



## Effect of case-based learning on the development of graduate nurses' problem-solving ability



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### SUMMARY

Case-based learning (CBL) is a teaching strategy which promotes clinical problem-solving ability. This research was performed to investigate the effects of CBL on problem-solving ability of graduate nurses. This research was a quasi-experimental design using pre-test, intervention, and post-test with a non-synchronized, non-equivalent control group. The study population was composed of 190 new graduate nurses from university hospital A in Korea. Results of the research indicate that there was a statistically significant difference in objective problem-solving ability scores of CBL group demonstrating higher scores. Subjective problem-solving ability was also significantly higher in CBL group than in the lecture-based group. These results may suggest that CBL is a beneficial and effective instructional method of training graduate nurses to improve their clinical problem-solving ability.

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### Introduction

Dramatic advances and transformations have been made in health care organizations in the past recent decades, resulting in the rapid growth of technology (Vittrup and Davey, 2010). Success of nurses in such fast changing modern hospital environment involves becoming skilled at higher-level critical thinking and problem-solving abilities to provide safe and effective care to patients with complex and variable needs (Kaddoura, 2010; Yoo et al., 2009).

Graduate nurses are expected to problem-solve and plan interventions independently (Kaddoura, 2011; Vittrup and Davey, 2010). According to Benner (1984), graduate nurses are novice nurses entering the role of a registered nurse who have typically practiced less than 2 years in the clinical setting during their educational experience. Graduate nurses are required to think critically in order to identify complex situations and practice sound clinical judgments, while considering multiple aspects of care (Halfer and Graf, 2006; Vittrup and Davey, 2010). However, research has suggested that many graduate nurses often have difficulty thinking critically in clinical practice, especially in situations that require making quick and accurate decisions and actions (Kaddoura, 2010, 2011; Wilgis and McConnell, 2008).

Additional research has focused on errors related to graduate nurses not being adequately prepared in performing critical thinking skills, prioritization, and in their general inability to convert theoretical training to real-world situations (Morrow, 2009; Saintsing et al., 2011). These

studies certainly indicate that such problems experienced by graduate nurses are common concerns within the international practice of nursing (Saintsing et al., 2011). Although graduate nurses can demonstrate minimal competencies, they need continuous educational support to further develop critical thinking and problem-solving abilities and to progress their professional roles as nurses. Therefore, hospital-based nurse educators should construct orientation programs that can facilitate the development of critical thinking skills and problem-solving abilities in graduate nurses (Wilgis and McConnell, 2008).

This study was carried out to investigate whether case-based learning (CBL) would be useful in developing problem-solving abilities in graduate nurses.

### Literature Review

Nurses are confronted with many clinical problems on a daily basis, and their ability to competently deal with such problems is critical for safe and effective nursing practice. The question of how best to develop more successful clinical problem-solving abilities among nurses has become an issue of major importance to nurse educators (Simpson and Courtney, 2002; Wilgis and McConnell, 2008). Problem-solving ability is tied to thinking ability, which is considered a prior condition of professional practice (Bentley, 2001). Problem-solving begins with the perception of a situation as a problem, and then includes a selection of appropriate choices from many, in order to achieve a desired goal and its subsequent implementation (Taylor, 2000; Terzioglu, 2006).

Traditionally, nurse education curricula have adopted a content-focused approach, with emphasis on teaching facts, concepts and their relationship to particular subject domains, which are limited in demonstrating application of these ideas to clinical situations

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(Kaddoura, 2011; Roberts, 2000). Furthermore, course delivery has mainly been teacher-centered (Cholowski and Chan, 2001; Yoo et al., 2009). To overcome these limitations, the field of nursing education has been increasingly focusing on teaching strategies to enhance critical thinking skills as well as on student-centered education, which concentrate on each student's needs, abilities, interests, and learning styles, placing the teacher as a facilitator of learning (Vittrup and Davey, 2010; Uys et al., 2004).

CBL is an instructional method within the context of student-centered learning to facilitate students' learning and to decide for themselves regarding their perspective field, through the use of case studies (Kaddoura, 2011). CBL is derived from constructivism, which is a theory of learning and an approach to education that lays emphasis on the ways people create meaning of the world through a series of individual constructs (Jonassen and Hernandez-Serrano, 2002). CBL that simulates realistic problems appears to be an ideal approach for preparing graduate nurses to deal with patients with a multiple of clinical problems (Kaddoura, 2011). Case studies, or cases, are descriptions of specific activities, events, or problems that are drawn from the real world of professional practice and include contingencies, complexities, and dilemmas to evoke integrative analysis and critical thinking in CBL education. CBL seek to engage students through the use of drama from a real situation. CBL can support authentic learning experiences by presenting episodes of real professional practice (Carroll and Borge, 2007). Therefore, CBL provide models of practice to graduate practitioners and is a teaching strategy which promotes clinical problem-solving abilities (Morrow et al., 2003).

