Optimizing learner assessment in a respiratory therapy clinical simulation course

Yvonne Drasovean, MEd, RRT, FCSRT[1,2]

The purpose of this participatory action research project was to evaluate the effectiveness and objectiveness of learner evaluation methods used in a clinical simulation course offered at a community college as part of the 3-year Respiratory Therapy advanced diploma program. A mixed-method approach to data collection was used. A paper-based questionnaire was completed by 47 participants and was utilized to identify learner satisfaction with the simulation experience. An online questionnaire was completed by 16 participants and utilized to identify learner satisfaction with the evaluation methods used in the course, as well as to gather suggestions for improvement of those methods. Two focus groups further explored 7 participants' impressions of how evaluation practice in the course affected their learning process and competence in preparation for formal assessment. Data analysis found that the majority of participants were generally satisfied with the current evaluation process considering the practice objective and found that it was effective in helping learners achieve their learning goals. Areas identified for improvement included practice improvement, such as team and communication skills assessment; student self-reflection assessment; and changing the grading system from a numerical grade system to a pass/fail system. The project offers suggestions for future research, including the development of a standard evaluation rubric in high-fidelity simulation in respiratory therapy in Canada based on the national competency profile for entry to practice.

Key Words: *simulation-based education; evaluation; respiratory therapy; evaluation in clinical simulation; evaluation in adult education; program evaluation*

INTRODUCTION

The purpose of simulation-based education in respiratory therapy is to help learners combine knowledge and practical skills gained in previous courses in preparation for real-world clinical practice. Simulation-based education uses computerized manikins that can be programmed to simulate real scenarios that are safe and controlled. This type of educational activity offers a unique opportunity for learners to make mistakes and to learn from them while developing and improving critical thinking skills [1]. The traditional apprentice-learning model in medical education, respiratory therapy included, is undergoing a pedagogical shift to a simulation-based, experiential learning model. Although not intended to replace clinical practice, experiential learning and the ability to provide immediate feedback on performance are advantages of simulation-based learning in preclinical education of respiratory therapy students [2].

An important aspect of any learning process is learner assessment, including the measurement methods and strategies employed to ensure that learning actually happens. Learner assessment is a systematic process that allows instructors to identify how much and how well students have achieved curriculum goals, providing critical—at times, instant—feedback that is essential to the learning process [3]. On that premise, it is important that learner assessment is consistent with the curriculum being taught and that learner expectations are clear to ensure that measurement tools do not cause anxiety, thereby restricting learning.

Currently, there is no gold standard in assessment methods in simulation-based education in respiratory therapy. Farell et al [4] suggested designing program evaluation processes to include a needs assessment, a framework describing who, why, when, and how process evaluation should be approached, stating that "Process evaluations are ongoing and help program providers to understand what is being done and how, and to assess what needs to be changed or improved." Learning in clinical simulation requires a flexible formative and summative assessment process [5]. Formative learner assessment is a low-stake assessment that helps learners identify their strengths and weaknesses and provides means for instructors to identify opportunities to correct or enhance skills as needed. Summative learner assessment is a high-stake assessment intended to evaluate learning at the end of an instructional unit.

Assessment methods must include strategies to provide useful feedback that directs learner behaviour towards learning and adapting based on that feedback. In the course being evaluated, debriefing each simulation scenario was intended as such a strategy. Another important element to consider is that during stressful situations (such as summative assessment) learners can make errors in judgement, leading to lower than expected performance. Is there a better way to provide learners with tools for learning while at the same time evaluating their performance? It may be worth building on Peterson's [5] idea of using both formative and summative assessment of learners, because it may increase the quality of performance and improve learner engagement in learning during the practice simulation. For instance, formative assessment as applied to a clinical simulation course could be done in the weeks leading up to the main evaluation, which is the summative evaluation. Peterson [5] states: "The assessment process must be designed so that we can provide the teams with feedback that is useful and also directs their behaviour toward learning and adapting based on the feedback."

Simulation-based education assessment strategies employed using global rating scales and checklists have limitations. Kim et al [6] provided a comparison of global rating scales and checklists for the validation of an assessment tool used in performance assessment in simulation of high-crisis medical situations. They concluded that construct validity, the degree to which a test measures what it claims to be measuring, is seen in both tools. Both tools have the ability to discriminate between participants of different skill levels. There seems to be poor inter-rater reliability in certain categories in both tools, indicating that future design revisions for both instruments are necessary. An interesting observation from this study was that users indicated a strong preference for the Ottawa global rating scale due to the ease of scoring, presence of an overall score, and potential use as a tool for formative evaluation.

O'Leary [7] discussed implications of using various strategies for evaluation, offering an overview of Miller's model of assessing clinical

[1]*School of Health Sciences, Fanshawe College, London, ON;* [2]*London Health Sciences Center Respiratory Therapy, London, ON*
Correspondence: Yvonne Drasovean, School of Health Sciences, Fanshawe College, 1001 Fanshawe College Blvd., London, ON N5Y 5R6. e-mail ydrasovean@ fanshawec.ca

competence. Miller's prism of clinical competence suggests a hierarchical assessment of performance along a learning journey from novice to expert status. Miller's model emphasises that while simulation can be very realistic, it is still a simulation, and learners may not necessarily perform as in real life [7]. Taking into consideration learners' level of preparedness is also an important element in the designing process of an assessment tool.

