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## **Keywords**

Critical thinking, Didactic teaching, Case-based learning, Case studies, Cooperative learning, Active teaching-learning strategies

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## **Critical Thinking Skills of Nursing Students in Lecture-Based Teaching and Case-Based Learning**

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### **Abstract**

In today's technologically advanced healthcare world, nursing students should be active learners and think critically to provide safe patient care. A strategy that promotes students' active learning is case-based learning (CBL). The purpose of this study was to examine critical thinking (CT) abilities of nursing students from two different curricular approaches, CBL and didactic teaching. The design used in this research was a comparative descriptive survey. The sample included 103 participants; 65 students from the CBL nursing program and 38 students from the didactic nursing program offered by the MOH Schools of Nursing in the United Arab Emirates (UAE). Data were collected using the California Critical Thinking Skills Test (CCTST) Form B to measure the CT abilities of the participants. The data were analyzed using the SPSS. The independent t-test results revealed that the CBL participants performed better in the total CT score and all CT subscales than the didactic program participants.

**Key Words:** Critical thinking, didactic teaching, case-based learning, case studies, cooperative learning, active teaching-learning strategies.

### **Introduction**

The world of nursing has been changing daily specially in the last two decades. In today's fast paced, technologically advanced world, the challenge for nursing faculty is to teach students critical thinking (CT) skills and the ability to practice competently in a variety of situations. The rapidly changing nature of the health care system presents nurses with varied complex practice issues with no clear solutions. These health care problems require nursing students and nurses to have CT skills (Bambini, Washburn, & Perkins, 2009). Educators have to equip nursing students with skills that promote their CT to solve complex issues. The development of CT skills requires students to engage in discussions to become active participants in their own learning (Bucy, 2006). A major strategy that promotes students' active learning and provides their prudent preparation for clinical practice is CBL; case-based learning (Lowenstein & Bradshaw, 2001).

According to Lowenstein and Bradshaw (2001), CBL engages students and teachers in analytic dialogue about nursing situations by helping learners analyze an authentic case to identify client problems, compare and evaluate optional solutions, and decide how to deal with clinical situations. CBL demands active participation from learners, and it supports professional practice goals by encouraging learner-teacher interactions. It also offers students opportunities to discuss real-life situations and nursing challenges in a safe environment and stimulates students "to think critically since the cases offer no concrete answers" (Chen & Lin, 2003, p. 138).

Using CBL prepares students for the principles of CT, which has become an essential outcome in most schools of nursing today. No matter what type of program students attended previously this skill has been fundamental to their practice. Nursing faculty strive to prepare nurses who think critically in order to elicit and interpret information, integrate multiple sources of data; solve clinical problems, make sound clinical judgment and provide logical scientific rationale for their decision-making process (Gentner, Loewenstein, & Thompson, 2003).

The staff of the Ministry of Health (MOH) Institutes of Nursing in the United Arab Emirates (UAE), which are managed by the same general director and offer the same nursing curriculum, recognized the significance of CT in nursing education. The method of teaching instruction had been the didactic, face to face teaching strategy in all the MOH Institutes. Needs assessment was done by the MOH to assess the satisfaction of the MOH hospitals, in which the vast majority of the nursing graduates were employed, with the performance of those graduates. The results revealed a major concern with the ability of the graduates to apply the knowledge they learned at the Institutes of Nursing to solve critical problems and make sound decisions related to effective patient care.

Based on the feedback of the hospitals' nurse managers, the Institutes of Nursing faculty and administration sought ways in which students graduating from their nursing program could be equipped to meet the challenges presented by the demand for independent thought in clinical decision making. A strategic review of the didactic nursing program took place and led to a complete review of their nursing curriculum to integrate teaching and learning activities that develops students' CT.

However, it was not clear to them which type of curriculum to adopt due to lack of experience in using any other curriculum, apart from the didactic teaching, in the entire gulf region. This uncertainty of what curriculum could be appropriate to espouse was also attributed to lack of adequate literature on teaching and learning strategies that promote students' CT skills. After consulting with a western university, a suggestion was to adopt the case-based learning (CBL) curriculum and conduct research to evaluate its effectiveness in terms of its impact on the students' CT. This was done by progressively replacing the traditional lecture-based teaching program, which was perceived by the MOH hospitals and Institutes of Nursing administration as not conducive to students' CT, by the CBL as an approach to facilitate students' learning by using relevant case studies and discussion to engage students in all courses. Yet, this study was the first of its kind in the gulf region, including the UAE.

The nursing program at the Institutes of Nursing is a three-year Diploma program designed for students who hold an official Secondary School (high school) Certificate from the UAE, or its equivalent. The language of instruction at the Institutes is English. In each semester an English course is offered according to the educational developmental needs of the students. The ultimate goal of these courses is to maintain academic professional functioning since English is the language used in all health care facilities in the multicultural society of the UAE. The mission of the Institutes is to prepare a nursing workforce (from the UAE and Arab citizens) that is responsive to the actual and potential health needs of the UAE community, wherever they reside. The program is committed to the preparation of generalist, Arabic-speaking nurses who employ the nursing process and CT skills in meeting the human needs of clients as individuals, families and communities throughout the life span. Recently, the MOH signed an agreement with the Higher Colleges of Technology, the other major provider of nursing programs in the UAE, to collaborate in the delivery, management, teaching and

evaluation of the Bachelor of Science in Nursing at the three Federal Institutes of Nursing at Sharja, Ras Al Khaima and Fujaira.

