students dropped out due to incomplete laboratory practice. Hence, the investigation was carried out with 111 students (59 students in the experimental group and 52 students in the control group). The rate of participation in the study was 69.4%.

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