The Impact of Post-Training on Job Performance in Nigera's Oil Industry

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Case study pedagogy is a teaching strategy in which teachers hope to help students develop and use critical thinking (CT) abilities. This study compared CT skills of 75 second year generic accelerated baccalaureate nursing students during their Fundamentals of Nursing course before and after being educated using case study pedagogical method. Through the use of a standardized CT (HESI) exam, taken at the beginning and the end of the course, scores were compared for improvement using paired t-tests and a one sample t test. The results demonstrated that the HESI CT test scores identified a statistically significant difference with a larger average score after the intervention of the integration of the case study teaching strategy as compared to the pre-intervention average. The findings have implications for educators to help students develop insight into the usefulness of case studies as a teaching learning method to foster students' CT skills.

Introduction

The rapidly changing world of healthcare increasingly requires that nurses be competent and skillful in dealing with complex information, technology, and complex patient disease states. In order to cope effectively with the various challenges to solve patients' problems, these students should be prepared to think critically. The American Nurses Association (2008) has identified the use of critical thinking (CT) as the standard for nursing practice (Alfaro-LeFevre, 2006). CT is the art of analyzing and evaluating thinking with the hope to improve an outcome (Paul & Elder, 2008). Skills of CT in nursing consist of "analyzing, applying standards, discriminating,

information seeking, logical reasoning, and predicting and transforming knowledge" (Scheffer & Rubenfeld, 2000, p. 352).

In the nursing profession, in which nurses are expected to be able to make decisions in patient care situations that are complicated and intricate, CT is essential (Navedo, 2006). Thinking critically is not only necessary, but considered crucial for the empirical progression of nursing practice (Pittman, 2006). The educational goal for the profession of nursing requires the development of CT, both from an academic and clinical perspective (University of New Mexico, 2008). There are many definitions, interpretations, and applications of CT; as a result, nursing students must be able to understand and apply these skills throughout the educational process (Wilkenson & Van Leuven, 2007). According to Staib (2003), one of the challenges nursing educators continue to face is finding innovative teaching methodologies to improve CT in nurses and nursing students. Young and Patterson (2007) asserted that the major objectives of nursing education have been the development of students' CT.

Diekelmann and Smythe (2004) proposed that CT involves both cognitive and affective skills that can be taught, learned, and measured, and is both a process and an outcome, involving reflection, dialogue, and inquiry that encourages students and instructors to ask why and why not. A current pedagogical approach to cultivate students' CT is the case study teaching method (Herreid, 2004). Case studies are narratives or situations that present unresolved and provocative issues or questions. Ignatavicius and Workman (2009) found that during the transition from student to practitioner, CT requires a logical, systematic approach to the problem solving process that is facilitated by the integration of case studies as a student-centered teaching strategy.

This process allows for the development of problem-solving methods necessary to emphasize the cognitive connection between theory and practice. Students educated by case studies are encouraged to follow a sequence of steps as they learn how to collect, analyze, and interpret biological, psychological, and social data on their patients (Ignatavicius & Workman, 2009). Based on the data, students develop a nursing diagnosis and outcome-oriented goals and interventions, for their patients, families, and other members of the health care team. Evaluation of the outcomes is a continual process with revision occurring as often as necessary (Young & Patterson, 2007). As a teaching and learning tool, cases challenge participants to critique, analyze, make judgments, speculate and express reasoned opinions (DeYoung, 2003). Cases are important for bringing real world problems into a classroom to ensure active participation and may lead to innovative solutions to problems (Young & Patterson, 2007). Case teaching is learner centered, characterized by intense interaction between faculty and student as well as among students in a group (Herreid, 2004). According to Beyea (2004), case studies help students to remember certain facts and details without having to use memorization. The process of student participation encourages engagement in the learning process and supports an active, rather than passive learning experience because students are required to analyze the case study to identify the major problems that exist and to suggest solutions to these problems (Beyea, 2004). In nursing education, instructors use these cases to teach students about specific disease processes, patient care, and nursing interventions that will help them to retain important concepts regarding the nursing process. It is in this way that case studies help students to see the relevance of a topic, and the scenarios motivate students to want to engage in the process of learning.