As mentioned earlier, the Institutes of Nursing have undergone changes in an endeavour to promote students' CT. These changes have affected the students and faculties' roles. The CBL adopted nowadays in the Institutes promotes a process-oriented curriculum, in which the teacher becomes acting as a facilitator of the teaching-learning process. Students are expected to be active participants in the process and develop skills of problem solving and CT in a collaborative approach to the care of patients, who are the major focus of the nursing program. Presently, the three Institutes of Nursing are maintained uniformly under the central management of Higher Administration located in Sharja Campus. Despite the documented importance of applying CT skills in nursing education, there is a noticed dearth of research exploring the development of these skills among nursing students in the UAE. Very little has been done in the UAE in terms of empirical research comparing the influence of various teaching-learning approaches, particularly traditional lecture-based teaching and CBL, in facilitating the development of nursing students' CT skills. Specifically, prior to this study, no research was done to investigate the development of CT skills in the traditional didactic or the adopted CBL curriculum in the MOH Institutes of Nursing in the UAE and neighbourhood countries. For this reason, this study was conducted in an attempt to answer the following research question: "Will there be a significant difference in the CT ability between nursing students educated using the CBL program and those homogeneous students educated using the traditional lecture-based program?"

### **Purpose**

This study examined CT skills of nursing students from two different approaches, a CBL and a traditional lecture-based nursing program. The purpose was to compare the difference in CT abilities of the participants from both nursing programs. The objectives of this study were to:

1. Measure CT skills of nursing students educated using a didactic nursing program.
2. Measure CT skills of nursing students educated using a CBL nursing program.
3. Compare the level of CT of nursing students educated using a didactic nursing program to the level of CT of nursing students educated using a CBL nursing program.

### **The Null Hypothesis**

There will be no significant difference in the CT scores between nursing students educated using the CBL program and those students educated using the traditional lecture-based program.

## **Review of Relevant Literature**

### **Critical Thinking (CT)**

There is no standard, universally accepted, all-inclusive framework or set of criteria by which to describe or evaluate CT (Myrick, 2002). Varied CT definitions and perspectives have been proposed. Some authors included cognitive skills and attitudes in their description of CT (Profetto-McGrath, 2003). Other authors expanded the CT definition to include investigation and reflection on all aspects of clinical problems to decide on an

appropriate course of action (Bowles, 2000). Morrison and Walsh-Free (2001) asserted that CT incorporates assessment and multi-logical thinking as a key requirement for nurses to be able to relate and apply concepts to clinical situations. Giancarlo, Blohm, and Urda asserted that, "CT is widely recognized as an essential component of education and a powerful and vital resource in one's personal and civic life" (2004, p. 347). According to Case, "Every curriculum document mentions CT, and there is universal agreement about the need to make thoughtful judgments in virtually every aspect of our lives - from who and what to believe to how and when to act" (2005, p. 45).

Critical thinking is described in many ways, but is most importantly viewed as a process rather than an endpoint or objective (Petress, 2004). Critical thinking is not limited to disciplines, knowledge, or experience and occurs within and across all these domains (Paul & Elder, 2002). Critical thinking is developed through reflection both on experience and knowledge. Giancarlo and Facione (2007) asserted that CT is a disciplined, self-directed cognitive process leading to high quality decisions and judgments through the analysis, assessment and reformulation of thinking. The operational definition of CT used for this study was the one described by Facione (2006) that involves identifying problems, assessing resources and generating possible solutions. This definition has frequently been used in the fields of nursing and education. According to Facione (2006), CT skills include the ability to analyze, synthesize, infer, and evaluate situations.

Today, more than ever, nursing students should demonstrate mastery of CT skills prior to their graduation from their respective nursing school. Critical thinking has been considered an essential nursing competency since 1997 (Shirrell, 2008). It has been a controversial issue whether CT is a concept that can be taught. As a case in point, Facione (2006) argued that CT skills can be taught and learned. Case (2005, p. 45) stated that he "is disheartened by the failures to teach CT." A research study by Tanner (2005) about teaching students to think critically was inconclusive revealing that there is no consistent relationship between teacher CT and student CT. It is important for nurses to develop CT, problem solving, and reflective practice techniques to expand their clinical decision-making skills (Hoffman, Duffield, & Donoghue, 2004).

