



Comparing the effects of problem-based learning and the traditional lecture method on critical thinking skills and metacognitive awareness in nursing students in a critical care nursing course☆



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ABSTRACT

Background: Problem-based learning (PBL) is a method used to develop cognitive and metacognitive skills in nursing students.

Objectives: The present study was conducted to compare the effects of PBL and the traditional lecture method on critical thinking skills and metacognitive awareness in nursing students in a critical care nursing course.

Design: The present study was conducted with a quasi-experimental, single group, pretest-posttest design.

Methods: A group of third-year nursing students ($n = 40$) were recruited from Khorramabad School of Nursing and Midwifery in the west of Iran. The lecture method was used in one group over the first eight weeks of the first semester and PBL was adopted in the second eight weeks. Standardized self-report questionnaires including The California Critical Thinking Skills Test-B (CCTST-B) and the Metacognitive Awareness Inventory (MAI) were administered before and after the use of each of the instruction methods. Data were analyzed in SPSS using the paired t -test.

Findings: No significant changes were observed in the students' critical thinking skills and metacognitive awareness after performing the lecture method. However, a significant increase was observed in the overall critical thinking score ($P < 0.01$) and its sub-scales of evaluation and deduction ($P < 0.05$) and in the overall metacognitive awareness score ($P < 0.001$) after performing the PBL method.

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1. Introduction

In the rapidly advancing healthcare environment of the contemporary society, professional nurses (Kong et al., 2014) and nursing students need to develop their critical thinking skills as a way to prepare for greater expertise in flexible, individualized, situation-specific problem-solving (Klunklin et al., 2011; Kong et al., 2014). Accrediting agencies urge nursing education to present a curriculum that trains

students with high levels of cognitive and metacognitive skills, such as critical and reflective thinking skills (Josephsen, 2014).

2. Literature Review

Critical thinking is a purposeful, self-regulatory judgment that results in interpretation, analysis, evaluation and inference (Hajrezayi et al., 2015). Critical thinking is a major component of the discipline of nursing as well as nursing education (Kong et al., 2014). Walsh and Seldomridge have confirmed the positive effects of critical thinking on the quality of care provided to patients (Burrell, 2014). A study conducted by Moghadam identified the relationship between fostering critical thinking skills in nursing students and an evidence-based performance (Poodineh Moghadam et al., 2015).

Critical thinking entails cognitive and metacognitive components (Vaghar Seyyedini et al., 2009) and meaningful learning through

☆ Type of study: a quasi-experimental, single group, pretest-posttest design.

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metacognition is one of the main objectives of nursing education, i.e. the training of autonomous and self-directed learners (Chiejina and Ebenebe, 2013). According to Allen and Armour-Thomas (1991), metacognition contains its own knowledge and control of learning processes (Sart, 2014). Through developing metacognitive skills, including self-awareness, self-evaluative and self-reflective skills, nursing students can learn to view situations from different perspectives and use and interpret their new knowledge (Josephsen, 2014). Some empirical studies have reported nursing students with good metacognition to have a better academic performance compared to those with poor metacognition (Hsu and Hsieh, 2014).

Despite the emphasis in nursing curricula on fostering critical thinking skills and metacognitive awareness in nursing students, the results obtained from previous studies suggest poor and moderate levels of competence in these skills in nursing students, particularly in Iran. Using the Watson-Glaser Critical Thinking Test, Eslami & Moarefi reported poor critical thinking skills for Iranian nursing students (Poodineh Moghadam et al., 2015). A study conducted by Salehi et al. showed that nursing students rarely use the concept mapping strategy for developing their metacognition (Salehi et al., 2013). Some studies have shown the relationship between poor critical thinking skills and metacognitive awareness and nursing students' inability to solve problems, the widened gap between theory and practice, indecisiveness and poor clinical reasoning (Hajrezayi et al., 2015).

Nursing students should utilize cognitive and metacognitive strategies to elucidate multifaceted solutions for complex problems (Doyle, 2013). Problem-based learning (PBL) has been the focus of this shifted attention and it is expected to help develop students' critical thinking skills and metacognitive awareness (Sart, 2014). PBL is a student-centered instruction method in which students take on an active role in their own learning. Previous studies have suggested that students who have received instructions through PBL have better problem-solving abilities compared to those who have received instructions through lectures (Choi et al., 2014; Klunklin et al., 2011). In one qualitative study, Dornan et al. (2005) showed that PBL facilitates self-directed and lifelong learning (Choi et al., 2014). A study conducted by Harris and Hofer (2011) also suggested that PBL increases critical thinking skills, independent study skills, deductive abilities and active participation (EL-Shaer and Gaber, 2014).

