Teaching Simulation Literacy in Adult Healthcare Education:
A Qualitative Action Research Study

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Abstract: Teaching and learning with simulation is an increasingly important strategy of adult education in healthcare. This paper discusses the process and results of an action research study on developing a simulation instructor program where experiential learning was not only the topic, but the tool by which the learners received instruction.

There has been much discussion in the healthcare domain regarding the application of adult education principles to continuing professional education, but there has not been a corresponding conversation in mainstream education circles on the role of adult education in the health professions. One key point of intersection between adult education theory and healthcare education practice that may benefit from such cross-fertilization is the increasingly important strategy of teaching and learning with simulation. Misconceptions about simulation education are common among those who teach healthcare students with some thinking only of high-tech, expensive manikins that mimic complex conditions, while others see simulation as a method to teach or test task competency. In reality, simulation is a powerful teaching method which provides experiential learning in a safe environment.

Simulations in healthcare education have a long history (Loyd, Lake, & Greenberg, 2004), with an initial focus on task-related instruction. Technology-driven manikins were first used in the late 1960s (Abrahamson & Denson, 1969). Early simulations also engaged actors as patients or family members to test medical students. Using simulation to improve teamwork began in anesthesia in the 1980s (Howard, Gaba, Fish, Yang, & Sarnquist, 1992). As the perceived value of simulation increased, many institutions purchased technologically advanced equipment without first understanding simulation-based education, while others struggled to identify the most appropriate uses for simulation in their curricula.

Simulation pioneers researching the best uses for simulation started offering courses on how to teach with simulation. Professional societies were formed to provide members a forum to discuss best use and educator development (IMSH, 2004). Nevertheless there is a paucity of literature describing the process of developing and revising a simulation instructor course. The purpose of this paper is to share the process of developing a simulation instructor course using an action research method, by soliciting student feedback to: improve the course continually, develop student expertise in simulation education, and advance the body of knowledge in simulation education. The intended emphasis was on trainee exposure to the scope, philosophy, and theory of simulation education using experiential exercises. All instructors held the belief that learners are intelligent, well-trained, and want to learn, and the premise that we were interested in what they wanted to learn and would revise the program to address their concerns.

Theoretical Framework
The theoretical framework for this study is grounded in experiential learning and the works of Dewey (1933), Knowles (1980), and Kolb (1984) that posit that all learners have prior

experiences that form their basic beliefs and knowledge, and that adults learn best by hands-on activities. Healthcare simulation provides a realistic environment for the learner to practice a task or response before performing in real life. This safe environment allows them to practice and learn from mistakes without fear of blame, embarrassment, or harm to the patient. Fenwick (2000) describes five perspectives on experiential learning in adult education that she labels as reflective (constructivist), interference (psychoanalytic), situative, resistance, and co-emergence. Two of these provided the framework for our course, the situative in that it emphasizes the "tools, community, and activity of the situation" (p. 267) and the reflective, since we emphasized critical reflection in debriefing. This reflective practice (Schon, 1983; Brookfield, 2011) aids understanding and helps to internalize the information. The theoretical underpinning of this practice is the learner's need to link prior experiences to new ones, allowing them to make sense of the event and apply new knowledge to future events.   Caffarella and Daffron (2013) also highlight the importance of this link to ongoing program planning.

Methodology

This was a qualitative action research study in the context of an intensive five day simulation instructor course for healthcare educators. Since the study was intended to improve practice by focusing on participants' experiences in the program and then adjusting the course to better meet their needs, an action research study was the most appropriate design. (Kuhn & Quigley, 1997; Merriam, 2009). The curriculum was designed to address aspects of simulation including equipment, curriculum development, debriefing, and evaluation. Faculty were selected by their expertise and interest in healthcare simulation. Course trainees were selected for their experience in teaching, with an attempt to balance different healthcare disciplines. Course faculty included a daily "watchman" who summarized the day and addressed participant concerns, a program coordinator, a faculty coordinator, and key faculty, with at least three faculty members present at each session. The optimal proportion of topics to cover was not known and was the basis of our research question: What topics should be given greatest weight and how should topics be ordered in a simulation instructor course for experienced healthcare educators?

Trainees were surveyed daily in a two-question one minute paper (Weaver & Cotrell, 1985) and written evaluation. Those results, watchmen's notes, student interviews, and faculty debrief notes were used to modify seven courses provided over a four year period. This served as the primary data for the study. Though we had a base curriculum, the program allowed for adjustments based on learner input and observed student difficulties. The lead instructors met daily to review and update the lesson plan. At the end of each course, the entire teaching team reviewed and adjusted the future course curriculum based on participant and instructor feedback. As significant themes emerged for each iteration, faculty consensus determined modification in subsequent courses. This was repeated over the four year period for each of the courses provided.

