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Action research and millennials: Improving pedagogical approaches to encourage critical thinking☆

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ABSTRACT

Background: This article examines the effects of intergenerational diversity on pedagogical practice in nursing education. While generational cohorts are not entirely homogenous, certain generational features do emerge. These features may require alternative approaches in educational design in order to maximize learning for millennial students.

Method: Action research is employed with undergraduate millennial nursing students (n = 161) who are co-researchers in that they are asked for changes in current simulation environments which will improve their learning in the areas of knowledge acquisition, skill development, critical thinking, and communication. These changes are put into place and a re-evaluation of the effectiveness of simulation progresses through three action cycles.

Results: Millennials, due to a tendency for risk aversion, may gravitate towards more supportive learning environments which allow for free access to educators. This tendency is mitigated by the educator modeling expected behaviors, followed by student opportunity to repeat the behavior. Millennials tend to prefer to work in teams, see tangible improvement, and employ strategies to improve inter-professional communication.

Conclusion: This research highlights the need for nurse educators working in simulation to engage in critical discourse regarding the adequacy and effectiveness of current pedagogy informing simulation design. Pedagogical approaches which maximize repetition, modeling, immersive feedback, and effective communication tend to be favored by millennial students.

1. Introduction

Mobile technologies, Web 3.0, and the increasing availability of wireless networks are broadening the concept of acceptable learning spaces (Santos et al., 2016). Technology is advancing exponentially, and that means a digital generation has come of age while a generation of Baby Boomers still clings to the lecture theatre (Gross, 2014). The findings reported in this article are drawn from a Doctoral of Health Science thesis (Erlam et al., 2015).

Today's university and college classrooms represent several generations of students being taught by faculty members from a different generation (Earle and Myrick, 2009). A new generation emerges on the planet approximately every 20 years (Gross, 2014; Howe and Strauss, 2000). Millennials, the newest generation to enter the tertiary setting, were born between 1982 and 2002 (Howe and Strauss, 2000; Parker and Myrick, 2009). Their parents are often Baby Boomers (born between 1943 and 1960), or Generation X (born between 1961 and 1981). Millennials are the first generation to conduct social interactions digitally (Gross, 2014).

Technology does more than define this generation; it shapes their expectations (Gross, 2014). Millennials in the educational setting are keen that technology be woven seamlessly into educational platforms (Earle and Myrick, 2009). However, the integration of simulation in a scaffolded manner within undergraduate nursing curricula is less certain (Parker and Myrick, 2009). With the majority of nursing educators being Baby Boomers or Generation Xrs, there may be a tendency to allow technology to drive changes rather than sound philosophically-based pedagogy. Research to assist in changing the educational platforms employed by Baby Boomers and Gen Xrs to best accommodate the needs of Millennials is the topic of this paper.

2. Background

One of the predominant technology-based tools currently being

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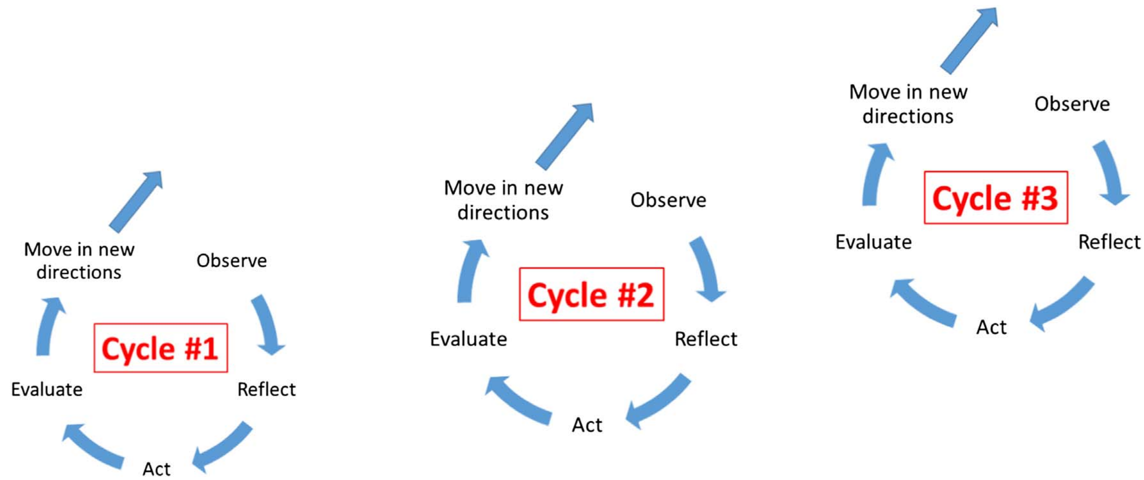

