Measurement of critical thinking, clinical reasoning, and clinical judgment in culturally diverse nursing students – A literature review

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1. Introduction

There is a need for nursing education globally to assist nursing students in developing the skills of critical thinking, clinical reasoning, and clinical judgment. Developing these skills will require that nursing students develop the ability to: (a) analyze collected data (critical thinking), (b) apply reasoning to the data obtained (clinical reasoning), and (c) appropriately act based on the specific situation (clinical judgment) (Victor-Chmil, 2013). It is expected that nursing students worldwide will need to meet diverse health needs, in both urban and remote areas, and to provide safe and effective patient care (Berkow et al., 2008; Cronenwett et al., 2007; International Council of Nurses, 2009; Lovett and Gidman, 2011). However, these skills may be exhibited and defined differently in various cultural groups (Lasater, 2011; Tian and Low, 2011). Effective evaluation of these skills will require measurement tools that are available and applicable for use with nursing students from all cultures. The purpose of this paper is to review recent literature to determine what measurement tools are available to evaluate critical thinking, clinical reasoning, and/ or clinical judgment in nursing students from diverse cultures.

What is the relationship between culture and learning? If there is a relationship, would the effect of culture on learning also influence critical thinking, clinical reasoning, and/or clinical judgment? The cultural values of an individual will affect learning style preferences (Holbrügge and Mohr, 2010). Students’ cultural values will also influence motivation, ways of thinking, respect for elders, group expectations, and style of communication, (Brown et al., 2013; Coburn and Weismuller, 2012; Frambach, Driessen, Beh and van der Vleuten, 2014). This influence may result in some students not speaking up in discussions or asking questions in class, as those behaviors may be considered unacceptable in some cultures (Frambach et al., 2014; Fung, 2014; Henze and Zhu, 2012).

Sommers (2014), in a review of the literature related to problem-based learning methods to promote critical thinking among nursing students from differing cultures, noted that there was very limited research in nursing that examined the relationship between culture and learning. A conclusion of that review was in order to prepare nursing graduates to meet patient care needs globally, nurse educators need to understand how to work with the unique knowledge and skills of ethnically diverse students (Veal et al., 2012). This will include nurse educators being aware that students who have only been exposed to teacher-centered methods (i.e. lecture) may struggle when initially exposed to student-centered methods (i.e. flipped classroom, group work, team learning, problem-based learning) (Bestetti et al., 2014; Frambach et al., 2014; Gilligan and Outram, 2012; Hayes et al., 2015).

As approaches to learning are ingrained and shaped by an individual’s culture, caution is required when using tools that were developed for Western cultures for use in non-Western learners (Brown et al., 2013). Carter, Creedy, and Sidebotham (2015), in their review of tools to measure critical thinking in nursing and midwifery students, noted that the measurement of critical thinking in some of the studies reviewed may have been influenced by the impact of culture on different learning environments. Therefore, it is important that any tools used to measure critical thinking, clinical reasoning, and clinical judgment are appropriately culturally contextualized during the translation process (Hwang et al., 2016; Shin et al., 2015a; Shin et al., 2014; Yu et al., 2013).

2. Search strategies

Electronic databases were searched for papers related to measurement tools that have been used to measure critical thinking, clinical reasoning, and/or clinical judgment in nursing students from diverse cultures. The databases of PubMed, CINAHL, ERIC, PsychINFO, and ProQuest databases were searched. The search was limited to recent articles and dissertations published between 2010 and 2016 that were accessible in the English language. The search terms used were “measurement” AND “critical thinking OR clinical reasoning OR clinical judgment” AND “nursing student OR undergraduate nursing OR nursing education”.

The initial search identified 211 papers (Fig. 1). Inclusion criteria for studies included that at least one of the following skills be measured: critical thinking, clinical reasoning, and/or clinical judgment. An additional 15 studies were identified from these 211 studies as potentially meeting the criteria. A more detailed search was then conducted in these 15 studies for additional studies that had used these tools in culturally diverse nursing students.
were papers that discussed measurement tools used to evaluate critical thinking, clinical reasoning, or clinical judgment in nursing. Once duplicates were removed, the title and any available abstract were reviewed for meeting the inclusion criteria. Ninety-six papers met this initial review. Full-text of those papers were obtained and screened for inclusion criteria. Another 53 papers did not meet the inclusion criteria and were discarded. A manual search of articles added an additional ten papers that also met the inclusion criteria, for a final total of 53 papers reviewed.

To facilitate the review of this large volume of papers, a literature review matrix was developed. The matrix method is a spreadsheet or table to use to abstract selected information from each paper in a review (Garrard, 2014). The use of the matrix enabled being able to view the different papers in summary form and quickly identify which skill was measured, how it was measured, and the country of the participants.

