Enhancing critical thinking through simulation

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ABSTRACT

Purpose: To adopt an evidence-based approach to evaluation of learning experiences reliant on simulated clinical practices in an under-graduate nursing program and to determine whether the learning events are structured in ways that elicit and make explicit critical thinking and other behaviours related to intended learning outcomes.

Methods: i) An iterative critical evaluation of pedagogy, philosophy and learning events involving simulations to determine the worth of assessment tasks and their alignment to evidence from the literature and the learning outcomes specified in the chosen curriculum blueprint; ii) Literature Review

Results: Appraisal of curriculum leaning goals and outcomes and evidence of outcomes in assessment tasks supported the choice of curriculum model: The capacity for integrating the elements of PBL, critical thinking and medium to high fidelity simulation was demonstrated. Careful construction of simulated learning events address the limitations of clinical placement because it facilitates the development and refinement of clinical judgment acumen. Renewal of a model highlighted the need for staff development in order to support the integration of learning outcomes, encourage development of contemporary stimulus material and enhance opportunities for assessment of critical thinking.

Conclusion: The authors propose further curriculum renewal and adoption of an amended curriculum model that facilitates an integrated approach elevating critical thinking that is integral to addressing learning outcomes that mirror behaviours relevant to real-life practice.

Changing contexts of education and practice in health professional programs require further exploration of the potential of simulation to provide alternative and complementary learning to that acquired through clinical placements.

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INTRODUCTION

One might expect that contact with actual patients and simulated patient experiences results in greater familiarity with the requirements for performance in the context of practice. However the extent to which hours of clinical placement can involve direct care activity and the belief that clinical placement affords a learning experience that is individualized for either safe care the patient or honing particular abilities for the student might not always be realized (Cockerham, 2015). Simulation offers alternative or complementary learning experiences that enhance acquisition of abilities, knowledge and skills required for nursing practice. Given that autonomy and critical thinking are considered essential components of professional competence (WHO 2009; Weatherspoon et al 2015) focussing more on learning events about exercising these skills is desirable. Simulations can provide an alternative to clinical placements, but the quality of the curriculum blueprint and the extent of alignment of design of simulations to student-focussed learning and contemporary practice are of utmost importance. The choice of appropriate simulated events must reflect the drivers for reform in both education and health service delivery. For the latter these include:

- Increased emphasis on evidence-based practice
- Growth of the empowered health consumer
- Safety and quality concerns
- Delivery of services in different settings (primary versus acute care)
- Increase in people living with chronic and complex conditions
- Shorter length of bed stays for most clientele
- Frequent technological innovation (Waters et al 2012).

The relationship between the chosen learning events and outcomes also needs to be determined. Kim, Hwang et al (2012) and Son and Song (2012) appraised the effects of simulation and integrated curriculum designs such as problem-based learning (PBL) courses on student critical thinking, problem solving abilities and learning and found both improved. However Goodstone, Goodstone, et al (2013) studied the effect of simulation on the development of critical thinking in associate degree nursing students. They found no statistical difference in simulation and case based learning with respect to critical thinking as an outcome. Given that both worked well these authors suggested it is instructional design not the simulation itself that is important. Higher levels of critical thinking and autonomy may also enhance job satisfaction and retention of qualified nurses, a global problem for the profession.

We argue for careful application of criteria for adoption of a simulation model that facilitates integration of simulated learning experiences into our PBL curricula. We also argue that staff members need to have sound curriculum, instruction and assessment skills in order to maximize simulations as adjuncts to clinical placement (Weatherspoon et al 2015). Our own appraisal processes that support curriculum renewal began with an examination of pedagogy and philosophy.

Curriculum Design: Pedagogy and Philosophy

Preparing health professionals for practice in the 21st century requires a transformation in pedagogical philosophy from reliance on apprenticeship models to competency based learning and assessment and all that entails (Conway & McMillan 2010). PBL is an educational (philosophical and methodological) approach that has the potential to foster the construction of meaning and deeper learning; it is a 'hallmark' of curriculum design

for the health professions. Well structured instructional and curriculum designs like PBL have been argued to provide a mechanism to develop and assess a range of behaviours including critical thinking behaviours (Conway and McMillan 2010). However, we acknowledge limitations from the use of PBL and other philosophical approaches and educational methodologies. There is potential to produce graduates who are so concerned about considering multiple perspectives and generating alternative solutions and working in groups that they fail to develop the confidence and competence that is required to make a sound decision in a timely fashion in the real world of practice (Landeen & Jeffries 2008, Yuan et al 2008). Nestel and Bearman (2015) highlight the importance of the application of any chosen theoretical underpinning to simulation-based education.

