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Comparison of technology-based cooperative learning with technology-based individual learning in enhancing fundamental nursing proficiency

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SUMMARY

Background: The aim of nursing education is to prepare students with critical thinking, high interests in profession and high proficiency in patient care. Cooperative learning promotes team work and encourages knowledge building upon discussion. It has been viewed as one of the most powerful learning methods. Technology has been considered an influential tool in teaching and learning. It assists students in gathering more information to solve the problems and master skills better.

Purpose: The purpose of this study was to compare the effect of technology-based cooperative learning with technology-based individual learning in nursing students' critical thinking in catheterization knowledge gaining, error discovering, skill acquisitions, and overall scores.

Methods: This study used a pretest–posttest experimental design. Ninety-eight students were assigned randomly to one of two groups. Questionnaires and tests were collected at baseline and after completion of intervention.

Results: The results of this study showed that there was no significant difference in related catheterization skill performance. However, the remaining variables differed greatly between the two groups.

Conclusions and applications: This study's findings guide the researchers and instructors to use technology-based cooperative learning more appropriately. Future research should address the design of the course module and the availability of mobile devices to reach student-centered and learn on the move goals.

Introduction

Due to high demand for qualified nurses, mass education has become the norm (Platt, 2002). The majority of nurse teachers use passive learning techniques with little student involvement. Students, therefore, have insufficient opportunity and limited capability to develop and demonstrate critical thinking, as well as to master nursing skills. Critical thinking encompasses the ability to analyze, apply standards, discriminate, information seek, reason logically, predict and transform knowledge (Scheffer and Rubenfeld, 2000). Scholars believe that critical thinking cannot be independently developed. McPeck (1990) asserted that critical thinking mastery is improved if developed and assessed within the context of a discipline. Nursing faculty generally agree that students who know how to think, make better clinical judgments and master skills, than those who have merely memorized facts. In this regard, nursing educators should utilize the most effective way to train students. Cooperative learning has been suggested as one useful method to nurture students' cognition, metacognition ability and skill acquisition.

Cooperative learning encourages groups of heterogeneous students to work on a common problem. Through a process of negotiation, conflict resolution, and active listening, they move to discussing issues and developing a consensus (Johnson and Johnson, 2003). Cooperative learning echoes the notion of constructivism, which stresses an individual's mind creates his or her own reality based on experiences and interaction with the environment. Cooperative learning teaches and enables the students to apply course content to situations they will experience as a nurse (Baumberger-Henry, 2005).

Twenty-first century communication channels disseminate information through both traditional (i.e. newspaper, TV) and modern media (i.e. telecommunication). Computer technology has been utilized to educate or life-long learning for decades. However, it has flourished with the advent of the Web. Web-based learning is a popular means to enhance face-to-face classroom learning and is at the center of most collaborative, multimedia educational environments (Chen et al., 2009). In recent years, the rapid growth of mobile technology promises to be comparable to the Web (Trifonova and Ronchetti, 2003). Integrating multiple forms of technology is gaining greater acceptance.

The use of technology-based cooperative learning became apparent after teaching the fundamental skills for ten years and seeing the same mistakes and hearing the same questions from students.

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After a decade teaching this course, it was clear that the materials were too difficult for entry level students to absorb within such a short amount of time (2–4 h/week depending on the topics) and class size (50 students). The students' learning difficulties are increased when their instructors are away teaching for clinical practicum. Nursing instructors need to fulfill both academic and clinical teaching responsibilities. Currently, the length of leave ranges from three weeks to nine weeks. A technology-based cooperative learning platform is expected to provide a more prompt, flexible, and accessible learning atmosphere.

Purpose

The purpose of this study was to investigate the effect of technology-based cooperative learning in nursing students' critical thinking, knowledge gain, error discover, skills acquisition, and overall scores.

Literature Review

Needs for Critical Thinker in Nursing Discipline

The speed of change in the healthcare context and the emphasis of best practice make it difficult to cultivate capable nurses with traditional teacher-centered lecturing. In an era of mass education the focus is on what is being taught, but not how. It promotes acquisition of the rules, but it does not necessarily lead to an exploration of how and when these might apply. In this climate, students may find it difficult to appreciate the relevance of the lessons and have little incentive to do so (Platt, 2002). Global nursing education reform also asserts that a nurse will have to be flexible, adaptable, able to work as a team member, and be a critical thinker and \problem solver.