Fig. 1. Adapted action research process.
Adapted from *All you need to know about action research* (McNiff and Whitehead, 2011, p. 9). Reprinted with permission.

integrated into undergraduate nursing education is simulation (McNeill et al., 2012). Immersive classrooms integrating simulation have emerged over the past 20 years in order to meet the challenges of increasingly complex clinical environments compounded by a lack of quality clinical placements (Curl et al., 2016).

Simulation is an interactive teaching strategy which replicates essential aspects of reality so that reality can be better understood (Jeffries, 2007; Nehring and Lashley, 2010). It is designed for augmenting the teaching/learning process (Miller, 2010) and it may employ the use of computerised manikins, models, and scenarios in place of live patients. Manikins can be programmed to respond to both actions and omissions, thus immersing the student in a learning environment which mimics the reality of clinical complexity without posing danger to actual patients.

Simulation as a teaching/learning method is a specialty requiring educator training in theory-based simulation methods (Hayden et al., 2014). Baby Boomers and Generation Xrs may not be familiar with the pedagogical underpinnings employed to maximize the effectiveness of simulation, nor how to embed these into simulation design. Our team identified a gap in simulation educator development, along with some reticence on the part of educators to change current delivery platforms (Erlam et al., 2015). This study employed action research to both discover educator challenges, and implement millennial preferences in simulation classrooms.

2.1. Intergenerational Diversity

The four generations described in the literature include: Silents (born 1925–1942), Baby Boomers (born 1943–1960), Generation X (born 1961–1981) and the Millennials – also known as Generation Y (born 1982–2002) (Foley et al., 2012; Howe and Strauss, 2000). Differing educational preferences may exist between generations, and these differences can often be traced to technology (McGlynn, 2010; Thomas, 2015). Millennials have not known what it is like to grow up without electronic games, or social media (Gross, 2014; McGlynn, 2010).

2.2. Some Tendencies of Millennials

Millennials as a generational cohort are characterised by seven distinguishing traits (Erlam et al., 2016; Foley et al., 2012; Howe and Strauss, 2000, pp. 43–44):

1) *Special*: they tend to feel they are collectively vital to whatever group they belong;
2) *Sheltered*: they have been on the receiving end of numerous safety rules and devices;
3) *Confident*: they tend to exhibit high levels of confidence, and optimism;
4) *Team-oriented*: they have grown up in a culture of social media and classroom group teaching, which fosters strong team instincts and tight peer bonds;
5) *Achieving*: they have experienced high levels of accountability and higher school standards;
6) *Pressured*: they have been pushed to study hard while avoiding personal risks; and
7) *Conventional*: they tend to be more comfortable with their parents' values than any other generation in living history.

Currently, there is a lack of research on the intergenerational context in higher education (Foley et al., 2012). There are several tendencies present in many Millennials, which may encourage their involvement in participatory research. Their exposure to safety devices may lead to a heightened awareness of the value of simulation as a means of promoting patient safety. Their *team orientation* may encourage them towards participatory forms of research. Their often adept abilities with technology and social media can mean that they are more interested in being involved in technological applications like simulation. Millennial *achieving* tendencies may contribute to improving their performance in simulation, while feeling *pressured* may encourage them to repeat the simulation to achieve competency.