Objective and comprehensive post-hoc analysis was completed through review of the one-minute papers using the constant comparison method (Glaser & Strauss, 1967; Merriam, 2009) looking for themes that emerged or changed over time. Trustworthiness and consistency were maintained by triangulation, using the faculty input and multiple sources of student data.

Findings

The number of trainees for each course ranged from 10-18, most having 15, with a male to female ratio of 4:10. The trainees were multidisciplinary. The three primary thematic findings

that emerged were recognition that theory is important, practical application requires practice, and that unexpected insights matter, as discussed in detail below.

Recognition that Theory is Important

While some trainees had an extensive background in education theory, many had little knowledge of education theory, and most had little knowledge of the theoretical underpinnings of simulation-based learning. Hence this was included in the curriculum as needed over time.

Education theory. The realization that theory was important often came through in the comments addressing the trainees' daily take-home message. One respondent said the "talk about adult learning theory was very interesting," and they would "like to learn more about using some of these theories to create simulations." The course instructors continued to adjust the way that theory was introduced with a short overview near the beginning of the week coupled with an ongoing effort to reinforce the theoretical framework of learning activities throughout the week. This led to a number of more specific and insightful comments about the flexibility of teaching styles and strategies. In later courses, trainees still wanted to learn more about adult learning techniques and the philosophy of simulation, with one student commenting, "The adult learning topic was very interesting and I plan on using some of the techniques taught." Conversely, there was at least one participant who wanted "less theory."

Simulation theory and experiential learning. Trainees enjoyed the opportunities for experiential learning, writing, "Would have been nice to practice feedback in a feedback simulation." They wanted more practice. When we added more the next year, one participant said, "It was a good experience today doing and listening to simulations and learning from them." Even at the end of our fifth cycle, when we thought we had made the course as experiential as possible, one participant encouraged us to include, "more scenarios, less lectures, less power-point."

Practical Application Needs Practice

A common theme among all learners was their need to practice their new skills. In particular, the debriefing skill was uniformly the most challenging and requested. Students also wanted more practice in scenario design and orchestrating a simulation.

Debriefing is difficult. In the 2010, 2011, and 2012 courses, almost every participant indicated that they wanted more practice debriefing. One participant wrote, "I still don't really get the debriefing, but that will come with practice. I will need lots of it," indicating their new appreciation of how difficult debriefing is.

Curriculum design and building cases. Students continued to share concerns about developing curricula. In response, we introduced presentations by former students who demonstrated the ways they had incorporated simulation into their curricula. In each class, one of the take-home lessons mentioned frequently was "know your learning objectives before creating a simulation case." In our classes however, we noticed that many trainees had difficulty doing this. In 2012, we began to use the method advocated by Kern, Thomas, and Hughes in their book on curriculum development (2009). This was very helpful, with many students indicating that this was one of the most important take-home points for the course.

Running and trouble shooting a simulation: Building a case scenario. Most people were surprised at "the depth of thought and detail needed to prepare a case" and many wrote that there should be, "more on case development." At the same time, the message to "simplify" the cases was coming through in the daily comments: "Need to keep the objective focused and keep

simulation simple!" People were also surprised that complicated technology is not necessary to achieve a good learning experience.

Operating the manikin was a concern for many trainees, and they indicated a desire to know more about what goes on "behind the scenes." When asked what they wished they had learned more about, some students said, "How to operate the controls and do the actual simulation." To provide a logistical perspective, we added a session where we restarted the first case of the week and then stopped it midstream to allow trainees to interact with the team running the case. Members of the team explain what they are doing in the case and the trainees ask questions. To provide more practice with the technical aspects of simulation, each team work with the simulation technologists to build and run cases their groups create (simulated simulations). We also added a center tour with a focus on simulation devices and capabilities. Even with these changes, some trainees still felt there should be more instruction on the technical aspects and the operational management of using simulation. In the most recent course, we added optional training sessions to address these requests.

Unexpected Insights and Details Matter

When developing a course like this, attention to unexpected insights and details is important. In our experience, it became clear that student perception of interprofessional education was not obvious until they saw it modelled in the course. This was also true concerning students' understanding of how to work with challenging students.