3. Results

Of the 53 papers that were reviewed, the majority (n = 38) measured critical thinking. Clinical reasoning was measured in four papers and clinical judgment was measured in eleven papers. There were five papers that focused on providing a literature review; four of these focused on critical thinking (Carter et al., 2015; Romeo, 2010; Salsali et al., 2013; Zuriguel Perez et al., 2015) and one focused on clinical judgment (Victor-Chmil and Larew, 2013). The other 48 papers focused on describing and/or validating a measurement tool or model; using a measurement tool to determine if a teaching strategy improved critical thinking, clinical reasoning, or clinical judgment; and/or examining relationships between a concept and measuring critical thinking, clinical reasoning, or clinical judgment.

3.1. Critical thinking

Critical thinking is necessary for nursing (Romeo, 2010) and is a vital component of clinical judgment in nursing practice (Pai and Eng, 2013). Caring behaviors play a key role in the disposition toward critical thinking (Pai and Eng, 2013) and both should be included in nursing curriculum. Measurement of critical thinking in students should occur at multiple points in the nursing curriculum to obtain information about development of critical thinking skills, achievement of educational outcomes and objectives, and the influence of specific teaching strategies to improve critical thinking (Dembitsky, 2011; Hunter et al., 2014; Lee et al., 2011; Newton and Moore, 2013; Paul, 2014; Swing, 2015).

Multiple tools were used to measure critical thinking (Table 1). Of the commercially developed tools, the most common were California Critical Thinking Skills Test (CCTST) and California Critical Thinking Disposition Inventory (CCTDI) and variations of CCTST and CCTDI (Azizi-Fini et al., 2015; Blondy, 2011; Fero et al., 2010; Gorton and Hayes, 2014; Hwang et al., 2010; Pai and Eng, 2013; Pai et al., 2013; Salsali et al., 2013; Searing and Kookem, 2016; Shin et al., 2015b; Sinatra-Wilhelm, 2012; Yu et al., 2013). The CCTST and the CCTDI were the only commercially developed tools that were translated into other languages (Persian, Japanese, and Chinese).

Other commercially developed tools that were used to measure aspects of critical thinking were

- Critical Thinking Assessment Entrance Test (Newton and Moore, 2013);
- Educational Resources Incorporated (ERI) RN Assessment test (Romeo, 2013);
- Health Education Systems, Incorporated Critical Thinking Specialty Exam (Brown Basoné, 2014; Greggs, 2014; Kaddoura et al., 2016; York, 2010);
- Health Sciences Reasoning Test (Goodstone et al., 2013; Hooper, 2014; Hunter et al., 2014; Pitt et al., 2015; Shinnick and Woo, 2013);
- InterEd Critical Thinking Nursing Instrument (Abell et al., 2013);
- Kaplan Assessment Tests (Greggs, 2014; Swing, 2015); and