The outcome of critical thinking processes must be informed clinical judgment about therapeutic interventions: There has been significant development in models of PBL: there is greater focus on a range of stimulus materials, greater preparation for practice and structured debriefing (Conway and McMillan 2010). In some models used in the past, the 'case' was text based and simulated experiences most often were clinical laboratory experiences that focused on performance of clinical tasks and procedures (Kahn & O'Rourke 2005). Students were then provided clinical placement experiences that may not relate directly to the content, concepts and processes explored in on-campus settings. Lunney (2008: 161) acknowledged that "the opportunities for repeated practice, however, to learn the deep structures of the associated content knowledge are limited in clinical settings". Weatherspoon et al (2015) examined the effects of Electronic Interactive Simulation (EIS) and concluded that student scores on Critical Thinking Disposition improved overall on three sub-scales.

An emphasis on competence and measurable outcomes necessitates determination of agreement on how broad concepts such as critical thinking are operationalized in practice and developed throughout education programs. We need to guide members of the discipline (both academics and clinicians) in the development and effective use of thinking processes applied to discipline specific frameworks. The habits of the mind of critical thinking in nursing developed by Scheffer and Rubenfeld in 2000 and used by others such as Son and Song (2012) included: confidence, contextual perspective, creativity, flexibility, inquisitiveness, intellectual integrity, intuition, open-mindedness, perseverance, and reflection. Scenario-based simulations have the potential to take the student from a sole focus on their own learning to extend into thinking about ways to interact within their environments (Nestel and Bearman 2015 p 352).

The potential of simulation

Clinical placements are valued by students, clinicians, academics, professional bodies and communities, but few studies have attempted to determine how time spent during clinical placement has been used by students to achieve specified learning goals and outcomes. Contexts of practice are dynamic, complex and dependent upon variables such as case mix and presentation, skill mix, availability and quality of clinical teachers and the learner's response to settings and clientele.

From the review of the literature it is clear that well designed simulated learning experience can imitate the working environment when there is also a requirement for learners to demonstrate not only procedural techniques, but also decision-making and critical thinking (Brown & Chronister, 2009; Cant & Cooper, 2010). Simulation as an educational technique is one in which elements

of the real world should be appropriately integrated to achieve specific goals related to learning or evaluation. Nurse teachers engaging with simulations in learning events therefore need to use pedagogies which encourage reciprocal transfer of learning between on campus and clinical settings and foster the ability to think critically and engage in clinical reasoning (Park, et al., 2013).

Simulations allow for learning facilitated by the construction of meaning in context (Tanner 2006) in order to facilitate development of competence. Contemporary education reliant on simulation challenges health professionals to question and justify practice and emphasises ability to think about care situations as well as ability to perform clinical interventions to best manage situations. The challenge is to develop an integrated approach to learning which results in thoughtful, highly skilled and efficient action. This requires the ability to examine clinical situations, deconstruct them from a number of perspectives and reconstruct them around core concepts essential to practice (Conway & McMillan, 2010). Central to many approaches to teaching and learning in contemporary nurse education are beliefs that nurses, as critical thinkers, are flexible, creative, independent and collaborative (Son and Song 2012; Kim, Hwang et al 2012) and capable of the intellectual activities demanded in critical thinking.

A range of technologies can enhance and have potential to both supplement and complement clinical placement (Weatherspoon et al, 2015). Therefore simulation experiences must encourage development of higher learning and help students become more competent in the care of complex patients (Lasater 2007).

METHOD

Staff development within a cross-cultural collaborative partnership over a decade, resulted in substantial iterative curriculum innovation appropriate to the culture and context of South Korea (Cheju Halla/Newcastle Center for PBL). Most recently the Simulation Problem Based Learning (S-PBL) Model was evaluated for internal consistency between curriculum intentions and outcomes and the authenticity of the learning events centred on simulation. Staff members were caused to use tools and frameworks to review the potential to achieve consistency of S-PBL activities with contemporary advances in uses of simulation in practice-based curriculum implementation. They were then encouraged to draw on their own experience of learning and knowledge about contemporary practice to brainstorm ideas for curriculum renewal, especially around the philosophy of S-PBL. In particular the group members were to rely on the literature showing benchmarks for best practice in simulation that is consistent with a Work-integrated Learning (WIL) approach such as that at the centre of their S-PBL model.