This action research project intentionally included a pedagogical approach in which the researcher sought to understand, through a participatory process, what was and was not working with Millennials in current simulation settings in an undergraduate nursing program. Participants were invited to be involved in revised simulations where their suggestions were put into action, and evaluated in a cyclical process (Erlam et al., 2015). This process allowed participants to drive the research process according to their own learning needs.

3. Research Design

Action research involves taking action to improve personal and social situations while explaining why these solutions are beneficial. The methodology involves a cycle of inquiry (observe, reflect, act, evaluate, modify next cycle) (McNiff and Whitehead, 2011). This cyclical process is shown in Fig. 1.

Action research is a form of practitioner-centred research that is carried out by professionals into a practice problem for which the researcher is in some way responsible (Foreman-Peck and Murray, 2008).

Unlike other forms of practitioner research, which involve studying a situation in retrospect, action research involves a process whereby the researcher takes action in a particular situation while simultaneously researching the effect of the said action. The goal is to solve a problem or improve a particular situation (Mills, 2014; Reason, 2004).

3.1. Research Aim

The aim of this research was to improve pedagogical practices for millennials when applied to simulation design and implementation in an undergraduate nursing school. The research question is, "How can pedagogical practices be improved when working with undergraduate millennial students in the simulation environment?" As 67% of the undergraduate population was millennials at the time of this writing, recruitment was not a barrier.

Approval for the study was gained from the University Human Ethics Committee and participants were recruited from all three years of a university undergraduate nursing degree. In accordance with action research theory involving practitioners as co-researchers (McNiff and Whitehead, 2011; Mills, 2014), inclusion criteria required participants were enrolled in the undergraduate nursing program, and between the ages of 18 and 30 at the time of data collection (2012–2014). This research intentionally sought to understand current practice in the undergraduate simulation program, put interventions into place to improve simulation via participant feedback, and look to best practice in future simulation.

3.2. Data Collection

Data collection occurred over a 24-month period incorporating three action cycles. There were a total of 161 student participants (two males, and 159 females), 35 educators, and two technicians involved in this project. Ethnic background was not considered as part of demographics. Multiple methods of data collection including questionnaires, focus groups, technician interviews, pre- and post-simulation tests, surveys of academic staff, research journaling, participant verification, and evaluation of student performance using the ***Lasater Clinical Judgment Rubric (LCJR)*** (Lasater, 2007, 2011) provided a broad range of evidence as to the effectiveness of simulation on clinical reasoning, content knowledge, satisfaction, and confidence (Erlam et al., 2015). In line with action research objectives (McNiff and Whitehead, 2011) the focus groups in the first and third cycles ensured participants had a voice, and allowed them to express their experiences in the current simulation landscape. Focus groups also facilitated discussion on issues and barriers influencing involvement in simulation in the undergraduate degree along with challenges to engagement, and new ideas in simulation design and reflection.

Questionnaire responses from cycle 2 suggested that a simulation suite which moved students through a series of scenarios with increasing complexity would be helpful to build competence across a variety of deteriorating patient situations. Thus, cycle three emerged. It involved added layers of complexity due to the addition of an embedded quantitative section (Creswell and Plano-Clark, 2011).

The Lasater rubric was employed in this cycle to quantify student performance. Statistical analysis by Adamson et al. (2012) using SPSS confirmed that Lasater rubric was internally consistent with an alpha coefficient of 0.87. Other researchers report an interrater reliability of 0.889 with an internal consistency of 0.974 (Victor-Chmil and Larew, 2013). The LCJR has thus been shown to have a sufficient measure of consistency when evaluating the ability of learners to respond to a clinical problem that is presented in a simulation.

These multiple data collection methods (Fig. 2) followed the action research process in a manner which encouraged active change coupled with participant reflection and feedback as subsequent research spirals emerged (McNiff and Whitehead, 2011).

3.3. Data Analysis

Action **cycles one and two** included focus groups, faculty surveys, technician interviews, and questionnaires. These were transcribed and thematically analysed with the research question as a guiding inspiration. The themes captured "something important about the data in relation to the research question, and represented some level of patterned response or meaning within the data set" (Braun and Clarke, 2006, p. 84).