### **Traditional Educational Programs**

Traditional educational curricula are didactic, teacher-centered teaching methods organized around subject areas or disciplines (Burgan, 2006). A prominent feature of such an educational philosophy is a hierarchical view of teacher and students, in which the faculty teaches, and students learn by listening to the teacher. The teacher delivers structured packages of theoretical or practical knowledge complete with analysis, insight, and conclusions, while students are expected to take notes, memorize and master the imparted information (Loving & Wilson, 2000). Hence, the traditional classroom is teacher-centered, with students passively accepting information given by the lecturer, who is in the position of authority. The teacher decides about the teaching-learning process. A traditional teaching-learning environment tends to produce shallow, surface thinkers who primarily rely on rote memory rather than careful understanding of the content (Jeffries, 2005).

It has been argued that outcomes of didactic learning fail to exhibit a patient-oriented; critically thinking nurse capable of adequate decision making in practice, as lecturing principally provide basic knowledge and theory (Royse & Newton, 2007). Lecturing has been a traditional method of teaching nursing students with or without the use of PowerPoint slides to pass on the content to the students. It provides the foundation for the application of knowledge to real-life scenarios and complex health problems (Flanagan & McCausland, 2007). The didactic lecture-based teaching approach is associated with teacher-centered

environments, where teachers provide information to students, who reproduce the information in examinations or assignments (Barrett, Bower, & Donovan, 2007). There are some advantages for lecturing in the way that novice nursing students need teaching on unfamiliar information and how to use the acquired information (Burgan, 2006). When lecture-based teaching is used in conjunction with active teaching strategies such as analytical questioning and group discussion it helps students with the acquisition of knowledge. According to Charlton (2006), lectures are for the most part a form of spoken communication that is delivered to an audience by an actually-present and visible person.

Lectures create a formally arranged social event that fits human nature and artificially manipulates human psychology to improve learning (Charlton, 2006). Once combined with active learning strategies, teaching becomes a process where the learner takes an energetic role in education. Active learning is usually enjoyable, motivational and effective, and retention of knowledge is perceived to be increased (Petress, 2008). According to Richardson (2008), the key student behavior that brings about active learning is engagement. Basic elements of active learning include talking, listening, reading, writing and reflecting (Karamustafoglu, Costu, & Ayas, 2006). According to Kane (2001), it is satisfying for educators to think that students might enjoy themselves while being engaged in their learning, as they learn something useful.

### **Case-Based Learning (CBL)**

CBL is an instructional method within the context of student-centered learning to facilitate students' learning and teach them to decide about their perspective field, by the use of case studies. The teacher in this method presents a case study that mimics a genuine clinical situation from a proper healthcare facility and asks the students various questions about the case (Woody, Albrecht, Hines, & Hodgson, 1999). This teaching method was first introduced in the 1870s by Harvard school faculty. It has been used for many years in business and law schools at Harvard University. Then, it was implemented in the medical and health professions schools. Lately, CBL has been adopted by various disciplines including nursing both as a teaching strategy and as a problem-solving and decision-making tool. Case studies often are long and detailed, describing fairly well-defined problems. Learners can apply their background knowledge as well as new learning to solve the problem (DeYoung, 2003). Because the primary aim of CBL is to develop CT and problem-solving skills, its application has been used in nursing education (Down & Davidhizar, 1999). The cases in CBL help build on prior knowledge, integrate data, and consider application to future situations. Cases encourage teamwork and accountability, and are realistic and motivating to adult learners to be engaged in their learning to think about plausible answers instead of passively receiving the information (Bastable, 2003).

Rowles and Brigham (2005) suggest the following five guidelines for effective use of case studies: 1). the case study needs to focus on the most important concepts to be learned; 2). as case studies may not have one right answer, the teacher should consider alternative responses and ask students analytical questions for further discussion of the case. 3). the learning environment needs to be open, safe, and nonthreatening to facilitate students' participation. 4). all students should be engaged in the learning activity if class size allows. 5). summarization of key points is essential to ensure that students take away the most important concepts. According to Schodt (2000), CBL can be defined by contrasting it with the traditional lecture-based method. Instead of textbooks, the CBL method uses cases of description of specific situations as a narrative of a realistic problem that typically, but not always, represents real clinical situations that enable students to discover and develop their own unique framework for dealing with the case. Case-based teaching has been found to

be a more effective instructional method than conventional lecture-based teaching for promoting students' CT and decision-making skills (Carter, 1999).

CBL is a teaching method that integrates concepts, theories and practice over time in a variety of settings. It promotes reflection, teacher-student dialogue, and group discussions (Ferrario, 2003). Case developers can provide guidelines for customizing the content to match the learner levels (Morrow et al, 2003). Abboud (2000) averred that CBL is a process by which students learn by using a clinical presentation as a stimulus to acquire additional knowledge on a clinical entity to solve problems. Uys (1998) purported that CBL focuses strongly on the process of learning and covers the required content through a set of complete cases, yet she balanced the process with the content. Gwele (1999) emphasized that CBL offers learners opportunities to make meaning of their own world of nursing through active participation in their own learning, developing inquiring minds and awareness of knowledge. Cases that approximate real-world settings increase the likelihood that learners will transfer their learning from one setting to another (Weiss & Levison, 2000). Cases should reflect the backgrounds, needs and diversity of learners. They should address the goals and objectives of both learners who are challenged to analyze problems presented in cases and make rational inferences (Snyder & McWilliam, 2003).