In order to facilitate the development of a plan of action for renewal in teaching and learning, particularly with reference to the use of simulations underpinned by authentic stimulus material, they were asked to:

- Test the alignment of the agreed Program Graduate Profile with the agreed Graduate Attribute Domains of (S-PBL).
- Undertake a mapping exercise to identify and describe potential evidence of achievement of the Graduate Attributes and identify strategies to collect sufficient evidence through appropriate assessment tasks
- Review the alignment of the teaching and learning strategies across the program to prepare students

for the provision of evidence of confidence and competence to practice in the real world of health services.

- Identify resources required for staff in implementing the graduate attributes consistent with the aims of S-PBL.

The concept of S-PBL is depicted in Figure 1, which represents the combination of two teaching and learning strategies: Simulation and Problem-Based Learning. The vertical axis represents the PBL experience, showing the increasing complexity of clinical situations challenging students to utilize previous learning and critical thinking skills. The horizontal axis represents simulation based learning experiences. Although not easy to present as formulae, simulation learning begins with basic or compartmentalized simulation and advances to blended/integrated simulation characterising the complexity of clinical situations. As learning progresses each week, the

levels of knowledge integration with skills and professional attitudes improves (Park, et al 2009).

The educational frameworks were also amended to enhance the level of integration of knowledge, skills and attitudes/behaviours through the student's experience of simulated encounters reflecting nursing practice and utilising high-fidelity human mannequins and actors simulating patient experiences. Harden (2008) used three sides of a cube to portray such appropriateness in the use of simulation: Fidelity, Patient representation and Learning outcomes.

When it emerges from sound curriculum design, evaluation data demonstrate that simulation provides an integrated approach to acquiring and amplifying the knowledge, skills and behaviours required for effective clinical practice (Park et al, 2008). S-PBL sought to ensure that the limitations of some approaches to implementation PBL were addressed. For example, some stimulus material
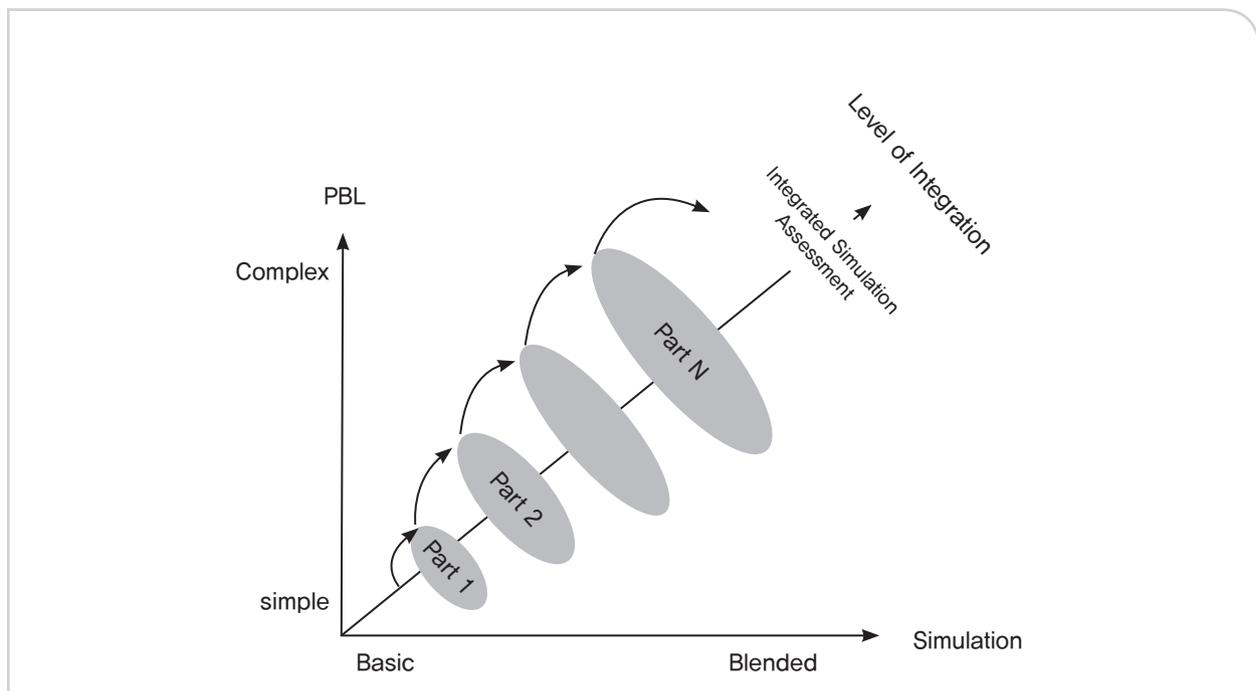