Interprofessional educational modeling. Trainee groups and course instructors were selected to include different professions and disciplines to enhance interprofessional collaboration in the hopes that this would extend beyond the course. There were few comments or complaints about this mixing, and trainees seemed to enjoy learning new things from each other. One student did note in her comments at the end of the week that she would "Work to develop more varied sim students; interdisciplinary/interprofessional education."

Working with challenging students. Any diverse class has the potential to include challenging students requiring thoughtful management. In earlier courses, there were comments about problems trainees had with their own trainees. In one course, we had a participant who caused friction with other members of the class. Although we thought we were managing this well, there were many comments about this by the third day. We then included a short discussion about difficult situations that trainees had encountered, and developed ideas about managing them. We now include a session on "the challenging debriefing" that is still evolving.

Trainee comfort affects learning. If all goes well, the work put into a course often remains hidden; but when details are not addressed, the trainee experience and learning can be diminished (Caffarella & Daffron, 2013). Daily evaluations identified concerns about room temperature, space, food, and breaks, which were addressed throughout the course. Celebrating the learners and helping them connect with faculty and each other was achieved through such strategies as group photographs, t-shirts, logo mugs, shared contact lists, and follow-up emails.

Discussion, Implications, and Conclusions

This work brings together the concepts of experiential learning as defined in the adult education literature and concepts in simulation education (Fenwick, 2003). Due to the lack of other action research studies related to simulation instructor courses, the authors put forth this paper as an example of the unfolding new knowledge learned in ours. In our review of the seven courses, the themes that emerged were both expected and surprising. We expected that there would be much that the learners "did not know that they did not know" and that this could cause

concern on their part.   Due to the general inexperience of the group, we also expected that many would be uncomfortable with the new skills that they were learning to perform. Trainees often spoke about the need to better understand the theory behind the educational programs we were helping them to develop. In response, we provided additional supportive background papers with short presentations touching on the key focus areas of education theory as they relate to simulation education. Further, we added a specific educational strategy commonly used in curriculum development and medical education (Kern, 2009). The value of this resource is frequently cited on the one-minute papers.

What became increasingly obvious was the learners' desire to gain additional comfort and skills with debriefing. While debriefing practice was integrated throughout the course, learners continually requested more time on this topic. We recently added a session early in the course on creating good questions before diving into the theories relative to debriefing and more complex methodology. This was an example of us "breaking the task into component parts" which is something we are trying to teach our learners to do. The appropriate amount of debriefing instruction and practice remains an ongoing topic for evaluation and adjustment.

We observed that many learners arrived with a notion that they would learn how to deliver complex, high-level simulations. By mid-week, we observed a significant paradigm shift. Trainees learned that an effective simulation can be simple, and that the driving factor is to match the learning objectives and learner needs with the appropriate level of technology.

As more detail was presented about running simulations, the learners' individual needs surfaced. We addressed this through additional sessions called "hot topics," which were offered as optional sessions during lunch, focusing on three areas of interest: simulation center administration, managing technology, and curriculum development. We realized that we could not tailor the course to each individual's needs and that a careful balance had to be achieved among the diverse population of learners.

Although we emphasized the interprofessional design of the course, we did not specifically discuss interprofessional education until our most recent course. The trainees interacted well and seemed to enjoy the diversity of opinion, even indicating their interest in applying it to their courses.

It was clear from the comment review that many trainees still experienced a significant sense of discomfort with their new skills and knowledge at the end of the courses. We are currently developing strategies to address this. Generally though, by the end of most courses, the following comment was more typical: "My concerns are decreasing as I become more educated in simulations. The course has given me numerous ways to enhance our courses. I'm excited to apply my new learned concepts."

The purpose of this paper was to highlight the steps we took to develop a simulation instructor course so that others can learn from our experience, and to consider this in relation to the larger world of adult education research. We have determined the need to attend more acutely to the preparation of the student, including a heightened awareness of the goals of the course prior to attendance, to a clearer explanation of the trainees' assignments throughout the course, to the need for additional faculty support for these assignments, and an acknowledgment that they have now engaged in a life-long learning process. This is a journey for which we hope to provide ongoing support and direction. We also recognize that not only does the field of simulation education have much to learn from adult education, but that the field of adult education has something to learn from simulation. This study contributes to that end.

In conclusion, developing educators' simulation proficiency enhances the appropriate and effective use of simulation-based education in healthcare. In addition to expanding educators' knowledge about simulation and understanding experiential learning theory, the course has benefitted from a growing awareness that educators also learn from experience. Enabling trainees to simulate cases and debrief each other in a safe environment allows reflective and directed feedback. The use of action research allowed our team to take an existing instructional program for simulation education and enhance it well beyond its original design.

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