Instructional methods for improving the process of CBL include building up students' prior knowledge; assessing students' knowledge and skills; providing specific feedback to students, and embedding various teaching aids to support student learning (Eshach & Bitterman, 2003). Cases should be designed in a thoughtful way to help reinforce the student's prior knowledge by allowing learners to progressively use the most recently acquired materials (Leong, Baldwin, & Adelman, 2003). Cases should reveal to learners the outcomes of their choices, both positive and negative, to help learners' self-assessment (Malloy, 2002). CBL aims at keeping learners engaged in thinking about answers to the cases to help them identify learning needs and explain sound scientific rationales for their choices (Thomas et al., 2001).

## **Methodology**

### **Design**

This study compared lecture-based teaching and CBL programs in terms of CT development. The design used in this quantitative research was a comparative descriptive survey as it examined and described differences in CT skills of participants in the lecture-based teaching and the CBL programs.

### **Participants and Setting**

The researcher used a convenient sample of 103 participants. The sample included all the third year nursing students (N = 65) enrolled in the CBL nursing diploma program and the third year nursing students (N = 38) from the traditional lecture-based diploma program offered by the MOH Institutes of Nursing in the United Arab Emirates (UAE). The students in the CBL group were in Sharja branch and those in the didactic program were in Fujeira branch of the MOH Institutes of Nursing. The Sharja and Fujeira Institutes of Nursing were chosen to be included in this study as they are both MOH institutes of Nursing that teach national Emirati and expatriate students. Both tend to offer the same diploma nursing courses for comparable student populations (with similar characteristics) in the UAE.

Students from both groups received the same instructional content and the same exams overseen by the same central course coordinator who ensures consistency among the



Institutes of Nursing in terms of courses' syllabi, assessment and evaluation. Before their enrolment in the three-year diploma-nursing program, all of the participants graduated from high schools that followed the traditional didactic teaching method with a general average of their cumulative grades exceeding 70 % (the two Institutes have similar admission criteria in terms of GPA, gender, age, and English proficiency level). The only difference between the two groups was the mode of delivery of the content. The CBL students were educated using Power Point slides and cases studies for three years. However, the lecture-based students were educated through didactic lecture-based method using only Power Point slides and were never exposed to CBL prior to the conduction of this study, although the plan was to change their entire curriculum to CBL the following year. For the sake of this study, the same instructor taught both sections.

### **Interventions/practical activities**

The courses' content and syllabi for both groups were designed by the same academic coordinator who coordinated all courses taught at the Institutes of Nursing. Although both groups received the same instructional materials, textbooks, tests, assignments and evaluations, the didactic group was educated using a didactic teaching using the same PowerPoint slides of the CBL group that only received additional practical activities. The same power point slides were used for both groups and these slides were prepared by the course coordinator. The CBL interventions included case studies, which were interspersed between Power Point lectures throughout the curriculum. Each case study required students to work in groups in the class to discuss the questions the teacher poses related to the cases. The nursing students were introduced to complex health problems that presented with similar signs and symptoms such as neurological, cardiovascular, respiratory, digestive, urinary tract diseases, etc.

While the teacher of the didactic group was lecturing the same material for the students who were listening to him/her, the teacher of the CBL group was seating the students in small groups of five to six, asking questions, and wandering around the classroom to ensure that all students were engaged in their learning by participating in the discussions. By lecturing, the didactic teacher was helping the students understand the content, complete their assignments, and pass the tests. On the other hand, by using case studies, the CBL facilitator was trying to help students achieve similar goals by discovering and constructing knowledge instead of just transferring the knowledge to the students.

### **Instrument**

The California Critical Thinking Skills Test (CCTST) Form B was used to collect data on CT abilities of the participants. It is an intellectually challenging standardized 34 item multiple-choice instrument administered over a 45 minutes period to test cognitive skills. The items are based on common topics intended to be of short, discipline-neutral content; problem statements; and scenarios grouped into six subscales including analysis, evaluation, inference, explanation, interpretation, and self-regulation (Facione, 2006). According to Facione (2006), the possible scores on the CCTST total scores can range from 0 to 34. Moreover, sub-scale scores on the instrument can range as follows: Analysis (0 to 9); Evaluation (0 to 14); Inference (0 to 11); Deductive reasoning (0 to 16); and Inductive reasoning (0 to 14). The sum of the scores of analysis, evaluation, and inference is equal to the CCTST total score. The inductive and deductive scales overlap with the analysis, inference, and evaluation scales (Facione, 2006)

The CCTST has undergone a number of psychometric tests by its developers. The internal reliability of 0.78 to 0.84 was computed using Kuder-Richardson (KR-20) internal consistency coefficients. Content validity was undertaken in a previous stage of

development of the CCTST, which involved 46 national experts who participated in a Delphi survey. Concurrent validity was measured by correlating the CCTST with college entry scores such as the Scholastic Aptitude Test verbal scores (correlation alpha = 0.55) and the GRE (0.72). Construct validity was supported by significant correlation between CCTST and student gender, ethnicity, academic major and self-esteem when administered to 1196 university students scores (Facione, 2006).