Several other studies used tools or methods that were developed by the researchers to evaluate and define critical thinking (Chong et al., 2016; Dembitsky, 2011; Fountain, 2011; Gant, 2010; Hsu and Hsieh, 2013; Jenkins, 2011; Lee et al., 2013; Moattari et al., 2014; Paul, 2014).
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<th>Author</th>
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<tr>
<td>Chong, E. J., Lim, J.-S., Liu, Y., &amp; Wong, Y.-X.</td>
<td>2016</td>
<td>Examine use of authentic assessment pedagogy and impact on four learning domains during clinical practice: CT was one of the domains.</td>
<td>63 first-year nursing students</td>
<td>Quasi-experimental study</td>
<td>None described</td>
<td>USA</td>
</tr>
<tr>
<td>Yang, Q.</td>
<td>2016</td>
<td>Explore relationships between the CCTDI and educational outcomes in nursing education.</td>
<td>83 first-year nursing students</td>
<td>Retrospective study</td>
<td>None described</td>
<td>USA</td>
</tr>
<tr>
<td>Abdul-Majeed, A. &amp; Alkaja, M.</td>
<td>2015</td>
<td>Use of the Authentic Assessment Rubric to measure CT.</td>
<td>192 first-year nursing students</td>
<td>Quasi-experimental study</td>
<td>None described</td>
<td>Kuwait</td>
</tr>
<tr>
<td>Catley, A., Corey, K. &amp; Scholanthem, M.</td>
<td>2015</td>
<td>To evaluate tools designed to measure CT and the construct of CT.</td>
<td>34 studies; 16 different tools</td>
<td>Literature Review</td>
<td>Literature Review</td>
<td>USA, United Kingdom, New Zealand, Australia, Sweden</td>
</tr>
<tr>
<td>Searing, L. M. &amp; Kooken, W. C.</td>
<td>2016</td>
<td>Explore relationships between the CCTDI and academic records.</td>
<td>18 new graduates 1 group pretest-posttest</td>
<td>Explanatory, quantitative study</td>
<td>CCTST</td>
<td>United States, United Kingdom, Turkey, Slovenia</td>
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<tr>
<td>Gorton, K. L. &amp; Hayes, J.</td>
<td>2014</td>
<td>Determine whether there was a significant relationship between CT skills and CN in relation to CT scores.</td>
<td>46 nursing students</td>
<td>Retrospective study</td>
<td>None described</td>
<td>United States, Taiwan, Korea, China, Iran, Hong Kong, Turkey, Slovenia</td>
</tr>
<tr>
<td>Kaddoura, M., Van-Dyke, O., &amp; Lau, Y. Y., &amp; Wu, V. X.</td>
<td>2016</td>
<td>Development of CT in response to pedagogy and impact on four learning domains during clinical practice: CT was one of the domains.</td>
<td>192 first-year nursing students</td>
<td>Comparative study</td>
<td>None described</td>
<td>China</td>
</tr>
<tr>
<td>Shin, S., Jung, D., &amp; Kim, S.</td>
<td>2015</td>
<td>Develop a revised version of the clinical thinking skills test and validation of the revised tool.</td>
<td>34 studies; 16 different tools</td>
<td>None described</td>
<td>United States, United Kingdom, New Zealand, Australia, Sweden</td>
<td></td>
</tr>
<tr>
<td>Carter, A. G., Creedy, D. K., &amp; Hunter, S.</td>
<td>2015</td>
<td>To evaluate tools designed to measure CT and the construct of CT.</td>
<td>192 first-year nursing students</td>
<td>Quasi-experimental study</td>
<td>None described</td>
<td>United States, Taiwan, Korea, China, Iran, Hong Kong, Turkey, Slovenia</td>
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<tr>
<td>Hunter, S., Pitt, V., Croce, N., &amp; Sidebotham, M.</td>
<td>2014</td>
<td>Investigated the CT skills of senior-level nursing students and whether there was a significant relationship between CT skills and nursing competency.</td>
<td>32-4th year nursing students</td>
<td>Quasi-experimental post-test only design</td>
<td>None described</td>
<td>United States</td>
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<tr>
<td>Moore, M., Svecovits, S., Moghadam, N. &amp; Mocholi, F.</td>
<td>2014</td>
<td>Aided nursing students to obtain a profile of and determine demographic mapping on discipline-based critical thinking of nursing students.</td>
<td>284 nursing students</td>
<td>Cross-sectional descriptive study</td>
<td>Delphi Research Method</td>
<td>United States</td>
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<tr>
<td>Roche, J.</td>
<td>2014</td>
<td>Determine if using case studies with video-taped vignettes helped facilitate the development of CT in new graduates.</td>
<td>18 new graduates</td>
<td>Quasi-experimental post-test only design</td>
<td>None described</td>
<td>United States</td>
</tr>
<tr>
<td>Hunter, S.</td>
<td>2013</td>
<td>Determine if using case studies with video-taped vignettes help facilitate the development of CT in new graduates.</td>
<td>18 new graduates</td>
<td>Quasi-experimental post-test only design</td>
<td>None described</td>
<td>United States</td>
</tr>
<tr>
<td>Hooper, B. L.</td>
<td>2013</td>
<td>To evaluate tools designed to measure CT and the construct of CT.</td>
<td>192 first-year nursing students</td>
<td>Quasi-experimental study</td>
<td>None described</td>
<td>United States, Taiwan, Korea, China, Iran, Hong Kong, Turkey, Slovenia</td>
</tr>
<tr>
<td>Pitt, V., Pow, D., Lee, J., Jones, T. &amp; Hunter, S.</td>
<td>2013</td>
<td>Describe entry and exit CT scores and compare to academic performance in predicting nursing competency.</td>
<td>223 nursing students</td>
