



Featured Article

Psychometric Properties of the Simulation Thinking Rubric to Measure Higher Order Thinking in Undergraduate Nursing Students

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KEYWORDS

high-fidelity simulation;
higher order thinking;
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Simulation Thinking
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nursing students

Abstract

Background: There is progress in the development of simulation-based instruments that measure the effectiveness of high-fidelity simulation (HFS) as an educational strategy. However, there are few psychometrically sound instruments that can quantify learning in HFS. This study sought to test the psychometric properties of the Simulation Thinking Rubric (STR). The purpose of the STR was to assess higher order thinking during HFS in undergraduate (bachelor of science in nursing [BSN]) nursing students. **Method:** Using a nonexperimental design, a convenience sample of 22 first semester junior year and 22 fourth semester senior year BSN students allowed six raters to review their previously recorded scenario to score the STR.

Results: The content validity index average was a 0.92. Cronbach's coefficient alpha was an acceptable but weak 0.74. The analysis of variance *F* test showed that the fourth semester BSN nursing students (mean = 4.11; standard deviation = 1.12) were rated higher on the STR than the first semester BSN students (mean = 3.20; standard deviation = 0.74).

Conclusion: Although the psychometric testing of the STR did not show strong evidence of internal consistency reliability between raters, work in this area is important. A revision and more testing of the STR are warranted with a focus on interrater agreement procedures and internal consistency reliability.

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High-fidelity simulation (HFS) is an active learning strategy that is thought to increase higher order thinking (HOT), such as clinical reasoning, problem solving, clinical decision making, critical thinking, and clinical judgment in undergraduate nursing (bachelor of science in nursing [BSN]) students. Nurse educators use various simulation-based instruments to measure the effectiveness of HFS as a

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learning strategy. However, few instruments can quantify HOT from HFS and most are not supported by a theory of learning.

There is a need to quantify HOT in HFS using a theoretically based psychometrically sound instrument to

add to the current evidence-based research literature in clinical simulation (Boulet et al., 2011; Cant & Cooper, 2009; Kardong-Edgren, Adamson, & Fitzgerald, 2010; Adamson, Kardong-Edgren, & Willhaus, 2013; Nehring & Lashley, 2010). This methodological study tested the psychometric properties of a theoretically based new instrument—the Simulation Thinking Rubric (STR). The purpose of the rubric was to assess the cognitive development of HOT in BSN students during HFS.

Key Points

- The development of a simulation instrument that measures higher order thinking in BSN nursing students is needed.
- A formative assessment of a BSN student's stage of higher order thinking HFS scenarios can be developmentally designed.
- Developmentally designed HFS scenarios can facilitate development of higher order thinking to higher stages of cognitive development.

Review of the Literature

Higher Order Thinking

The ability to apply concepts is considered an essential element in nursing education and practice (American Association of Colleges of Nursing, 2008; Nehring & Lashley, 2010; Oermann & Gaberson, 2014), but evidence suggests that new nurse graduates may not be graduating with entry-level clinical judgment (Del Bueno, 2005; Harris, Eccles, Ward, & Whyte, 2013; Richardson & Claman, 2014). Terms such as critical thinking, clinical reasoning, clinical judgment, problem solving, decision making, higher order cognitive skills, higher order reasoning, higher order learning, and higher level learning are used synonymously in the literature to represent the concept of HOT (Oermann & Gaberson, 2014; Secomb, McKenna, & Smith, 2012; Tanner, 2006).

For this study, the definition of HOT (Table 1) was founded on the simulation based on learning language (SIMBaLL) model (Arwood & Kaakinen, 2009). HOT is defined as thinking and linguistic function with maximum displacement, flexibility, and decreased redundancy at the cognitive developmental stage of formal operations (Arwood, 2011; Inhelder & Piaget, 1958). There are four expanded language functions that a formal thinker demonstrates (a) linguistic function, (b) displacement, (c) flexibility, and (d) redundancy (Arwood, 2011).

Linguistic function describes the ability of a formal thinker to use language in complex sentences to talk about what they know with others, and this can increase the depth and breadth of HOT (Arwood, 2011; Arwood & Kaakinen, 2009). When we talk with one another about what we know, we gain knowledge from each other. This layers new conceptual knowledge into what we already know and facilitates the ongoing development of HOT. So, language becomes a tool for thinkers who are acquiring concepts to access the most symbolic meanings connected with words (Arwood, 2011; Arwood & Kaakinen, 2009). A formal thinker can use language to communicate abstract concepts that cannot be seen, touched, or physically experienced (displacement). Additionally, a formal thinker can use language function to describe complex concepts without being repetitive (decreased redundancy). Sometimes, when we do not fully grasp a concept, we repeat ourselves and try describing what we are talking about in different ways but become redundant (Arwood, 2011; Arwood & Kaakinen, 2009). As an example, a nursing student who is a formal thinker can use language to describe the concept of oxygenation in a variety of ways to different individuals, such as a respiratory therapist, a patient who has pneumonia, or a physician, and for different purposes (flexibility). Equally important, the formal thinker can use language to discuss an abstract concept such as oxygenation across various health care contexts for different disease processes and apply the concept across the life span. Socially, a formal thinker can see life from a patient's perspective and can empathize (Arwood, 2011; Arwood & Kaakinen, 2009). A formal thinker can hypothesize on what is good for patients, families, health care providers, the health care system, and communities in increasingly wider contexts (Arwood, 2011; Arwood & Kaakinen, 2009).

Simulation Evaluation Instruments

The purpose of the review of the literature on simulation evaluation instruments was to locate an instrument that could evaluate the cognitive development of HOT in undergraduate nursing students. However, cognitive development of HOT in undergraduate nursing students engaged in HFS is a relatively unexplored topic. There are instruments used to measure psychomotor, cognitive, and affective domains of learning during HFS. Additionally, some are utilized to measure individual characteristics of HOT such as critical thinking, clinical judgment, and clinical reasoning (Fero et al., 2010; Gantt, 2010; Lasater, 2007; Johnson et al., 2012; Sullivan-Mann, Perron, & Fellner, 2009; Todd, Manz, Hawkins, Parsons, & Hercinger, 2008).

There are standardized tests such as the California Critical Thinking Test and the California Critical Thinking Disposition Survey (Facione & Facione, 1996) that were developed to measure critical thinking across disciplines.

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