The pre- and post-simulation test scores (**cycle three**) were analysed using Statistical Analysis System (SAS™). This analysis was conducted by a biostatistician at the University. This software enabled analysis of the variance between pre- and post-simulation test scores, determined the mean scores across the three scenarios, and analysed the standard deviation as the students proceeded through the scenario suite (repeated measures design).

4. Results

4.1. Cycle One

4.1.1. Millennials Desire Supportive Learning Environments

The aim of cycle one was to understand the current landscape in which simulation was embedded, and discover barriers/challenges to simulation development in the undergraduate nursing program. Two focus groups yielded a multitude of nuances existing in current simulation culture, which were acting as barriers to millennial student uptake and engagement in simulation. Firstly, as stated above, Millennials can be both *achievement oriented* and *pressured*, which may make them avoid personal risks due to being accustomed to excessive support in formative years (Borges et al., 2010). They therefore require supportive learning environments in which to extend their knowledge. They did not find current simulation learning environments supportive as evidenced by the following:

> *I feel sick on the days I have to go into the SIM room — literally sick. I hate those SIM days. No confidence. I feel awkward the whole time. They make me nervous and worried. I thought the whole point was to set you up for failure.*
>
> *(Cycle one, FG1)*

4.1.2. Millennials Desire Facilitator Presence and May Be Risk-averse

Millennials want educators entirely available to them when they are, from their point of view, risking their reputations (Erlam et al., 2015). These desires align with the above characteristics of being *high-achievers*, *pressured* to perform. They are accustomed to being catered for, tutored, and helped along their journey to success (Howe and Nadler, 2008). Their comments indicated they felt they had not been getting what they perceived as the right attention or instruction from educators (Erlam et al., 2015). In theory, they have been regarded as 'special since birth,' and have been obsessed over at every age (Howe and Nadler, 2008). Combining this group of potentially 'entitled' students with the often argumentative and value-laden Baby Boomer or Gen Xrs can create challenges (Earle and Myrick, 2009) as evidenced by the following focus group comment:

> *What I really hate about the simulation is the glass. I'd love the educator to be down on the floor with us. It's intimidating when they are behind the glass. It makes you feel like them and us. I hate that glass!*
>
> *(Cycle one, FG1)*

4.1.3. Millennials Desire Supportive and Twitter-sized Communication

Technological immersion can mean that Millennials suffer from shorter attention spans than other generational cohorts (Howe and Nadler, 2008). This trait can spill over into educational settings to influence their 'preferred classrooms.' They prefer short, concise, timely,