Figure 1. Simulation-PBL Framework

was used in ways that was limited to acquisition of knowledge. The separation of thinking and doing does little to promote integration of concepts within theoretical and clinical learning (McMillan and Andersen, 2015). The curriculum must include structured, integrated learning opportunities to acquire technical and process skills together with opportunities to fuse knowledge and experience. To develop an effective S-PBL program, quality scenarios needed to be designed and integrated into the curriculum (Curtin & Dupuis, 2008). The quality design of stimulus material and aligned simulation learning experiences integrate thinking and doing during learning processes and inform action oriented decision-making by students.

Tanner (2006) provides a Clinical Judgment Model which includes four aspects: Noticing (a perceptual grasp of the situation); Interpreting (sufficient understanding to respond); Responding (deciding on an appropriate course of action); and Reflecting (reviewing all the previous

aspects) against the actions and outcomes). In 2015 we have adapted the model depicting PBL curriculum design used throughout the collaboration to demonstrate the relationships among clinical judgment and PBL as a curriculum design as follows:

When engaging in instructional design for their respective PBL curricula, staff members from both partner organizations strive to meet specific criteria: Material should be should be authentic and reflect "real world" practices; provide specificity and direction for students around time, place and role; include social, political and ethical components; and recognise the potential for multi-media to enhance fidelity of simulation (Little and McMillan 2015). Learning events

- should complement and extend self-directed learning
- must provide opportunity for skill development and practice
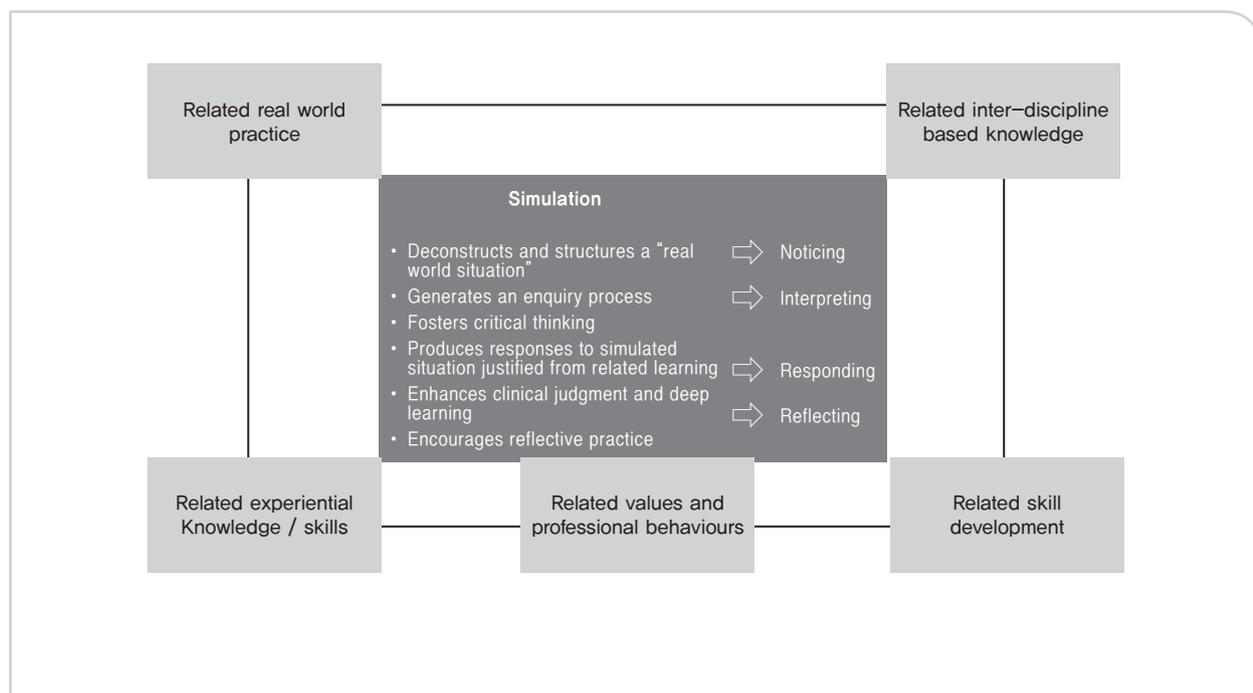- should fully utilize expertise of faculty

Figure 2. PBL as a curriculum design to enhance clinical judgment

- should focus learning on key concepts
- provide a guide to breadth and depth of learning
- require assessment that focus on priority outcomes (Conway and Little, 2000; Little and McMillan 2015).