For the UAE context, the feasibility and use of the CCTST was validated by a pilot study, which was conducted almost three weeks prior to the data collection. The CCTST (Form B) was administered by a facilitator to a small convenient sample of twenty five senior diploma nursing students Ras Al Khaima MOH Institute of Nursing that was not included in the actual study. This pilot study was meant to test the feasibility of using the CCTST with the UAE students whom, in addition to being a culturally different group from the original group on which the instrument was tested by its developers, are also not native English language speakers.

The results of this pilot study helped the researcher to check the English understanding of the test. It anticipated the sort of understanding of the questions by the students. Moreover, it checked how long it took the students to complete the questionnaire. The time ranged from one hour to ninety minutes with an average of seventy-five minutes. The CCTST was also sent to the English department at the MOH Institutes of nursing for the English language director and faculty who teach the students to comment on the level of understanding of the English language of the instrument. The results of the pilot study as well as the feedback received from the English director and faculty recommended translating the tool to Arabic, the mother tongue of all participants. The instrument was then translated and piloted to confirm feasibility of its use. Moreover, the pilot study results suggested allowing the participants no time limit to complete the CCTST even though in its original (English) form it required a 45 minute test period.

### **Data Collection**

Data were collected from the senior diploma students by using a demographic survey and the CCTST that were distributed to participants towards the end of the third year of their nursing program. All of the senior nursing students were sent letters inviting them to participate in the study. After getting IRB approval from the MOH Institutes of Nursing, participants' consents were obtained. Then, the researcher distributed the CCTST and survey to collect data from all the participants. The entire participants took the test at a convenient time and place that worked best for them. No time limit was set as the participants were allowed to take as long as they needed to take the test, as recommended by the pilot study. An average time taken by participants to complete the test was seventy-five minutes. The CCTST was translated to Arabic by an authorized translator because the mother tongue of all the participants was Arabic, and English was their second language.

### **Data Analysis**

The data were analyzed using the SPSS software package, version 17.0. Descriptive statistics were used to analyze demographic data of the participants. For the CT scores, the mean, the standard deviation (SD) and the entire item analysis were computed for each group. In addition, a didactic versus CBL participants' performance on the CCTST was computed using the Independent Samples t-test. The level of significance was set at 0.05.

### **Ethical Considerations**

Institutional Review Board (IRB) approval was obtained from the MOH Institutes of Nursing prior to the collection of data. All participants signed an informed consent after being

informed adequately of the research study. They were assured of their anonymity and confidentiality of their information. To ensure anonymity, each participant had a unique code number, which was used in the study. Use of a numeric code instead of names on the surveys and tests ensured confidentiality of the data. Participants were informed that participation was voluntary and that they were free to withdraw at any time without affecting their current or future academic course assessments or their standing in their program. No physical or emotional risks were caused to any of the participants. All documentation was kept in a locked office and electronic documents were password protected with only the researcher having access.

## Results

### Sample Characteristics

Analysis of the demographic data revealed that the participants from both programs were similar in most respects. They were all (100 %) females, whose primary spoken language is Arabic. The mean ages for the two groups were similar. All the participants ranged in age from 18 to 25 years with a mean of 20.55 years and a standard deviation (SD) of 1.64 years. Having started their nursing education right after graduation from their secondary schools (high school), the majority of participants in both groups fell into the 19-22 age groups (81.5 %). As for the marital status, 93 (90.3 %) of the overall participants were single and 10 (9.7 %) were married. In the lecture-based program, four (10.5 %) were married and 34 (89.5 %) were single, whereas seven (10.76 %) of the CBL program participants were married and 58 (89.24 %) were single.

### Participants' Performance on the CCTST by Educational Program

The participants' CT scores on the CCTST and its sub-skills in the lecture-based and the CBL programs varied. The lecture-based program group scored between 4 and 16 on the total CCTST, 0-7 on analysis, 1-8 on evaluation, 0-7 on inference, 1-9 on deduction and 1-8 on induction. On the other hand, the CBL program group scored between 9-23 on the total CCTST, 1-8 on analysis, 2-11 on evaluation, 2-8 on inference, 4-12 on deduction, and 2-9 on induction.

The mean CCTST total score for the participants in the CBL program in this study was higher than that for those in the lecture-based program. The mean score for the lecture-based program group was 10.11 with a SD of 3.15; and the mean score for the CBL program group was 14.45 with a SD of 2.80. The scores for the CT were extremely diverse both on the overall average score and on each subscale with those of the CBL much higher. As revealed in Table 1, the CBL participants performed better in the total and all subscales (analysis, evaluation, inference, deduction and induction) than the lecture-based program participants.