<td>Quasi-experimental post-test only design</td>
<td>None described</td>
<td>United States, Taiwan, Korea, China, Iran, Hong Kong, Turkey, Slovenia</td>
</tr>
<tr>
<td>Swing, V. K. (Dissertation)</td>
<td>2014</td>
<td>Determine if using case studies with video-taped vignettes help facilitate the development of CT in new graduates.</td>
<td>18 new graduates</td>
<td>Quasi-experimental post-test only design</td>
<td>None described</td>
<td>United States</td>
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<th>Theory or Framework</th>
<th>Tool</th>
<th>Country of participants</th>
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<tbody>
<tr>
<td>17. Zargar, S. et al.</td>
<td>2014</td>
<td>Analyze the current state of scientific knowledge concerning CT in nursing</td>
<td>90 published articles</td>
<td>Quantitative, convergent, sample size unknown</td>
<td>None described</td>
<td>Critical Thinking Assessment Entrance Test</td>
<td>United States, Sweden, United Kingdom, Australia, Austria, China, Korea, Iran, South Africa, Mexico, and United States</td>
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<tr>
<td>18. Abell, C. et al.</td>
<td>2013</td>
<td>Compare the effects of high-fidelity simulation and case studies on the development of CT skills</td>
<td>42 Associate degree nursing students</td>
<td>Quasi-experimental, pre-test post-test design</td>
<td>Conceptual framework</td>
<td>Reasoning Test</td>
<td>United States, Canada, Australia, China, Korea, Iran, South Africa, Mexico, and Jordan</td>
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<tr>
<td>19. Goodstein, L. et al.</td>
<td>2013</td>
<td>Compare the effects of different theorists that described caring</td>
<td>174 nursing students from 3 schools</td>
<td>Cross-sectional, descriptive study</td>
<td>Constructive Thinking Model of Domain Learning Written CT case scenario</td>
<td>Critical Thinking Classroom Tests in nursing education</td>
<td>United States</td>
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<tr>
<td>20. Han, L. et al.</td>
<td>2013</td>
<td>Develop a competency inventory to measure learning outcomes of BSN students</td>
<td>599 nursing students</td>
<td>Quasi-experimental, pre-test post-test design</td>
<td>Competency Inventory of Nursing Students</td>
<td>Critical Thinking Classroom Tests in nursing education</td>
<td>United States</td>
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<tr>
<td>21. Newton, S. E. &amp; Moore, G.</td>
<td>2013</td>
<td>Investigate the predictability of grade point average, SAT Math and Verbal scores, and other dispositions toward CT, learning styles, and caring behaviors in student nurses</td>
<td>182 student records of associate degree students</td>
<td>Quantitative, comparative, retrospective design</td>
<td>Perry's scheme of intellectual and ethical development</td>
<td>Health Sciences Reasoning Test</td>
<td>United States, Canada, Australia, China, Korea, Iran, Norway, and Japan</td>
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<tr>
<td>22. Newton, S. E. &amp; Moore, G.</td>
<td>2013</td>
<td>Compare the effects of different theorists that described caring</td>
<td>154 nursing students from 3 schools</td>
<td>Quasi-experimental, pre-test post-test design</td>
<td>Constructive Thinking Model of Domain Learning Written CT case scenario</td>
<td>Critical Thinking Classroom Tests in nursing education</td>
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<tr>
<td>23. Newton, S. E. &amp; Moore, G.</td>
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<td>Develop a competency inventory to measure learning outcomes of BSN students</td>
<td>599 nursing students</td>
<td>Quasi-experimental, pre-test post-test design</td>
<td>Competency Inventory of Nursing Students</td>
<td>Critical Thinking Classroom Tests in nursing education</td>
<td>United States</td>
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<tr>
<td>24. Newton, S. E. &amp; Moore, G.</td>
<td>2013</td>
<td>Investigate the predictability of grade point average, SAT Math and Verbal scores, and other dispositions toward CT, learning styles, and caring behaviors in student nurses</td>
<td>182 student records of associate degree students</td>
<td>Quantitative, comparative, retrospective design</td>
<td>Perry's scheme of intellectual and ethical development</td>
<td>Health Sciences Reasoning Test</td>
<td>United States, Canada, Australia, China, Korea, Iran, Norway, and Japan</td>
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<td>25. Shinnick, M. A. &amp; Woo, M. A.</td>
<td>2012</td>
<td>Explore the effects of PBL on the development of CT skills and to compare CT before and after high-fidelity simulation</td>
<td>94 sophomore BSN students</td>
<td>Randomized post-test</td>
<td>Content analysis of responses</td>
<td>Critical Thinking Classroom Tests in nursing education</td>
<td>United States</td>
</tr>
<tr>
<td>27. Shinnick, M. A. &amp; Woo, M. A.</td>
<td>2012</td>
<td>Explore the effects of PBL on the development of CT skills and to compare CT before and after high-fidelity simulation</td>
<td>94 sophomore BSN students</td>
<td>Randomized post-test</td>
<td>Content analysis of responses</td>
<td>Critical Thinking Classroom Tests in nursing education</td>