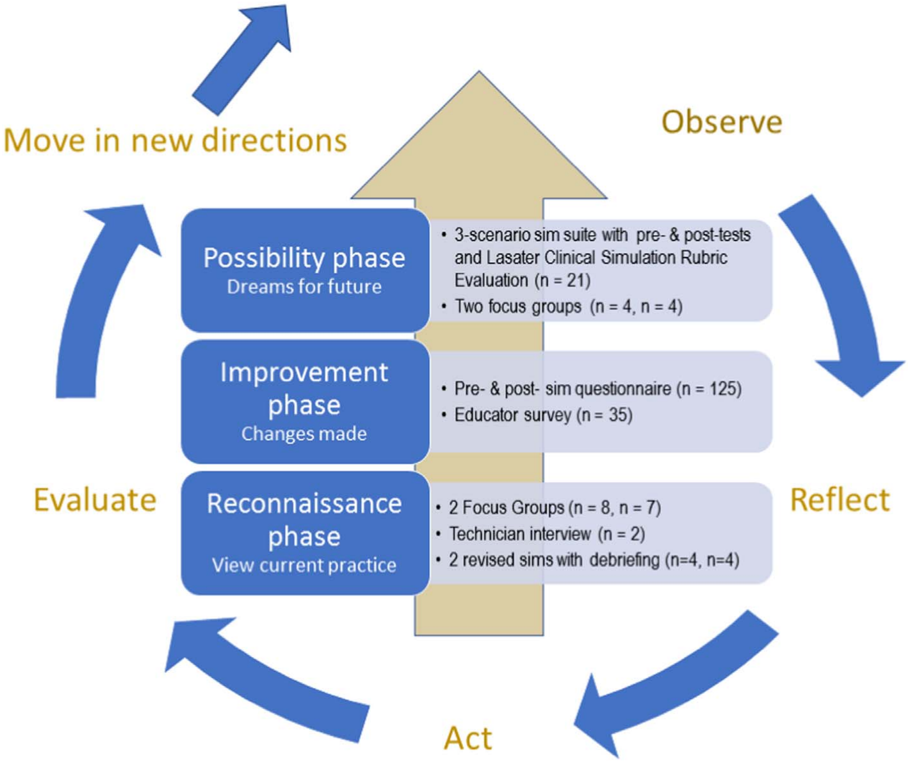

Fig. 2. Simulation design action research methods and cycles.

digestible and actionable advice (Brown, 2011; McGlynn, 2010). They tend to think in 'twitter-sized' supportive chunks of information which they prefer, instead of long and detailed explanations (Brown, 2011, p. 43). Furthermore, they tend to pull back if communication is less than constructive as expressed in the second focus group:

> *They did not give us proper feedback in the end. They did not tell us what we did well — just what we did wrong. We need to know we did something right.*
>
> *(Cycle one: FG2)*

It is important that feedback be friendly and constructive, ensuring that a sense of value and respect is conveyed. This is common sense, but needs to be emphasized, as many Baby Boomer and Gen Xrs might not be accustomed to having to treat students so 'carefully.' Feedback from older generational cohorts may feel blunt and need to be softened and more constructive in order to maximize its effectiveness with Millennials (Erlam et al., 2015).

It is important to note that each generation brings its own values, worldview, and ideals to the classroom or clinical setting and thus, the promotion of awareness and understanding of intergenerational diversity is an important aspect of pedagogical practice in nursing education.

4.2. Cycle Two

4.2.1. Millennials Desire Educator Modeling, Multiple Opportunities, Supportive Debriefing, and Communication Tools

The *second action cycle* employed a pre-post simulation questionnaire with the revised simulation embedding participant suggestions emerging in the first action cycle. Feedback from cycle one included the benefit of dividing students into roles (vital signs, medication administration, assessment for effect of medication, and calling for assistance using ISBAR - **I**dentify, **S**ituation, **B**ackground, **A**ssessment, **R**equirement). This process is in keeping with the circular relationship of cause and effect enfolding in each action cycle (McNiff and Whitehead, 2011). Four prominent themes emerging from the questionnaires included: (1) the value of *modeling* of expected performance by educators at some point in the simulation experience; (2) the value of being allowed to *repeat* the simulation after feedback was given; (3) the value of *supportive debriefing* after the first attempt in order to be able to modify simulation performance; and (4) the value of being taught the *ISBAR tool* to recruit assistance in managing the deteriorating client situation (Erlam et al., 2015). These values reflect millennials' tendency to desire positive outcomes despite risk aversion.

Cycle two included a small supplementary cycle involving a questionnaire intended for those attending any conference or training in simulation at my institution (n = 35). The need for this supplementary cycle arose out of requests for simulation training from both educators within my institution, and from colleagues at other institutions. Themes emerging from these surveys included a need for collaboration with other simulation leaders, a need for a clearer simulation plan for the future, and specific ways to integrate a scaffolded simulation plan into undergraduate nursing curricula. These themes inspired cycle three design which involved a scaffolded simulation suite which could be integrated into the undergraduate nursing program.

4.3. Cycle Three

4.3.1. Millennials Desire Team-work and Tangible Improvement

The *third action cycle* employed a repeated measures design, which involved moving all students through a three-scenario simulation suite in the same order, while students maintained one of four roles. All students took a pre- and post-simulation written test with subsequent evaluation of their performances using the LCJR (Erlam et al., 2015). The research model/design was with Table 1 showing the resultant

Table 1
Overall significance of model showing true effects.