Although the literature has indicated that case studies improve CT of students, all the reported studies were conducted in traditional programs that offer three years Associate Degree or at least four years baccalaureate programs (Bowers, 2004; Delpier, 2006; Oermann & Heinrich, 2004; Sandstrom, 2006; Young & Patterson, 2007). Yet, there has been no published research on the relationship between case study teaching method and CT of nursing students educated in generic accelerated baccalaureate nursing programs. The accelerated curriculum design compresses four years of full time program of study into an average of about 15 months (the most common program length in general range between 11 and 18 months) of a program of study. Most of the accelerated nursing programs in the US are offered to the second degree students. This is the first research study on this generic accelerated baccalaureate of science in nursing (BSN) program that was recently offered for the first time at a college in the Northeast, in which this study was conducted. This program is designed in a 32-month year-round format. Upon completion of the program, students are eligible to sit for the National Council of State Boards of Nursing Licensure Examination for Registered Nurses (NCLEX-RN).

Purpose

The purpose of this study was to measure and compare the CT skills of generic accelerated baccalaureate nursing students before and after being educated using the case study pedagogical approach. This study strived to answer the following research question: Is there a difference in the mean scores of CT skills of generic accelerated baccalaureate nursing students educated by case study pedagogical method from the pretest to posttest as measured by the HESI CT test?

The research hypothesis in this study was as follows: There is a difference in the adjusted differences in mean scores of CT skills of generic accelerated baccalaureate nursing students educated by case study pedagogical method from the pretest to posttest as measured by the HESI CT test.

Literature Review

The literature review in this study was based on Gough's framework for the appraisal of quality and relevance of evidence that considers the nature of the research question being asked, strategies to obtain evidence for inclusion, and empirical and conceptual data and analysis (Gough, 2011). CT, a phrase derived from roots in ancient Greek, was used by Socrates in his approach to learning over 2,000 years ago (Fisher, 2008). It is the process of reflecting and examining data and using judgment to create solutions to problems. Simply stated, CT is the understanding and application of knowledge. At higher levels, it develops into more complex skills of analyzing, synthesizing and evaluating situations (Critical thinking, 2008). CT moves beyond rote memorization of facts to problem solving and searching for answers. It involves the ability to have open communication and effective problem solving skills that are necessary for students' learning (Herreid, 2004).

According to Herreid (2004), CT cannot be just the pedagogical content knowledge of a discipline. Because some students have innate abilities to ask great questions and to pull information out of any situation, it is imperative that educators teach CT in some way to cultivate this construct. Herreid (2004) asserted that although content is important, CT must have something to do with the process, the way we think, and the way we go about problem solving and asking questions. General characteristic of critical thinkers include skepticism, which can be demonstrated when students silently

or openly ask, "What is the evidence for this idea? Why should I believe this? Are there other explanations for the data? Is there another way to explain the data? What do you mean when you say this?" According to Herreid (2004), because analyzing, arguing, challenging, and problem solving are hallmarks of CT, then case studies are essential for cultivating students' CT as cases inquire them to brainstorm solutions, prioritize them, and support each resolution by evidence. According to Tomey (2003), teaching by case studies provides a process of collaborative learning that facilitates active and reflective learning and leads to cultivation of CT and problem solving skills. According to Herreid (2007), case study teaching method provides students with opportunities to develop CT and evaluation skills through working collaboratively in small groups to analyze real-life situations.

Researchers reported that the case study method develops CT skills while increasing clinical skills, knowledge, and confidence. As a case in point, Bowers (2004) conducted a research using a quasi-experimental design that examined the effectiveness of case studies and student nurses' clinical decision-making abilities. A convenience sample of second-semester ADN students in two groups was used. The experimental group received instruction through case studies, whereas the control group through traditional lecture only. Using independent *t* tests to compare the HESI exam scores, the overall score of the experimental group was higher than the overall exam score of the control group, suggesting to the authors that nursing students' clinical decision-making abilities can be enhanced through the teaching strategy of case studies. Students in Bowers's (2004) study also completed a student satisfaction survey that had 20 Likert-type questions designed to elicit data on how case study strategy helped in preparation of the HESI exam, and open-