<td>United States</td>
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<tr>
<td>28. Sultan-Wahid, T.</td>
<td>2011</td>
<td>Compare the effect of high-fidelity simulation and high-fidelity simulation</td>
<td>49 nursing faculty members</td>
<td>Descriptive, exploratory study, cross-sectional</td>
<td>Descriptive, evaluative study</td>
<td>Critical Thinking Classroom Tests in nursing education</td>
<td>United States</td>
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<tr>
<td>29. Blandy, L. C.</td>
<td>2011</td>
<td>Measure faculty CT skills and compare them with the mean of a student nursing group</td>
<td>44 sophomore BSN students</td>
<td>Cross-sectional design, descriptive study</td>
<td>Critical Thinking Classroom Tests in nursing education</td>
<td>United States</td>
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<tr>
<td>30. Dembry, S. L.</td>
<td>2011</td>
<td>Determine the extent of congruence between CT goals and objectives of nursing programs and the subsequent assessment of critical thinking skills</td>
<td>Descriptive, evaluative study</td>
<td>Cross-sectional descriptive study</td>
<td>Critical Thinking Classroom Tests in nursing education</td>
<td>United States</td>
<td></td>
</tr>
<tr>
<td>31. Fountain, J.</td>
<td>2011</td>
<td>Compare the extent of congruence between CT goals and objectives of nursing programs and the subsequent assessment of critical thinking skills</td>
<td>2 associate degree nursing programs - 373 students</td>
<td>Comparative descriptive design, stratiﬁed random sampling</td>
<td>Health Sciences Reasoning Test</td>
<td>Critical Thinking Classroom Tests in nursing education</td>
<td>United States</td>
</tr>
<tr>
<td>32. Jenkins, S. D.</td>
<td>2011</td>
<td>Explore the effects of PBL on the development of CT skills and to compare CT before and after high-fidelity simulation</td>
<td>762 nursing students (355 in Korea and 407 in China)</td>
<td>Comparative descriptive design, stratified random sampling</td>
<td>Health Sciences Reasoning Test</td>
<td>Critical Thinking Classroom Tests in nursing education</td>
<td>United States</td>
</tr>
<tr>
<td>33. Lee, H. Y.</td>
<td>2011</td>
<td>Compare Korean and Chinese nursing students' curriculum and educational outcomes including CT</td>
<td>87 pre-licensure nursing students</td>
<td>Cross-cultural nursing education</td>
<td>None described</td>
<td>Critical Thinking Classroom Tests in nursing education</td>
<td>United States, Thailand, Korea, China</td>
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<tr>
<td>Gantt, L. T.</td>
<td>2010</td>
<td>Describe a pilot study using the Clark Simulation Evaluation Rubric</td>
<td>Nursing students, 69 associate and 109 BSN</td>
<td>Descriptive</td>
<td>Argyris and Schon theories of action Espoused and Theory-in-Use</td>
<td>None described</td>
<td>United States</td>
</tr>
<tr>
<td>Hwang, S. Y, Yen, M., Lee, B. O., Huang, M. C., &amp; Tseng, H. F</td>
<td>2010</td>
<td>Test the Chinese version of the CTDI among nurses</td>
<td>864 registered nurses from 7 hospitals; 112 agreed to retest</td>
<td>Survey design with stratified random sampling</td>
<td>None described</td>
<td>CTDI-CV, short</td>
<td>Taiwan</td>
</tr>
<tr>
<td>Romeo, E. M.</td>
<td>2010</td>
<td>Analyze quantitative research findings relevant to the measurement of CT abilities and skills in undergraduate nursing students and predictor of NCLEX</td>
<td>Research findings in measuring CT abilities and skills in undergraduate nursing</td>
<td>Literature Review</td>
<td>Review; noted that there is a need for tool specific operational definition of CT</td>
<td>Multiple</td>
<td>United States</td>
</tr>
<tr>
<td>York, K. (Dissertation)</td>
<td>2010</td>
<td>Determine the effects of constructivist-based teaching strategies on the perception and achievement of CT skills in Associate degree nursing students</td>
<td>136 4th semester students from 2 classes</td>
<td>Mixed-methods study, sequential, explanatory control group design</td>
<td>Constructivist-based approaches</td>
<td>HESI Exam</td>
<td>United States</td>
</tr>
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**Key**
- BSN, BScN = Bachelor of Science in Nursing.
- CCTDI = California Critical Thinking Disposition Inventory.
- CCTST = California Critical Thinking Skills Test.
- CJ = Clinical judgment.
- CR = Clinical reasoning.
- CT = Critical thinking.
- CTDI-CV = California Thinking Disposition Inventory, Chinese Version.
- HESI = Health Education Systems, Incorporated.
- NCLEX-RN = National Licensure Examination for Registered Nurses.
- NP = Nurse Practitioner.
- PBL = Problem Based Learning.
- RN = Registered Nurse.
Multiple countries are measuring critical thinking. The majority of the papers measured critical thinking in students in the United States. Critical thinking was also measured in over 15 other countries from the following regions: Africa, Asia, Australia and Oceania, Europe, Middle-East, and North America. However, several of the papers noted that when tools to measure critical thinking were directly translated for use with non-Western participants, the critical thinking scores were lower (Salsali et al., 2013; Azizi-Fini et al., 2015; Pai and Eng, 2013; Pai et al., 2013).