Studies conducted in Iran show that PBL increases students' general knowledge on and skillfulness in all the five steps of the nursing process (Khatiban and Sangestani, 2014). Mori et al. also showed that PBL has been beneficial to nursing students in their self-learning, learning integrity and learning communication skills after three years of implementation (Khatiban and Sangestani, 2014; Mori et al., 2006). However, studies on the effects of PBL on critical thinking have shown mixed results; some have noted nursing students' improved problem-solving, communication, critical thinking and autonomous learning as benefits of PBL (Kong et al., 2014), while other studies have claimed that PBL does not improve critical thinking. In one review study, the author concluded that the evidence at hand does not support the development of critical thinking through PBL (Kong et al., 2014; Poodineh Moghadam et al., 2015). Another study found no significant differences between the effects of PBL and lecture on self-directed learning and problem solving skills in first-year nursing students; however, this study has failed to determine whether or not PBL can produce better outcomes compared to the traditional method (Choi et al., 2014). The majority of studies conducted on nursing students' critical thinking have been descriptive in approach and have been concentrated in the US and western or Asian countries such as South Korea (Hunter et al., 2014). Most theoretical models have conceptualized metacognition as a predictor and have less examined the effect of learning strategies such as PBL on the development of metacognitive skills as a learning outcome. Some studies have thus proposed further studies to be conducted on the effect of critical-reflective thinking-based strategies on nursing students' metacognitive skills in other societies such as Iran (Hsu and Hsieh,

2014; Vaghar Seyyedini et al., 2009). In Iran Some studies have shown that most nursing educators rely on content-based teaching methods and prefer a formal learning environment with the lowest amount of student participation (Azizi-Fini et al., 2015). Given the previous findings on Iranian nursing students' poor or moderate critical thinking skills and metacognitive awareness, and since PBL is based on a constructivist theoretical framework that has less been utilized in teaching theoretical courses in nursing, especially critical care nursing courses, the present study aimed to compare the effects of problem-based learning and the lecture method on nursing students' critical thinking skills and metacognitive awareness in critical care nursing courses.

3. Methods

3.1. Study Design

The present study is quasi-experimental, single-group and pre-test-post-test in design.

3.2. Study Subjects

All the 40 third-year undergraduate nursing students who had registered for the course of Critical Care Nursing at School of Nursing and Midwifery (in Khorramabad, the administrative town of Lorestan province in the west of Iran) in the second half of the academic year 2012–2013 were invited to take part in the study. These students met the study inclusion criteria, including having registered for the critical care nursing course (three units) and being a third-year undergraduate nursing student. The study exclusion criteria were an unwillingness to take part and participation in other PBL education programs. Considering that only one group of nursing students were accepted during each academic year at the time this study was being conducted, all the 40 third-year students (sixth semester) were chosen for both the intervention and the control groups. The students formed the non-PBL control group ($n = 40$) and were taught by the lecture method first, and then formed the PBL intervention group ($n = 40$) and were taught by PBL and were then compared against themselves.

3.3. Study Tools

The data collection tools used in the present study included a personal information form with eight items (on age, gender, cumulative GPA, etc.) and two questionnaires.

The California Critical Thinking Skills Test form-B (CCTST-B) was the first questionnaire used for measuring the students' critical thinking skills and contained 34 multiple-choice questions with one correct answer. This questionnaire has been specifically designed for measuring critical thinking skills in five domains including analysis, evaluation, inference, deduction and induction. The test takes 40 min to be completed and each correct answer is given a score of 1, making the minimum score obtained zero and the maximum 34. The validity and reliability of this test has previously been determined for use in Iran (Vaghar Seyyedini et al., 2009). In the present study, the test-retest reliability of the test (with a 10-day interval) showed a correlation coefficient of 0.9 and the internal consistency coefficient using Cronbach's alpha was calculated as 0.7 to 0.77 for the sub-scales and as 0.79 for the total scale.

The students' metacognitive awareness was measured using the standard and comprehensive Meta-Cognitive Awareness Inventory (MAI) with 52 items that measure different dimensions of metacognition. Participants respond to each of the items based on a 7-point scale (from totally agree given a score of 1 to totally disagree given a score of 7) and obtain a final score ranging from 52 to 364. This questionnaire has been used in several studies before, and has been reported to have a favorable reliability and validity in Iran. In their study, Vaghar et al. found the reliability coefficient of this scale to be 0.88, (Vaghar

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