ended questions designed for student comments and feedback of the case studies intervention. The findings revealed to the researchers a positive perception of the case study teaching strategy. From the open-ended questions, major themes emerged that re-enforced the positive aspects of the case study interventions. Delpier (2006) suggested that case studies encourage students to critically think through the process of inquiry because they are positioned to interact with information in the scenarios like they would in the actual clinical setting. Kaddoura (2011) conducted a study to examine CT abilities of nursing students from two different curricular approaches, case-based learning (CBL) and didactic teaching. The findings revealed that the CBL participants performed better in the total CT score and all CT subscales than the didactic program participants. Nurses must be able to use theory to make decisions related to complex clinical situations. When developing and presenting case studies, educators should be familiar enough with the material to include realistic details whether the inspiration comes from the text book, clinical experiences, or the educator's personal experiences (Oermann, Truesdell, & Ziolkowski, 2000). If students are not familiar with using case studies, they may experience some anxiety with this type of non-structured format, especially if they predominately attend lecture courses (Delpier, 2006). Case studies are not as popular a teaching strategy in nursing education primarily due to the large and complex amount of content in most nursing curriculums, and the increased time required to develop the cases studies (Sandstrom, 2006).

Method

Design

The design used in this study was the one group pretest posttest design to compare the students' CT scores of pretest and posttest, taken before and after being taught using case

studies in the Fundamentals of Nursing course. The course was taught during a standard 17-week semester, two times a week (75 minute class period each). The dependent variable was the HESI CT test and the independent variable was the case study pedagogical method. The CT scores were measured on a continuous scale with a range of 0 to 1,000, and were calculated automatically when the students completed the test. Lower scores indicated less knowledge of CT within the discipline of nursing while higher scores indicated more knowledge of CT within the discipline of nursing. This measure was obtained prior to (pre), and after (post) the case study teaching method.

Sample and Setting

Convenience sampling method was used and 83 second-year generic accelerated baccalaureate nursing students were invited to take part in this study at a school of nursing in a College in the Northeast. This college offers an accelerated 32-month streamlined program to appeal to the high school graduate who is seeking to complete a bachelor in nursing in less than three years instead of the traditional four to five years. Out of the 83 students, seventy five (90%) voluntarily chose to participate in the study. Before data collection, the participants filled out and signed a voluntary consent form. Students had the option to agree or not agree to participate in the study without any pressure or negative repercussions if they chose not to participate. According to Mills (2003), although the process of convenience sampling may not incorporate the strongest validity in design, it continues to be widely used in educational research due to the nature of accessible classroom or specific populations.

A colleague of the researchers, who was not associated with the Fundamentals of Nursing course or students acted as the research assistant for the duration of the

study. The assistant identified the students in the study sample and provided study codes in order to maintain anonymity and protect their identity. The researchers obtained access to data after it had been coded and entered into the appropriate software program by the assistant.

The participants completed the same CT test (pretest and posttest) at the beginning and then again at the end of their Fundamentals of Nursing course, which was taught using the case study method. The use of case study pedagogical method as a teaching tool was not utilized for these students prior to taking this course. The case studies were related to the content being taught and were focused on patient case presentation using real life patients' clinical situations. It's noteworthy that the goal is for students to learn about ways of thinking. This may or may not be helpful in preparing students becoming skilled clinicians; however, it may be the first step.

Treatment

The treatment in this study was the case study pedagogical method, by which the Fundamentals of Nursing course was taught. In this method, triggers or questions were asked related to the application of knowledge to nursing practice. Students were encouraged to question, inquire, and search bodies of knowledge using various resources in order to think about the answers and then share their thoughts with their peers and faculty in order to validate their thinking. All of the students participated fairly equally in the discussion and followed the group norms and dynamics appropriately as specified in the course syllabus. At the beginning of the course, students were introduced to the case method and their role in this approach and the guidelines were documented in the syllabus. The students worked in small groups with five to six students per group over about 50 learning hours (3 hours per week for 17 weeks). This number

of students in each group is considered optimal according to Herreid (2004).