The independent sample T test was computed to test for significance in the variations of the CCTST and the subscale scores between the two groups. Table 2 presents the results of the two sample T test showing the significance, degree of freedom and mean differences for the Total CCTST in the lecture-based program and CBL program. The data indicates that the CBL participants had a higher level of CT ability than did the lecture-based program participants, as measured by total CCTST scores ( $t = 7.24$ ,  $df = 101$ ,  $p < 0.001$ ). Moreover, the CBL program participants scored significantly higher than those from the lecture-based program on the CCTST subscales measuring analysis ( $t = 3.36$ ,  $df = 101$ ,  $p < 0.001$ ); evaluation ( $t = 4.77$ ,  $df = 101$ ,  $p < 0.001$ ); inference ( $t = 5.29$ ,  $df = 101$ ,  $p < 0.001$ ); deduction ( $t = 5.95$ ,  $df = 101$ ,  $p < 0.001$ ); and induction ( $t = 3.94$ ,  $df = 101$ ,  $p < 0.001$ ).

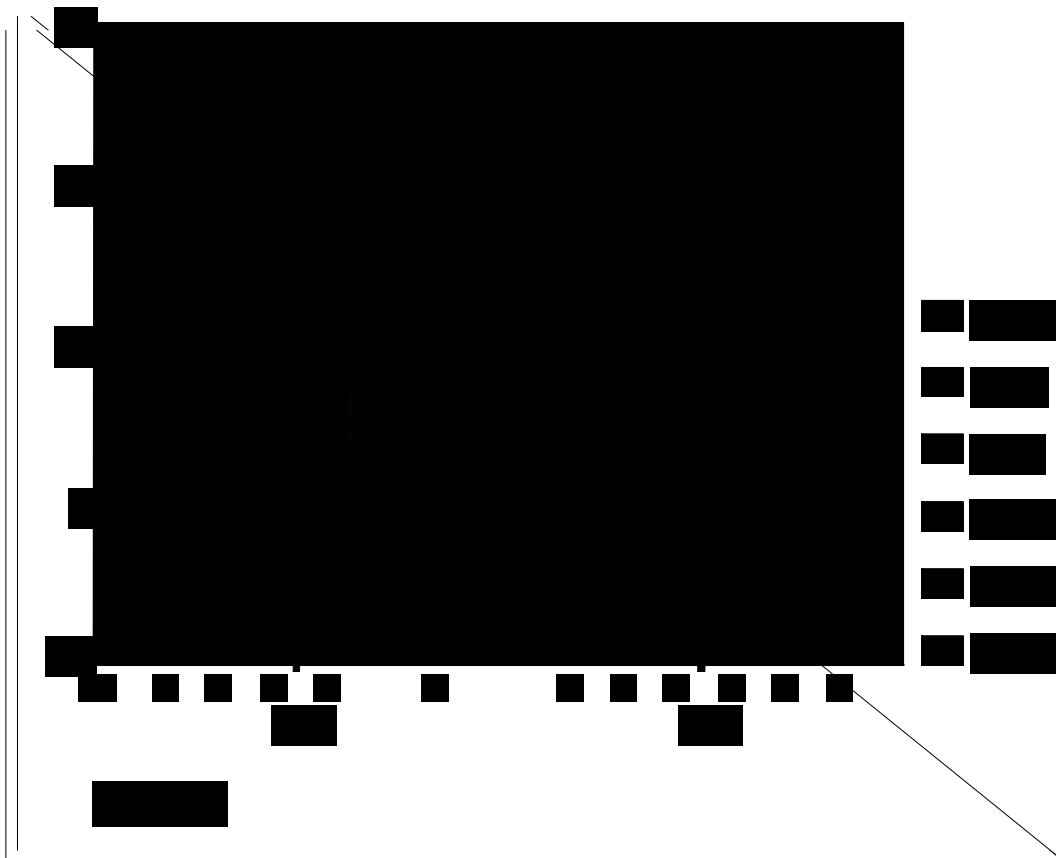
**Table 1.** Descriptive Statistics of CCTST scores by Educational Program

Variable	Lecture-Based Program Group (N = 38)			Case-Based Learning Program Group (N = 65)		
	Mean	Standard Deviation	Range	Mean	Standard Deviation	Range
<b>Total</b>	10.11	3.15	4 - 16	14.45	2.80	9 - 23
<b>Analysis</b>	3.05	1.54	0 - 7	4.03	1.36	1 - 8
<b>Evaluation</b>	3.84	1.75	1 - 8	5.57	1.79	2 - 11
<b>Inference</b>	3.21	1.69	0 - 7	4.85	1.39	2 - 8
<b>Deduction</b>	5.32	2.23	1 - 9	7.80	1.93	4 - 12
<b>Induction</b>	3.61	1.59	1 - 8	4.91	1.65	2 - 12

**Table 2.** Variations in CCTST Scores by Educational Program

CCTST Variable	t-test for Equality of Means						
	T	Df	Sig (2-tailed)	Mean Difference	St. Error Difference	95% Confidence Interval of Difference	
						Lower	Upper
<b>Total</b>	-7.24	101	.00	-4.34	.59	-5.23	-3.15
<b>Analysis</b>	-3.36	101	.00	-.98	.29	-1.56	-.34
<b>Evaluation</b>	-4.77	101	.00	-1.73	.36	-2.45	-1.01
<b>Inference</b>	-5.29	101	.00	-1.64	.31	-2.25	-1.02
<b>Deduction</b>	-5.95	101	.00	-2.48	.42	-3.31	-1.66
<b>Induction</b>	-3.94	101	.00	-1.30	.33	-1.96	-.64