Critical thinking is the cognitive engine that drives the processes of knowledge development and critical judgment in nursing. The skills and dispositional attributes of critical thinking are central to nursing as they embody a search for most applicable knowledge in a given context (Khosravani et al., 2005). Critical thinking is a composite of attitude, knowledge, and skills which includes: (a) attitudes of inquiry that involve an ability to recognize the existence of problems and the motivation to seek for the truth; (b) knowledge of the nature of valid inferences, abstractions, and generalizations in which the weight or accuracy of conflicting evidence is determined; and (c) skills to apply the above approach and knowledge (Watson and Glaser, 1980).

Cooperative Learning and Leaning Outcomes

The underlying premise for cooperative learning is founded in constructivist epistemology (Pantize, 2000). Knowledge is gained by students under created conditions or environments by the instructors. Within those conditions or environments students can construct meaning from materials learned by processing them through existing cognitive structures, as well as remain open to further processing and possible reconstruction (Johnson et al., 1998; Johnson and Johnson, 2003). Education can be delivered via three methods, (1) cooperative learning, (2) competitive learning, and (3) individual learning (Huang and Lin, 2000). Cooperative learning produces a better outcome. Different theoretical perspectives can explain why and how cooperative learning advances thinking and learning. These theories encompass social psychology's field theory, developmental social theory, cognitive theory, and humanistic theories etc. (Stiles, 2005).

Cooperative learning encourages students working in small groups or teams to achieve shared goals or complete assignments (Johnson and Johnson, 2001). Each member of the team has two responsibilities: to learn the material and to help all other partners learn the material. The assignments are not considered complete until all students have an understanding of the material. There are two achievement outcomes for cooperative learning: accomplishment of group goals and individual accountability (Johnson and Johnson, 2001). Learning consists of active participation by the student versus passive acceptance of information presented by an expert lecturer. Learning comes through transactions and dialogue among students and between faculty and students in a social setting. Students learn to understand and appreciate different perspectives through dialogue with their peers (Pantize, 2000).

Cooperative learning is not the same as small group discussion or tasks. Cooperative learning differs from the common small group work in that this method has essential elements that must be met. The most crucial difference is that in cooperative learning the success of the group depends on the successful work of each and every individual within the group, and each person is held accountable for his or her contributions (Stiles, 2005). There are many cooperative learning strategies, including Jigsaw, think–pair–share, round robin brainstorming, circle the sage, and online debate etc. (Stiles, 2005). The instructors should assess the characteristics of the students, goals of the assignment to determine the applied strategy. There are three major forms of cooperative learning: *formal*, *informal*, and *base groups*. *Formal cooperative learning* is done when students need to complete an assignment or project that requires a specific evaluation be done. *Informal cooperative learning* is done to promote active cognitive processing of information during a lecture or demonstration. *Base groups* are formed to provide long-term support and assistance, often for an entire semester or year (Johnson and Johnson, 2003). Stiles (2005) asserted that cooperative learning fits well within nursing education. It can be applied to classroom instruction, simulated laboratory experiences, online formats, and even clinical experience.

The previous studies have found mixed outcomes or perceptions of cooperative learning. Cooperative learning helped students develop better high-level reasoning and critical-thinking skills and the ability to recognize the perspective of others (Stewart and Gonzalez, 2006). Students performed a variety of technical and assistive skills while on cooperation, but, more importantly, they achieved positive outcomes in affective learning, developed as professionals, applied content and theories learned in academic courses, and gained new knowledge through experience (Hoffart et al., 2006). Stiles (2005) found negative perceptions of cooperative learning expressed by the students. The comments included “1 hate working in groups! I always end up being the one that does all the work.” “Group work is awful! There is always at least one person who never contributes to the project. It's so frustrating!” “It doesn't seem fair that the one person in the group who did not work gets the same grade that the rest of us made. We worked hard.”

Integrated Information Technology in Teaching and Learning

Today's generation of students have been coined *Millennial* learners or the *Net Generation*, because they have been raised in a media-rich environment and live in an information-centric world. Many of these students have surfed the Internet since early adolescence, purchased clothing and concert tickets on the Internet, and communicated with peers via multiple Instant Messaging windows (Windham, 2005). They are expert multi-taskers. Since they have been exposed to high amounts of technology during their lives they expect educators to appreciate their enthrallment with technology and therefore provide innovative technological tools that parallel and echo their technological skills and characteristics (Magg, 2006).

The computer is an important resource not only because of its unique control capabilities, but because these attributes are also