In this method, the faculty did not didactically lecture the content, but acted as a facilitator for students' learning. As the students were actively engaged in their learning, the faculty wandered among the groups to listen to their discussion, guide them, and make sure they were on track in solving the clinical problems in the scenario. The teacher often asked the groups questions to validate their answers by providing evidence. The teacher gave the students adequate time to reflect on what they were learning. After intense discussion in groups, students reported group consensus about the answers to all the class. This was followed by a whole class discussion where groups were also expected to respond to questions they had not prepared. Students were encouraged to contribute to discussions evenly as the faculty formed effective peer-to-peer relationships between students to help increase their interaction and cooperation, respect the views of all students, remain engaged and not to dominate the discussion.

Instrument

The HESI CT test was the tool used to score the students' CT skills in this study. This 30-item multiple-choice computerized exam was developed by Health Education Systems Inc. (HESI), software based testing company. It is a nationwide standardized test for nursing students and it has been widely used by nursing schools. It was selected for this study as it is designed to assess CT skills related to specific nursing content. This test covers the following CT skills: (1) Analysis of Data, (2) Argument Analysis, (3) Prioritization of Care, (4) Problem Solving, and (5) Resolution Biases. Each student receives an overall CT score and a score on each of the subscales. Possible scores on the test range from 0-1000 (Morrison et al., 2008).

The method used by HESI for the development of CT test items is based on concepts derived from the CT theory described by Paul (1992), and the cognitive taxonomy developed by Bloom (1956), and is grounded in classical test theory. The model for developing CT test items was developed by Nibert, Young, and Brit (2003) and described by Morrison, Nibert, & Flick (2006). These objectives are designed to test the student's ability to think critically and make appropriate decisions in a given situation. The objectives correspond to learning objectives that ask the student to analyze, synthesize, plan, interpret, or evaluate (Elsevier, 2008).

The HESI CT test has been shown to be reliable with reliability coefficient ranging from 0.86 to 0.99. As a measure of the overall reliability, a Kuder Richardson Formula 20 is calculated (Morrison et al., 2008). Validity of HESI CT test refers to the extent to which the test measures what it is designed to measure and is an ongoing process that incorporates assessment of content, construct, and criterion-related validity (Morrison, Nibert, & Flick, 2006). The content validity was established through the evaluation of each HESI test item for relevance of the content to current practice by expert nurse educators and clinicians in the development of the exam (Morrison et al., 2004). The construct validity was established as HESI exams measure concepts that are fundamental to new nurses entering the profession, are developed by nursing faculties from a variety of professional nursing venues, and are reflected in the NCLEX test blueprints that focus on measuring CT skills (Morrison et al., 2004). *Criterion-related validity* was also established. For nursing students, success on the NCLEX-RN that focuses on CT skills or performance in entry-level nursing positions can be predicted based on HESI test score results. These HESI CT scores, which are made based on the assumptions prepared

upon analysis of test scores, in order to predict student outcomes or performance in other related areas of practice or interest (Morrison et al., 2004, Morrison, Nibert, & Flick, 2006).

Ethical considerations

Approval from the Institutional Review Board at the College was secured. The addition of a research assistant, not associated with the course or students, strengthened the validity of the study. All student data generated from the participants was coded for identity protection, and only the research assistant had access to the data before it was coded. The assistant developed an anonymous coding system for the study participants, administered the CT pre and posttest, collected and recorded the data on a computerized flow sheet. The results were made available to the researchers following completion of the study, prior to the data analysis process.

The research assistant approached potential participants at a time in the class suitable to them and their faculty. Students were informed that participation in the study was voluntary and their participation or lack of will never affect their standing in the course or the college. They were also informed of their right to terminate at any time their participation without any penalty. Only students who consented to voluntarily take part in the study (75 out of 83) were included in the sample. In the mind of the researchers, there were no foreseeable risks associated with this study. Confidentiality of data was maintained in all cases. All identifying names were removed replaced by codes. Upon publication of this study, all raw data will be destroyed.