Salsali et al. (2013), in their review of the use of CCTDI in eleven countries, found that Asian nursing students had lower scores of critical thinking than non-Asian students. A possible reason for the finding is because of environmental, pedagogical methods, and cultural differences between countries. Another reason is that CCTDI and CCTST were developed within a Western culture of learning. Many of the papers that used a translated version of CCTDI or CCTST found that participants obtained lower scores (Azizi-Fini et al., 2015; Pai and Eng, 2013; Pai et al., 2013).

Two recent review articles (Carter et al., 2015; Zuriguel Perez et al., 2015) reviewed articles from the last 14 years related to the assessment of critical thinking in nursing and concluded that there is a need to develop nursing discipline specific tools, with testing for reliability and validity, to measure the application of critical thinking in actual nursing practice. A difficulty with critical thinking in nursing is that there is no universally agreed upon framework or definition (Blondy, 2011; Fountain, 2011; Jenkins, 2011; Romeo, 2010; Zuriguel Perez et al., 2015). This review also found that the papers used many different definitions of critical thinking and conceptual frameworks and sometimes no framework at all.

3.2. Clinical reasoning

Clinical reasoning is a combination of knowledge, attitudes, and reflective professional practice and is challenging to assess through direct observation (Deschenes et al., 2011). It involves the ability to reason about a clinical situation, including patient and family concerns. It is occurring within a specific context (Benner et al., 2009). Clinical reasoning remains a goal of nursing education and employers (Kuiper et al., 2011).

Students from two Western countries (United States and Canada) and one Asian country (Taiwan) were represented in the four papers. Three different methods were used to measure clinical reasoning (Table 2: Script Concordance Test (Dawson et al., 2014; Deschenes et al., 2011); Identify, Relate, Understand, Explain, Predict, Influence, and Control (IRUEPIC) model (Gonzol and Newby, 2013); and an adaptation of the Clinical Reasoning Model (Liou et al., 2016).

A script concordance test is a written examination of several realistic clinical practice situations in which information is ambiguous, complex, or incomplete and requires 10–20 reference panel members (Dawson et al., 2014; Deschenes et al., 2011). The IRUEPIC Model is a reasoning model that contains seven steps that build progressively and results in actions based on that reasoning (Gonzol and Newby, 2013). This review also found that the papers used many different definitions of critical thinking and conceptual frameworks and sometimes no framework at all.

3.3. Clinical judgment

There were 51 papers that discussed the measurement of clinical judgment (Table 3). The most common tool to measure clinical judgment was the Lasater Clinical Judgment Rubric (LCJR), and variations of that tool were used in nine papers (Ashcraft et al., 2013; Cazzell and Anderson, 2016; Fenske et al., 2015; Johnson et al., 2012; Kim et al., 2016; Manetti, 2015; Schlairet and Fenster, 2012; H. Shin et al., 2015a; Shin et al., 2014). One paper provided a review of studies that had used...
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<th>Research Design</th>
<th>Theory or Framework</th>
<th>Tool</th>
<th>Country of participants</th>
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<tbody>
<tr>
<td>Cazzell, M., &amp; Anderson, M.</td>
<td>2016</td>
<td>Impact of CT on CJ during a pediatric OSCE</td>
<td>160 senior nursing students</td>
<td>Descriptive correlational</td>
<td>Tanner's Clinical Judgment Model</td>
<td>LCJR HSRT CT</td>
<td>United States</td>
</tr>
<tr>
<td>Kim, S. J., Kim, S., Kang, K. A., Oh, J., &amp; Lee, M. N.</td>
<td>2016</td>
<td>Develop a tool to assess students' CJ in caring for simulated pediatric patients with dehydration based on LCJR</td>
<td>120 nursing students</td>
<td>Determine psychometric properties of tool</td>
<td>Tanner's Clinical Judgment Model</td>
<td>Modified LCJR</td>
<td>South Korea</td>
</tr>
<tr>
<td>Manetti, W. G. (Dissertation)</td>
<td>2015</td>
<td>Describe and compare CJ of junior and senior BSN students</td>
<td>75 junior and 61 senior nursing students</td>
<td>Descriptive, comparative</td>
<td>Tanner's Clinical Judgment Model</td>
<td>LCJR</td>
<td>United States</td>
</tr>
<tr>
<td>Shin, H., Park, C. G. &amp; Shim, K</td>
<td>2015</td>
<td>Develop and validate adapted version of LCJR</td>
<td>3 universities, 152 senior nursing students</td>
<td>Observational, cross-sectional designed study</td>
<td>Tanner's Clinical Judgment Model</td>
<td>Korean version of LCJR</td>
<td>South Korea</td>
</tr>
<tr>
<td>Shin, H., Shim, K., Lee, Y., &amp; Quinn, L.</td>
<td>2014</td>
<td>Develop a scenario-specific CJ assess tool guided by LCJR and evaluate psychometric properties and ability to assess CJ</td>
<td>250 undergrad nursing students from 3 schools</td>
<td>2 phase methodological design</td>
<td>Bloom's three evaluation domains and Tanner's Clinical Judgment Model</td>
<td>Grounded theory, A model developed</td>
<td>Korea</td>
</tr>
<tr>
<td>Wilber, M. E. (Dissertation)</td>
<td>2014</td>
<td>Develop a substantive theory of CJ in nursing. Discover the process hospital based RNs use to make CJ as they provide care to patients</td>
<td>15 nurses with two to three years of clinical experience, 3 acute care hospitals</td>
<td>Classical grounded theory, interviews</td>
<td>Tanner's Clinical Judgment Model</td>
<td>Grounded theory, A model developed</td>
<td>United States</td>
</tr>
<tr>
<td>Ashcraft, A. S., Opson, L., Bridge, R. A., Caballero, S., Veesart, A., &amp; Weaver, C.</td>
<td>2013</td>
<td>Describe the process of evaluating senior nursing students in the simulation lab using a modified LCJR</td>
<td>Senior nursing students, Phase 1 = 86; Phase 2 = 102</td>
<td>Descriptive study</td>
<td>Tanner's Clinical Judgment Model</td>
<td>Modified LCJR</td>
<td>United States</td>
</tr>
<tr>
<td>Penske, C. L., Harris, M. A., Aeberholtz, M. L., &amp; Hartman, L. S.</td>
<td>2013</td>
<td>Determine how closely nurses' perceptions of their CJ abilities matched their demonstrated CJ during a simulation</td>
<td>74 RN</td>
<td>Quantitative, descriptive study</td>
<td>Tanner's Clinical Judgment Model</td>
<td>LCJR</td>
<td>United States</td>
</tr>
<tr>
<td>Victor-Chmil, J., &amp; Lawe, C.</td>
<td>2013</td>
<td>Organize current knowledge available on the LCJR to assess validity and reliability and identify specific needs for continued testing</td>
<td>Published and unpublished literature related to LCJR validity and reliability</td>
<td>Review of literature</td>
<td>Tanner's Clinical Judgment Model</td>
<td>LCJR</td>
<td>United States</td>
</tr>
<tr>
<td>Johnson, E. A., Lasater, K., Hudson-Carlin, L., Siktberg, L., Siders, S., &amp; Billard, N.</td>
<td>2012</td>
<td>Determine the effect of expert role modeling on nursing students' CJ in the care of a simulated geriatric patient</td>
<td>275 nursing students from 5 sites</td>
<td>Quasi-experimental, international, multisite study</td>
<td>Tanner's Clinical Judgment Model</td>
<td>LCJR</td>
<td>United States and United Kingdom</td>
</tr>
<tr>
<td>Schlantet, M. C., &amp; Fenster, M. J.</td>
<td>2012</td>
<td>Pilot study to identify a model to promote development of CJ among beginning nursing students. What mix of simulation and direct care best promotes learning?</td>
<td>2 separate cohorts of junior BSN students, groups of ten, eight schemas - 78 students</td>
<td>Mixed method with pretesting and post testing</td>
<td>Jeffries' 2005 Nursing Education Simulation Framework</td>
<td>LCJR</td>
<td>United States</td>
</tr>
</tbody>
</table>