**Figure 1.** Boxplot for Total CCST and Subscales for the two Groups



As the significant ( $p$ ) value was less than 0.05, the null hypothesis can be rejected. Therefore, the data suggest that there was a significant difference in CT scores between the two groups. Figure 1 shows the medians of the total CCTST score in the two educational programs. It depicts boxplots of the total CCTST and its subscales in the traditional and CBL programs. Thus, the data from this study's findings concluded that the nursing students in the CBL group obtained significantly higher scores on the of CT skills measurements than those in the lecture-based program.

## Discussion

The significantly better performance in the overall total CCTST and subscales' scores obtained by CBL program participants compared to lecture-based program participants indicates that students in a CBL program are more likely to learn to think critically than those in a traditional lecture-based education program. The results revealed that the students who had completed three years of education in a CBL curriculum tended to receive higher CT scores than a comparison group from the traditional lecture-based curriculum who actually had completed a three-year nursing program at the time of data collection but were never exposed to CBL throughout their education. This suggests that CBL might be an effective approach compared to a traditional lecture-based approach for educating nursing students in terms of improving CT skills. This represents a meaningful, positive outcome for nursing education institutions seeking alternative educational approaches in an attempt to enhance students' CT skills.

The lower CT score of the lecture-based program participants compared to the CBL participants are in line with Carter (1999) who averred that CBL is superior instructional method compared with didactic teaching in promoting a learner's CT skills. According to Carter (1999), CBL has been found to be a more effective instructional method than conventional lecture-based teaching for promoting students' CT because in CBL students are challenged to analyze problems presented in cases, make inferences based on limited information, and make decisions on uncertain, ambiguous and conflicting issues that simulate a real-world professional context. Bentley (2001) proposed that CBL provides a process of participatory learning that facilitates active and reflective learning and results in the development of CT and effective problem-solving skills. This develops critically thinking professionals who are self-directed lifelong learners. Learners are exposed to complex situations, and they can discuss and debate courses of action, and have the opportunity to perform effectively (Lowenstein & Bradshaw, 2001). Learning by cases helps students to build on prior knowledge, integrate knowledge, and consider application to future situations. Cases foster CT and encourage teamwork and accountability, and are realistic and motivating to adult learners (Bastable, 2003).

Similarly, Camiah (1998) conducted a study and found out that nursing faculty who perpetuated a didactic approach to teaching and learning failed to develop in students a sense of creativity and CT. This author proposed that student-centered approaches to education, such as CBL, develop CT skills more than teacher-centered approaches. CBL has advantages over a conventional method of teaching. It involves a self-directed mode of study using more open and flexible learning methods. Silverman (1996) demonstrated a relationship between CBL and CT and concluded that the CBL fosters analysis and CT skills more than the traditional lecture-based teaching method. This author asserted that CBL provides students with the opportunity to ask important analytical questions, consider various responses, and argue for or against various situations. CBL also enables students to think critically through situations and evaluate several possible solutions, rather than merely identifying the right answers such as in didactic teaching.

The significant differences in the CCTST scores between the two groups may also be explained by the fact that CBL students were engaged in an educational program in which fostering CT skills was an explicitly stated intended learning outcome. According to Rowles and Brigham (2005), students in CBL programs develop more CT skills because the engagement of students in their learning relies on collaborative learning rather than the traditional teaching in which students take notes and study individually. CBL starts with real-life problems found in clinical workplaces, and rely on active engagement of students to

think about determining possible solutions (Jonassen, 2004). Using cases provides a learning activity that mirrors the decision-making process needed in the clinical settings and helps students understand that learning must go beyond simply learning material to perform well on examinations (Jonassen, 2004). These cases must be relevant and interesting to stimulate student participation in problem-solving activities. Well-crafted cases bring students together in a team approach to think critically and solve a problem that may be an accurate representation of the “complexity and ambiguity of the practical world” (Rippin, Booth, Bowie, & Jordan, 2002). This strategy can be effective in helping students learn about a topic and develop problem-solving strategies and CT skills. In addition, they learn to identify the important issues and the impact of possible solutions, taking into considerations various points of view (Quarstein & Peterson, 2001).

### **Limitations**

One limitation of this study is the small sample size. The participants represented 103 students from the diploma-nursing program. This may not allow for generalizing the findings to the entire diploma nursing students or nursing students from other programs despite the fact that the plan was to develop the MOH Institutes of Nursing program to a Bachelor of Science in nursing (BSN) program. In the UAE, there is a movement to baccalaureate entry-to-practice. Another limitation is that the study included only two types of nursing programs as pertinent to teaching methodology, didactic and CBL. As there are more various nursing programs being used in academic institutions, the study findings might not be generalized to all nursing programs. A third limitation is that English was not the first language of any of the participants and The CCTST was designed for English native speakers. Even though the test was translated into Arabic, the mother tongue of all participants, there is a possibility that some students might have not completely understood the questions. Despite these limitations, this research is considered a landmark study on CT in nursing education not only in the United Arab Emirates, but in the entire Gulf region as well as it was the first of its nature. This is significant due to the scarcity of research studies related to CT in the field of nursing education in the gulf region; specifically studies focusing on CBL in comparison with traditional nursing education programs.