Data Collection and Analysis

The total number of participants was 75 (N = 75). The tool, HESI CT test, was used as a pre and posttest to measure the changes in students'CT skills from the time they began the

Fundamentals of Nursing course to the time they completed the course. The results were analyzed to determine the mean difference in student scores pre and post treatment (case study method). Prior to starting the course the participants completed a demographic survey and the HESI CT pretest. Upon completion of the course, participants were then asked to complete the same HESI CT exam (posttest). Descriptive and inferential statistics were used in the data analyses, and were done using the Statistical Package for the Social Sciences (SPSS) for windows version 19.0. Data were analyzed using an alpha level of 0.05. The researchers chose the paired *t* test to compare means on the same students over time following a case study method as treatment intervention. The paired t-tests were performed to determine whether there was a significant difference between students' pretest and post-test CT mean scores on the overall total CT and each of the CT subscales.

Although a paired *t* test was fairly appropriate to measure the hypothesis; yet, as preliminary analyses were tested to ensure no violation of the assumptions of the tests used for data analysis, a histogram for testing the shape of the population distribution showed that the data were not perfectly normally distributed, albeit not dramatically. So, a non-parametric test Wilcoxon matched pairs signed ranks test for differences was used. This nonparametric test converted scores to ranks and compared them at the time of the pretest and posttest. Descriptive statistics were calculated to describe the demographic characteristics of the sample. Demographic statistics of students' age, gender, ethnicity, GPA, study time, and working hours were included.

Findings

The participants' demographic questionnaires revealed that their mean age was 20 (SD = 1.46, range = 17-26). Eighty

five percent (85%) of the participants were females and 15% were males. The mean GPA was 2.99 (SD = 0.3, range = 2.56 –3.92). The majority of the participants were Caucasian (64%), followed by Asian (13%), African American (12%), Hispanic (7%), and others (4%). The mean number of hours students studied was 9.5 hours per week with a SD of 1.5. The mean number of hours students worked per week was 10 hours with a SD of 1.7. Participants' pre- and post CT skills were scored and tallied.

The Paired Samples Statistics t-test revealed that the mean HESI CT overall pretest score was 791 (SD = 5.786), with a posttest of 851 (SD = 4.783). The mean HESI CT Analysis pretest was 770 (SD = 8.322), with a posttest of 839 (SD = 7.133). The mean HESI CT Argument was 842 (SD = 11.684), with a posttest of 907 (SD = 8.596). The mean HESI CT Prioritization pretest was 756 (SD = 8.195), with a posttest of 833 (SD = 7.324). The mean HESI CT Problem solving pretest was 789 (SD = 7.049), with a posttest of 868 (SD = 5.598). The mean HESI CT Resolution pretest was 843 (SD = 10.771), with a posttest of 886 (SD = 8.432). The data showed an increase in mean scores of CT from the pretest to the posttest in the total HESI CT test and each of the five subscales.

Table 1: Paired Samples Test

Pairs		Paired Differences			95% Confidence Interval of the Difference		df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper		
1	HESIpost – HESIpre	60.66667	6.921048	7.99174	44.74278	76.59055	7.591 74	.000
2	PostAnalysis – PreAnalysis	69.01333	11.850083	13.68330	41.74877	96.27790	5.044 74	.000
3	PostArgument – PreArgument	64.69333	13.870111	16.01583	32.78110	96.60556	4.039 74	.000
4	PostPrioritization – PrePrioritization	76.69333	10.611926	12.25360	52.27751	101.10916	6.259 74	.000
5	PostProblemSolving – PreProblemSolving	77.68000	9.126590	10.53848	56.68162	98.67838	7.371 74	.000
6	PostResolution – PreResolution	43.52000	14.251822	16.45659	10.72954	76.31046	2.645 74	.010

The descriptive statistics for the difference between each pair of overall CT and all subscales (posttest score – pretest score) was given in Paired Samples Test (Table 1). The mean difference between the overall CT posttest and pretest was 60.67, which was actually being tested against zero. The 95% Confidence Interval values were also given in table 1. This information indicated that the true population's mean lies between 44.743 and 76.591 with a 95% probability. It can be determined that the chance of this number occurring by chance alone (given the null hypothesis) is less than 0.0001. The data suggested that the result was statistically significant $t(74) = 7.591$, $p < 0.0001$. The data indicated that we can reject the null hypothesis that students' CT skills would not change when tested at the beginning and end of the course. It could therefore be suggested that the difference between pretest and posttest CT scores is likely to have been due to some systematic cause.