Key
CT = Critical thinking.
CJ = Clinical judgment.
LCJR = Lasater Clinical Judgment Rubric.
RN = Registered Nurse.
BSN = Bachelor of Science in Nursing.
HSRT = Health Sciences Reading Test.
the LCJR (Victor-Chmil and Larew, 2013). One paper developed a model regarding clinical judgment based on the results of a research study (Wilber, 2014).

In the papers that measured clinical judgment with the LCJR, the majority of the participants were in the United States (Ashcraft et al., 2013; Cazzell and Anderson, 2016; Fenske et al., 2013; Manetti, 2015; Schlairet and Fenster, 2012). Johnson et al. (2012) used the LCJR to measure clinical judgment in nursing students from the United Kingdom and the United States. In three of the studies (Kim et al., 2016; H. Shin et al., 2015a; Shin et al., 2014), the nursing students were from Korea and the LCJR was translated into Korean and adapted for use with Korean students.

The LCJR is a rubric with specific criteria for evaluating clinical judgement development (Lasater, 2007) that is based on Tanner’s Clinical Judgment Model (Tanner, 2006) and is frequently used to evaluate student performance in a high-fidelity simulation situation. Victor-Chmil and Larew (2013) reviewed published and unpublished literature regarding the use of the LCJR to assess the validity and reliability of the tool and concluded that there was documented feasibility of using the LCJR to assess student learning in the cognitive, psychomotor, and affective domains. They also concluded that additional research studies are needed to investigate construct validity and determine applicability of use in different nursing populations and in non-simulator situations.

Shin et al. (2015a) researched the use of a version of the LCJR that was translated and adapted for use with Korean students in simulation. They studied 152 senior nursing students and concluded that the Korean version of the LCJR is a reliable and valid instrument for measuring clinical judgment in nursing students in Korea. They also determined, through confirmatory factor analysis, that there was a good model fit to data, which demonstrated good construct validity.

Wilber (2014) interviewed 15 hospital based nurses with two to three years of clinical experience to discover the process that they used to make clinical judgements as they provided care to patients. She identified that there were limitations in existing research related to the consistent use of a definition and measurement of clinical judgment and in complex practice environments. As a result of her research, she developed a “framework” with a core category of “Fitting Things Together” and identified stages that contribute to knowing the patient and how clinical judgment situations provide an opportunity for learning at work. She stressed that the goal of nursing education is not just passing a final competency exam, but it is preparing students that are ready to practice nursing (Wilber, 2014).

In summary, it was noted that most of the participants in the studies were from Western countries. When tools to measure critical thinking were used in other countries, direct translation of the tools without cultural adaptation, frequently resulted in lower measurements. A few of the papers that discussed tools to measure critical thinking, clinical reasoning, or clinical judgment, also discussed aspects of contextually adapting the tool as part of the translation process (Liu et al., 2016; Hwang et al., 2010; H. Shin et al., 2015a; Shin et al., 2014; Yu et al., 2013). A variety of different definitions and conceptual frameworks were used in the papers to describe the concepts of critical thinking, clinical reasoning, and/or clinical judgment and the development of tools to measure them. With such a variety of theoretical underpinnings, it is difficult to have a common definition to use when discussing how to best measure critical thinking, clinical reasoning, and/or clinical judgment in nursing students from diverse cultures.