### **Implications and recommendations**

The results of this study have valuable implications for teaching, learning, and nursing educational research. If nursing schools are to prepare students to think critically to facilitate conceptual understanding as a basis for solving complex nursing problems, nurse educators and administrators should require that CT skills be taught, practiced and continually reinforced in meaningful context throughout the curriculum. CT skills development is most successful when such skills are grounded in a rich and elaborate content knowledge. It would seem fruitful then that CBL in nursing shifts to emphasize the development of well-structured knowledge base through the systematic provision of CT and problem-solving tasks in meaningful contexts.

The findings of this study provided an empirical evidence to prove that CBL is a teaching-learning method that is valuable in developing students’ CT skills. The findings of this study can be applied in multiple disciplines and people from other disciplines can benefit from this research. Nursing is one of various health care professions that are considered complex and challenging professions. To mention a few, pharmacy, physical therapy, physician assistant, public health, radiation therapy, medicine, and many other specialties involve health care management for multiple and complex patient problems. Health care management should be safe and effective for patient care. Patients are admitted to healthcare facilities suffering from various and multifaceted health care problems that require analytical and critical thinking (Eisenhauer, Hurley, & Dolan, 2007; Schmidt & Stewart, 2009). Students and

healthcare professionals from all these disciplines and others require CT abilities. CBL can be incorporated within all health professions in order to move beyond knowledge of health care problems and application of standardized health care interventions to provide high quality competent and safe patient care. In similar ways, CBL is also important for non-healthcare professional students and clinicians who can use it as a means in their educational process to facilitate the development of their CT in order to be more competent professionals.

Academic program directors should work with faculty collaboratively to ensure that teaching efforts are mainly directed toward more development of CT because CT skills have become central to nursing and nursing education. They should integrate CBL teaching strategies to enhance CT into nursing courses at all levels of the curriculum. This would contribute to the development of nursing students' CT skills.

As educating students to become critical thinkers is related to providing opportunities for deep learning, nurse educators have a particular responsibility to facilitate this approach. Nursing students and nurses who are effective critical thinkers are well positioned to provide advanced nursing care and solve complex clinical problems, both of which benefit patients, nurses, and institutions (Hoffman et al., 2004). For this reason, it is recommended that nursing faculty set CT as a crucial outcome and competency in their educational programs and utilize valid and reliable instruments to objectively measure the CT skills of nursing learners. Modelling CT effectively would communicate and facilitate students' CT. Faculty need to assure that they display attributes of CT when interacting with their learners. This is important in nursing education because if faculty just deliver their conclusions without their process in defining the problem, examining assumptions, generating and evaluating options, they might deprive the learners of opportunities to think critically.

As a result of this study, it is recommended that the CBL be encouraged to be used in nursing education as a teaching methodology to better enhance learners' CT. Changing the curriculum to focus on teaching strategies of CT is also recommended in an attempt to transform nursing education from educator's teaching to students' learning. The nursing curriculum needs to be regularly evaluated for teaching strategies to determine how faculty could better provide the experience for students to improve their CT skills. It is also recommended to conduct further research studies to discover more effective strategies for teaching CT for nursing students in the classroom as well as in their clinical practice. In addition, a longitudinal study to track patterns of growth in CT as nursing students step forward, after graduation during the first years of practice; after 6 months, 12 months, and 18 months afterwards to evaluate the ongoing CT skill development of nursing students.

Additionally, conducting further studies to compare more teaching-learning programs for CT development is recommended. This would help nurse educators in academic and clinical institutions to identify and adopt teaching-learning strategies that foster nurses' CT and consequently this might make the patient care safer and more effective.

## **Conclusion**

It is imperative that nurses be able to think critically to face the challenges of today's fast paced technologically advanced nursing practice. The didactic lecturing and CBL methods of instruction vary mostly in complexity and level of responsibility placed upon the students. While students educated using both strategies learn the content, the CBL students learn by working together in groups to accomplish their assignments or activities of shared learning goals. A positive outcome of this study was the finding that the CBL methodology appeared to be more effective in developing CT skills for nursing students than the traditional lecture-



based teaching methodology. The CBL program participants consistently outperformed the didactic program participants both in the total CCTST and its subscales. This study has various implications for nursing education and nursing research. The results suggested that, to develop students' CT skills, CBL in the form of patient case-based instruction can be used as an alternative to didactic lecture-based teaching that have gained substantial popularity in healthcare professionals education and other disciplines school curricula. The researcher concludes that CBL should be encouraged in the nursing curricula to develop the needed learners' CT, which might impact nursing care to improve patient outcomes.

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