In the same manner, table 1 indicated that all the mean differences between the pre and posttest of all the subscales were statistically significant (all p-values < 0.0001, except for resolution, $p = 0.01$). Thus, the paired samples *t* test was statistically significant for the pretest and posttest composite and four of the subscale HESI CT scores. If confounds are eliminated, this systematic cause must have been the case studies teaching method.

A Wilcoxon matched pairs signed ranks test (Table 2) revealed a statistically significant improvement in CT from the pretest to the post test in the overall CT scores ($z = -6.890$, $p < 0.001$), analysis ($z = -5.004$, $p < 0.001$), argument ($z = -3.580$, $p < 0.001$), prioritization ($z = -5.658$, $p < 0.001$), and problem solving ($z = -6.594$, $p < 0.001$). However, it revealed no statistical significance in the differences in posttest and pretest scores of resolution ($z = -1.362$, $p = 0.173$). Therefore, under both tests (paired t and Wilcoxon) the differences in scores between posttest and pretest were

significant in the overall CT and all subscales, except for the resolution.

Table 2: Wilcoxon Signed Ranks Test
Test Statistics[b]

	HESIpost - HESIpre	PostAnalysis- PreAnalysis	PostArgument -PreArgument	PostPrioritization- PrePrioritization	PostProblemSolving -PreProblemSolving	PostResolution- PreResolution
Z	-6.890[a]	-5.004[a]	-3.580[a]	-5.658[a]	-6.594[a]	-1.362[a]
Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000	.173

a. Based on negative ranks.
b. Wilcoxon Signed Ranks Test

The difference in the HESI pretest can be due to a number of factors. To adjust for the performance on the pretest, the researchers regressed the difference on the pretest score (alternatively all pre- subscale scores) and employed the predicted differences as the adjusted differences in scores. It is worthy to note that the residuals from the regression were inspected for satisfying the regression assumptions. A scatter plot of residuals versus predicted values did not indicate serious violations of the regression assumption for linearity although there was a slight hint of heteroskedasticity. Furthermore, a normal probability plot and a histogram of residuals illustrated non-significant deviation from normality.

Then the researchers performed a one-sample t-test (Table 3) for the mean of these adjusted differences. The data revealed that the mean is significantly different from zero ($t = 12.699$, $Df = 82$, $p < 0.001$). Because the p value was less than 0.05, the null hypothesis of equality of means can be rejected. The data indicated that the sample mean is not equal to the population means

Table 3: One-Sample Test

Test Value = 0	Unstandardized Predicted Value adjusted for all subscales
T	12.699
Df	82
Sig. (2-tailed)	.000
Mean Difference	61.32530120
95% Confidence Interval of the Difference	
Lower	51.7183137
Upper	70.9322888

In conclusion, the data revealed that even after adjusting for the pretest performance (by employing predicted values from the regression) the difference was significant. Hence, the researchers hypothesized that this significant improvement was due to the case studies teaching methodology used. The researchers noted that, in order to be able to further validate this conclusion, they would need a control group as well, to isolate the potential effect of students being familiar with the test (i.e. studying after the first attempt). Alternatively t and even better, a new posttest can be administered but it should be equally difficult as the first test (the equality validated on a different set of students). In summary the analysis findings revealed that the HESI CT test scores identified a statistically significant difference with a larger average score after the intervention of the integration of the case-based teaching strategies as compared to the pre-intervention average. The data then suggested that there is evidence that teaching by case studies method enhances CT skills in generic accelerated baccalaureate nursing students. The researchers suggested that future studies be conducted with a larger sample, a control group, and more stringent safeguards against confounds.

Discussion

Findings of this study indicated that students' CT skills increased using the case method approach. From pre-test to post-test, students' overall scores and scores on analysis, argument, problem solving, and prioritization subscales significantly increased. The attribute of this improvement in CT is thought to be the use of case studies teaching method. The findings support the notion that using case study teaching method can promote students' CT skills since all

scenarios used in the Fundamentals of Nursing course were derived from the real nursing practice situations.