CBL has been shown to be effective as part of medical and nursing programs in the U.S., Europe, and Australia (Chan et al., 2008; Dietrich et al., 2010; Massonetto et al., 2004; Thurman et al., 2009; Tomey, 2003). Moreover, CBL is widely used in other fields of professional education – in business, law, and engineering (Carroll and Borge, 2007; Kaddoura, 2011). Although many claims are made for CBL as an effective learning and teaching method, there is a paucity of empirical data on the effect of CBL in preparing graduate nurses for professional practice, especially from Korea.

In the current study, we tested the hypothesis that CBL for graduate nurses would improve their problem-solving abilities.

## Methods

### Study Design

A quasi-experimental design using pre-test, intervention, and post-test with a non-synchronized, non-equivalent control group was employed.

### Study Subjects

A convenience non-probability sampling method was used to select a sample and to attain a total sample of  $N = 190$  new graduate nurses from university hospital A. Institutional Review Board approval was obtained from the university hospital prior to data collection. The target population for this study consisted entirely of new graduate nurses hired to work as registered nurses at large university hospitals in Korea. Selection of subjects was based on the following inclusion criteria. They were expected to be new graduates without any previous experience as RNs. The selected participants started their employment at university hospital A. This study was explained in detail before obtaining informed consent. Participation was voluntary. If graduate nurses agreed to participate in the study, they were asked to sign the informed consent form. After signing the consent, a coded demographic questionnaire was administered. Finally, 96 graduate nurses, who were hired from university hospital A in 2009, were assigned to the traditional lecture-based group. Ninety-four graduate nurses, who were

hired from university hospital A in 2010, were assigned to the CBL group.

Power analysis for the two-group test of mean differences to reach 90% power and an effect size of 0.50 with an alpha value of 0.05 required a minimum sample size of 86 participants in each group (Cohen, 1988). The effectiveness of CBL or PBL education programs from a previous study was used as a reference for power calculation (Thistlethwaite et al., 2012).

### Instrument

#### Subjective Problem-Solving Ability

The problem-solving inventory (PSI) was used for the purpose of evaluating how graduate nurses perceive themselves as problem solvers. The PSI was developed in 1982 by Heppner and Petersen, and it has since proven to be valid and reliable. It was translated to Korean in Jun (1994). The scale is simple to use and participants are able to complete it by themselves.

Respondents were required to rate each item on a 6-point Likert scale (1 = strongly agree, to 6 = strongly disagree). The PSI has a total score (i.e., the sum of three factors) and three factors derived from factor analyses. The three factors are as follows (a) problem-solving confidence (PC), (b) approach-avoidance style (AAS), and (c) personal control (PC) (Heppner and Petersen, 1982). The PSC refers to an individual's belief and trust in one's own problem-solving ability. The AAS is defined as a general tendency to approach or avoid a wide range of problem-solving activities. The PC refers to an individual's belief that one is in control of his or her own behaviors and emotions while solving problems (Heppner et al., 2004).

A total score is derived from these factor scores and serves as a global index of problem-solving ability. Reliability estimates have revealed that these constructs are internally consistent (alpha coefficients ranged from .72 to .90). Lower scores indicate effective problem-solving attitudes and behaviors, whereas higher scores denote an individual's assessment of oneself as a relatively ineffective problem solver. The  $\alpha$  coefficients for the sample used in this study were .82 for the PSI total, and .82, .89, and .74 for the PSC, AAS, and PC, respectively.

#### Objective Problem-Solving Ability

We developed a simulated test to measure objective problem-solving abilities. This simulated test consists of three cases which depict common clinical problems that nurses may encounter in the hospital. An expert group consisting of instrument development and professional educators created an appropriate scenario and its relevant questions. The questions were developed based the Performance Based Development System (PBDS), which composes of six subcategories: problem recognition (e.g. What are the major issues in this case?), reports essential clinical data (e.g. What are the important data and what might they mean?), initiates independent nursing intervention, differentiation of urgency (e.g. What interventions should be initiated now? Or how should this patient be managed?), anticipates relevant medical orders (e.g. Now what should be done and what can the patient expect?), and provides relevant rational to support decisions (e.g. What do you think is the best way to deal with the problem and why?). The PBDS assessment is designed to identify critical thinking learning needs and to assist with the development of an individualized orientation action plan to prepare better nurses for safe clinical practice (Performance Management Services Inc., 2006). The simulated test was then revised in order to obtain consensus for the measurement of criteria, wording, and general presentation. Following revision of the content, the simulated test was further evaluated in a pilot study involving 12 nurses. All participants were interviewed to determine if they found the questionnaire clear and understandable. They were also asked to provide suggestions for the improvement of wording of any items they found confusing. All

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