Source	F	Sum of Squares	Mean Square	F Value	*p*-Value
Model	82	1507.26	18.38	23.00	< 0.0001
R-square		0.94			

Table 2
Results of general linear model.

Source	DF	Type III SS	Mean square	F value	*p*-Value
Role within group	11	47.48	4.32	5.40	< 0.0001
Group (1–6)	5	185.53	37.11	46.44	< 0.0001
LCJR dimensions	3	891.00	297.00	371.71	< 0.0001
Scenario type	2	233.75	116.88	146.28	< 0.0001
Group scenario	15	37.70	2.51	3.15	0.0002
Group type	10	27.70	2.77	3.47	0.0005
Scenario type	6	16.54	2.76	3.45	0.0035
Group/scenario/type	30	30.20	1.01	1.26	0.1912

general linear model.

Table 1 shows that the model used in this research significantly explains the majority of the variation in results. The **R-square** (coefficient of determination) indicates that the model can explain 94% of variance. The components of the model (independent variables) which evidenced statistically significant differences in student scores were the *role* the students played, the *group* they participated in, the *scenario type* (i.e. shock, croup, acute coronary syndrome), and the *LCJR dimensions* (noticing, interpreting, responding, reflecting). Each of these independent variables was found to have a statistically significant and true effect (p-value < 0.05) on student performance. The statistically significant impact of these variables is shown in Table 2.

The null hypothesis that the predictor has no effect on the outcome variable is evaluated with regard to p-value. In this case, the statistically significant p-values for group, scenario, role, and LCJR components mean that the null hypothesis is rejected and these predictors *do* have a significant effect on overall LCJR scores. Table 2 shows the interaction between various components of the model were all statistically significant (p-value < 0.05). In summary, the students' performance (*dependent variable*) was influenced by the following *independent variables*: (1) the individual groups; (2) the scenario subject; (3) the student role in the simulation; and (4) the particular component of the Lasater rubric being evaluated. When the interactions were two-way, the results were statistically significant (p-value < 0.05), but three-way interactions were statistically insignificant (Erlam et al., 2015). All of these independent variables require further investigation in order to more maximize the impact on student learning.

The pre-tests (given first) and post-tests (given after second simulation attempt) were another dimension which yielded positive results. The post-tests showed improved scores to the pre-tests in nearly all cases with the standard deviation tightening as the students progressed through the simulation suite. The standard deviation for the three scenarios was: (1) Hypovolemic shock SD = 1.94; (2) Croup SD = 1.63; and (3) acute coronary syndrome SD = 1.23. The standard deviation decreased as the students progressed through the scenarios (Fig. 3) indicating that the students were progressing in their ability to master the subject matter; recalling that these quizzes tested content knowledge only (Erlam et al., 2015).

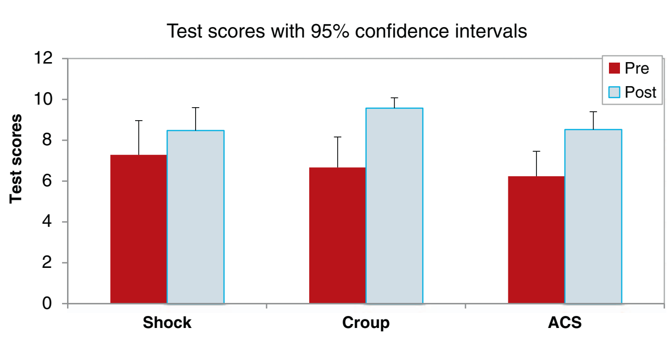

Fig. 3. Average pre- and post-test scores by scenario.

This positive progression was mirrored in the focus groups where students commented on their improved content knowledge and skill performance as they progressed through the simulation suite. Visible improvement in test scores improved student confidence.