The findings of this study conforms to Jones and Sheridan (1999) who asserted that case study instructional approach is frequently described in the nursing literature as effective in encouraging CT of nursing students. According to Herreid (2007), the case study pedagogical method has the real potential to develop skepticism, flexibility, and the ability to see alternative approaches. By engaging in the process of analyzing the case studies, students' CT and problem solving skills are cultivated (Herreid, 2007).This teaching method assists students in applying nursing knowledge to practice (Herreid, 2004). It also provides a developmental structure that moves beyond memorization of information to the application of knowledge to thinking that identifies the individual contextual elements and integrates these elements to create a framework of contextual knowledge to fill in the theory practice gap (Herreid, 2004). Case studies "encourage students to work through problem situations, generate hypotheses and test them against relevant literature and personal experiences within the context of a caring framework. It offers students opportunities to discuss real-life situations and nursing challenges in a safe environment and stimulates students to think critically since cases offer no concrete answers" (Chen & Lin, 2003, p. 138).

The study demonstrates the importance of case studies teaching method in developing a process of CT in practice, specifically the skills pertaining to analysis, argument, prioritization, and problem solving. This conforms to the work of Ferrario (2003) who affirmed that advantages of the case study teaching include promotion of learners' CT, reflection, teacher-student dialogue, and group discussions. The data from this study supports discipline specific changes in CT as demonstrated by Hassan and Madhum (2007) that

changes in mean scores occurred in the discipline of nursing. It can be suggested that case study pedagogy in specific disciplines may play a significant part in the acquisition of CT skills.

Implications and Recommendations

The findings revealed that the nursing students' CT skills increased after the use of case study teaching method. Utilizing the case studies method has implications for educating nursing students as it highlights their need for incorporating this teaching method in the classroom. There are important implications for nursing students' learning. Without developed CT skills, nursing care at best may be suboptimal and impact patient outcomes. Nursing students should use interactive learning strategies such as case studies to be able to provide safe practice for their patients. The study also has implications for designing and refining case development methods. When preparing these cases, teachers should consider that such scenarios need to be engaging and challenging in order to trigger the students' CT. Educators should also consider integrating case studies when preparing tests to shift the students focus from memorizing information to the analysis and application of knowledge in practical situations. The findings that student scores on resolution didn't significantly improve from the pretest to posttest have implications on nursing programs. The resolution concept need to be better integrated in the content of nursing courses or in the case studies and triggers to foster resolution development. It was anticipated that the outcomes of this study would inform the design of curricular and pedagogical practices that promote enhancement of CT in nursing students in accelerated baccalaureate nursing programs.

The findings provide empirical evidence to verify promoting CT skills through case study teaching method.

Further studies need to compare the effects on CT development between case study teaching method and other teaching methods. The findings call for improved educational practices with cases and research opportunities in case studies teaching and learning approach. Research is recommended to further explore the case studies teaching and learning using the mixed method quantitative and qualitative research with a larger sample size. Areas for further research also included replicating this study with the addition of control group. Although data in this study and in the literature support case studies as teaching strategies that help nursing students promote CT, it would be proposed if further studies can explore whether case studies are good to prepare the students for becoming good clinician. It would also be suggested that further studies explore CT of faculty and find out whether all teachers are strong critical thinkers, and if not, to investigate whether it is important and whether using case studies improve teachers' CT.

Limitations

The major limitation to this study is the nature of the one-group, pretest-posttest design, which, according to Munro (2011) is a common but flawed design that is subject to potential threats of internal validity as history and maturation. Thus, the changes in CT could have occurred because of factors other than the case study method intervention. Additional limitations include the small sample size, use of a convenience sample of students from a single nursing program, the disproportionate number of males versus females, and only one semester of data collection. These limitations may pose drawbacks to generalize the study findings to all other nursing program populations and nursing students in the US colleges.

Conclusion

Based on previous literature and the results presented in this study, the investigators concluded that case study pedagogical method helps improve CT skills in generic accelerated baccalaureate nursing students. It is hoped that case studies be considered by faculty searching for better ways to improve CT in teaching and learning. It is suggested that an extended study be conducted to explore age, gender, and ethnicity differences and whether the number of hours that nursing students study and work have any impact on the development of their CT. In conclusion, the case method approach promoted nursing students' CT skills.

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