4. Discussion

This review evaluated a total of 53 peer-reviewed papers to assist in determining what measurement tools are available to evaluate critical thinking, clinical reasoning, and/or clinical judgment with nursing students from diverse cultures. Measurement tools for critical thinking, clinical reasoning, and clinical judgment have been translated into languages other than English and have been used with nursing students from a variety of countries. When considering these measurement tools for use in nursing education, there are two challenges: use of the measurement tools with diverse cultures and influence of culture on the teaching-learning relationship.

4.1. Use of the measurement tools in nursing students from diverse cultures

Two of the tools used to measure clinical reasoning were only used with students in Western countries; therefore, their use in non-Western countries may not be applicable. In addition, the Script Concordance Test is time consuming to develop the questions and may be resource intensive in forming the reference panel members (Nouh et al., 2012). The Identify, Relate, Understand, Explain, Predict, Influence, and Control model is based on thinking methods that may not be the same thinking method used by students from other cultures. The model also requires training for faculty in how to use the model in teaching and evaluation. Additional research is needed with either of these models to determine applicability with students from diverse cultures and for use in non-Western countries. The adaptation of the Clinical Reasoning Model by Liu et al. (2016) was contextualized for use with a specific nursing student population in Asia.

There are few tools that measure clinical judgment, and most of the research has focused on evaluating students in high-fidelity simulated scenarios in Western countries. However, research is being done in other countries with the Lasater Clinical Judgment Rubric and validating the culturally appropriate adaptation of the tool (K. Lasater, personal communication, 25 May 2016) and include Lebanon (Fawaz and Hamdan-Mansour, 2016) and Brazil (Nunes et al., 2016). Continued research is needed to validate the use of the Lasater Clinical Judgment Rubric in actual patient care situations and for use with students from diverse cultures.

The use of commercially prepared tools in students from different cultures has two difficulties. One is that the translation may not accurately reflect the learning and thinking skills in that culture. Because students from culturally diverse backgrounds have different perspectives, ways of learning, and ways of processing information it will be important that ways of evaluating learning are culturally appropriate (Henze & Zhu, 2012; World Health Organization, n.d.). The tool must be culturally adapted for use and the World Health Organization provides a guide (World Health Organization, n.d.) The second difficulty is the cost of the tools may make their use prohibitive in many areas of the world. Many of the commercially prepared tools have a cost per student use that would make them unaffordable for nursing programs and students in some countries. There is a need for development of economical tools that measure critical thinking, clinical reasoning, or clinical judgment in nursing students from different cultures.

4.2. Influence of culture on the teaching-learning relationship

As tools are developed or adapted and translated for use, it is important to remember that since culture affects learning, culture may also affect the development of critical thinking, clinical reasoning, and clinical judgment and the tools will need to be culturally adapted. Varying cultural views and beliefs will result in differences in expectations among and between students and nurse educators (Clarke, 2010; Melby et al., 2008). Varying cultural views and beliefs may also influence the teaching-learning relationship; however, little is known about how culture affects this relationship in nursing students.

Several limitations are noted for this review. In order to review a variety of literature, the level of evidence in the papers was varied. The papers varied from expert opinion to quasi-experimental research designs. Another limitation is that many of the studies had small sample groups and only focused on short-term changes in critical thinking, clinical reasoning, and/or clinical judgment. Only studies that were accessible in English were reviewed, and that may have excluded
informative studies in other languages. A final limitation is that the review focused on only papers published between 2010 and 2016, and therefore, earlier papers discussing measurement tools were not included.

5. Conclusion

It will be important to modify teaching and learning strategies to meet the cultural needs of students as one way to improve the success of students from diverse cultures (Yoder, 2001). Meeting the challenging, complex, and unpredictable demands of today's healthcare needs will require that today's nursing graduates are able to critically think, to demonstrate appropriate clinical reasoning skills, and to demonstrate excellent clinical judgment in actual patient care situations.

Preparing nursing graduates that are able to meet the complex healthcare needs of patients requires that nurse educators are equipped to: (a) recognize that culture does affect learning, (b) adapt and develop teaching strategies for use with diverse cultures that promotes critical thinking, clinical reasoning, and clinical judgment, (c) share their experiences with other nurse educators, and (d) dialogue about the need for consistent terminology and definitions of critical thinking, clinical reasoning, and clinical judgment. In the 21st century, it is imperative that expert nurses are available in every country with the ability to clinically reason about changes in patient conditions and their own understanding of that specific patient care situation (Benner, 2015). Nurse educators, by teaching in a culturally congruent manner, can assist in making that availability a reality.

Ethical approval details

Not applicable.

Conflicts of interest

None.

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References

publications/reducing_the_rap.pdf.