5. Discussion

This study has identified five key elements which support millennial learners in simulation: (1) facilitator presence in simulation room; (2) brief but supportive feedback; (3) role modeling of expected performance; (4) an opportunity to repeat the performance; and (5) helpful communication tools. Participants in this research verbalized the expectation that educators design learning environments which actively engage learners. Millennials tend to prefer entertainment, technology, experiential learning, and a focus on teamwork (Montenery et al., 2013). They develop critical thinking through experimentation and active participation making simulation, with all its possible alternative directions and outcomes, an effective classroom for these students. Their learning has been described as non-linear and irregular (Brown, 2011), often characterised by rapid shifts in decisions and instant gratification.

This study employed the action research cycle (observe, reflect, act, evaluate, move in new directions) to provide an opportunity to construct and test emergent ideas and recommendations for simulation design (McNiff and Whitehead, 2011). Simulation as a teaching platform is an immersive learning environment which can actively engage millennials through the use of supportive environments coupled with educator presence (in the room) in the form of facilitated teaching (Benner et al., 2010). Support during and after the simulation is important due to the millennial tendency to be risk-averse (Erlam et al., 2015; Koeller, 2012). Providing supportive feedback *during* the simulation coupled with clear debriefing after the simulation (Howard et al., 2011) is essential to support the development of critical thinking and clinical reasoning (Gibson and Sodeman, 2014).

Educator modeling of expected performance to allows millennials opportunity to perfect their simulation role. Modeling assists students in changing outdated habits and refining their management of deteriorating clinical situations (Erlam et al., 2015). This new habit formation can be rehearsed and then stored in long-term memory (Sweller et al., 2011). Observational learning and modeling are thought to be important instructional design techniques for cognitive and behavioral learning (Anderson et al., 2008), as well as effective approaches for inspiring and correcting inconsistencies occurring in clinical practice (Davis, 2013).

Millennials valued the opportunity to repeat the simulation. In order for learning to 'stick' and be held in the working memory, it must be rehearsed (Roberts et al., 2014). If not rehearsed, it is lost in between 15 and 30 seconds after it is learned (Driscoll, 2005). However, with rehearsal, the skill becomes *automated* and remains a part of long-term memory. Repetition is required to accomplish such skill acquisition (Haraldseid et al., 2015).

As many millennials are immersed in social media (Stephens and Gunther, 2016), it is imperative that effective communication skills be taught in the clinical setting. There is a tendency amongst millennials to avoid face-to-face interactions in favor of social media (Morris, 2012). This study supports the importance of teaching the ISBAR tool for interprofessional communication (Kitney et al., 2016) with resultant improvement in patient safety (Spooner et al., 2016).

Simulation as a teaching/learning platform supports the millennial preference of teamwork (Howe and Nadler, 2008). In fact, simulation can improve teamwork attitudes, perceptions, and performance (Rice, 2016). Some are finding the ability to exhibit teamwork can improve patient safety (Steven et al., 2014). All of these benefits resonate with millennial learners.

5.1. Limitations

Due to time constraints this project did not allow for extensive training of educators in the use of the Lasater Rubric. This meant that interrater reliability was not optimal. There was a potential for researcher bias in the rating of the Lasater scores. This was managed by having a second educator review the video clips to ensure accuracy. Furthermore, some nursing cohorts consist of students from other generations or cultures who may prefer different pedagogic approaches to those outlined in this article.

6. Conclusions

This action research project has highlighted five pedagogical suggestions to guide nurse educators in maximizing simulation for undergraduate millennial nursing students. These include: (1) facilitator presence in room; (2) brief but supportive feedback; (3) role modeling of expected performance; (4) an opportunity to repeat their performance; and (5) helpful communication tools (e.g. ISBAR). These strategies support students in improving content knowledge, skill performance, clinical judgment, and effective communication. The simulation suite (cycle three) allowed students to see their progression in the above areas while inspiring them to intentionally explore their professional scope and abilities. These simple concepts may influence simulation design in a manner which results in more competent and safe professionals.

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