Experience has now shown that simulation, when coupled with a PBL approach as depicted in Figure 1, provides students with the opportunity, time and a safe environment in which to acquire, practise and test out their ability to make clinical judgments in a unique modality for experiential learning and evaluation. It also provides for provision of feedback to students in a manner consistent with Tanner's (2006) criteria for development of critical thinking. The simulated setting provides a risk-free environment where learners can integrate theory and practice and think critically without the fear of harming patients or having less than positive learning experiences during a clinical placement (Jeffries 2007). This is especially true when real-life experiences are discouraged because of risk to others. In these situations, simulation becomes the best (and perhaps only) learning approach. When integrated appropriately into learning and holistic assessment of competence, simulation plays an important role in acquiring the critical and reflective thinking skills needed to provide competent, safe patient care. However simulation is an educational strategy, not a technology. As an educational strategy, S-PBL requires that learning outcomes for which S-PBL has been implemented include an appropriate assessment strategy. If critical thinking is one of the processes inherent in effective clinical judgment, there is a need to develop assessment strategies that capture the formation and development of this.

Assessment of alignment of goals to learning outcomes

The extent to which the goals of the clinical component of the curriculum were assessed in ways that are consistent with the knowledge, skills and attitudes underpinning competent performance was and remains problematic. Self-appraisal of the strengths and weaknesses of implementation of the Cheju Halla Health Science programs showed that methods of assessment in some instances underemphasized some important domains of professional practice, including interpersonal skills, lifelong learning, professionalism, and integration of core knowledge into clinical practice. Curriculum renewal reflecting contemporary thinking was acknowledged as best practice by the South Korean Ministry of Education and Human Resources (Halla/Newcastle Reports (2007, 2008) but generational changes in staff profiles demands staff development such as that reported on by Cockerham (2015). We need to assess more than one dimension of competence (Epstein 2007) such as knowledge or skills, and focus on integration of both and explicitly assess the processes underpin knowledge and skills.

The partnership addresses the ongoing need for staff development in all aspects of S-PBL but particular needs focused on assessing the processes that develop during program implementation. Unless educators are able to agree on behaviours that reflect both the process of developing critical thinking and the outcomes of its application to nursing practice, the evidence that nurses can and do think critically will continue to be questioned. In times of diminishing resources within universities there has been a tendency to rationalise assessment methods to product oriented, summative assessment such as essays, knowledge tests or observation of performance of clinical procedures (Cheju Halla/Newcastle Evaluation Reports

2007; 2008). Those involved in nurse education need to develop valid, reliable, efficient and effective tools for assessing critical thinking as a process integral to both practice and learning.

CONCLUSION

Increasing numbers of students entering health professional programs and continuing requests from stakeholders for more graduates have compounded existing challenges in program design and implementation of learning events.

In this paper we started by examining curriculum design and learning outcomes particularly within simulated learning experiences, from both theoretical and clinical practice perspectives. We reported on continuing appraisal of the extent to which our programs are underpinned by sound pedagogy in order to ensure they facilitate development of abilities supporting the centrality of critical thinking deemed essential for the health professions.

It is anticipated that newcomers to Cheju Halla University have improved their capacity to enhance student learning through critical appraisal of the curriculum design given their participation in staff development that encouraged:

- A realistic and thorough critique of the Program Objectives and related Learning Outcomes and their relevance to, and impact on student learning for contemporary practice.
- A critical review of their use of S-PBL.
- A focus on assessment resulting in a comprehensive plan for gathering evidence of performance of the students prior to graduation.
- A documented linking of assessment to the graduate profile.

- Identification of opportunities to enhance the use of S-PBL and the quality of evidence of its impact on learning, collected through appropriate assessment tasks.

Appraisal of the use of simulation and virtual environments in health professional education is essential. These options continue to be explored in relation to effectiveness for student learning, practicality, feasibility and cost effectiveness. The cross cultural partnership between two institutions involved in the evaluation reported enabled robust discussion and debate about the importance of creating learning experiences which provided opportunities for defining, developing and determining processes such as critical thinking within curricula in the health professions.

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