While simulation is without a doubt a powerful educational tool, it is important that educators clearly identify the impact of appropriate evaluation on the learning process. Moreover, the lack of research on assessment practices in clinical simulation specific to respiratory therapy in Canada makes it difficult to assess how objective and how effective current evaluation practices are in supporting learners to achieve a satisfactory level of competency and knowledge prior to entering clinical practice. The purpose of this study was to examine the learner assessment processes used by instructors in the respiratory therapy clinical simulation course offered at an Ontario College. A participatory action research approach was undertaken employing both qualitative and quantitative methods guided by the following research questions:

1. What constitutes objective and effective learner evaluation in the respiratory therapy clinical simulation course?
2. How can improving evaluation practices in the clinical simulation course enhance student success?

Description of the project

Since its implementation, the clinical simulation course in this respiratory therapy program has proven to be an effective educational tool in preparing students for clinical practice. When discussing the importance of this course in the program curriculum, the developer of the course says that "As educators we need to adapt to the learning continuum of learners, high-fidelity simulation is an educational tool that can afford us the ability to purposefully design an experience that can make meaning for an individual" [8].

Similar to other courses with a practical skill learning component, the clinical simulation course must provide measurements of student learning outcomes; specifically, the assessment of clinical practice skills. Students in the course examined by this study were provided with the opportunity to take the role of team leader in at least one of the weekly scenarios, prior to being assessed. Scenarios were facilitated by course instructors and simulation technical staff. This researcher played an active role in the delivery of the course, including formative and summative assessment of students. A typical simulated clinical scenario consisted of a patient (manikin) presenting in cardio–respiratory distress. Learners were required to assess the situation and the patient, make decisions regarding the plan of action, suggest interventions to help the patient using previously gained knowledge and critical thinking skills and, ultimately, to act on these decisions. Simulations were videotaped each week and students were provided the opportunity to review their performance to enhance the learning process. At the end of each simulated scenario instructors facilitated a debriefing session where students had the opportunity to express concerns, offer feedback to each other, prompt critical thinking, and discuss all positive and negative aspects of their skill performance.

Due to scheduling issues and instructor time limitations, students were divided into three instructional groups, each led by a different instructor. As one of the instructors assigned to the course, this researcher chose to provide learners in their group with formative evaluations each week at the end of their practice simulation exercise. To do this, the instructor used the same evaluation rubric used for summative evaluation in all three groups during practice simulations. The intent of using the rubric as a formative tool was to provide learners with feedback structured the same way they would be expected to perform during summative evaluation. Although learners received a score during the practice sessions, the scores did not count toward the final grade. The instructors of the remaining two learner groups used the rubric for summative evaluation purposes only. Those 22 learners received general feedback on their performance

during the weekly practice sessions without the use of the evaluation rubric. The assessment rubric used in the study course was a global rating scale with a 5-point scale for performance in six categories and an overall performance score.

The course involved three simulation sessions (three weeks per session) with three practice scenarios (one scenario each week) followed by summative evaluation of individual students at the end of each session based on the summative assessment rubric. To pass the course, learners must have achieved a minimum score of 60% on each of the three individual evaluations. Learners scoring below the minimum grade were provided with the opportunity to perform one comprehensive assessment for upgrading purposes prior to the end of the semester, provided that the overall course grade was 60% or greater. Learners were also expected to complete a reflection assignment with the purpose of identifying areas for improvement and clearly finding and creating strategies that would enable them to obtain improvement in those areas.

METHODS

A participatory action research design was used for this project because it sought to engage processes of inquiry that are democratic and empowering [9]. The intent was to involve all stakeholders, including students, instructors, and technical staff, in the process to generate knowledge about the existing assessment methods (three individual summative evaluations, percentage scale used) and ideas for potential changes and improvement. Jackson and Kassam [10] suggested extending the concept of participatory action research to participatory evaluation (as cited in Benson et al [11]). Jackson and Kassam [10] defined participatory evaluation as the process of self-reflection, assessment, and collective knowledge production. Through collective work, stakeholders contributed to identification of issues in assessment practices through data collection and analysis. This type of collaboration led to an overall improved outcome as a result of actions taken based on evaluation findings.

In line with action research definitions [12] this study was conducted from the inside, as this researcher was part of the instructors team, in an attempt to develop and improve practice in evaluating students in this course. Various methods of inquiry were used to triangulate sources: listening to stakeholders as they described their experience and perspectives, observing and participating in events, and reading reports of similar events and activities [9]. In this study, mixed research methods enhanced the strength and validity of research findings and helped overcome some of the limitations of the project [12]. In particular, data from two surveys were corroborated with data from the focus groups. Laws et al [13] stated that "the key to triangulation is to see the same thing from different perspectives and thus to be able to confirm or challenge the findings of one method with those of another" [14]. The data collection goal was to critically analyze information received via different channels to paint a clear picture of the stakeholders' perspective on the evaluation process and to confirm similar findings or identify discrepancies that would further guide the research process.

Data were collected through two surveys and three focus groups, and they were supported by reflective journaling, review of course documents such as student grades, and course evaluation rubrics. Recognizing that some of the research study participants might not have been comfortable speaking in the presence of others, the surveys offered anonymity and potentially more flexibility in terms of participation time. Interviewing stakeholders offered a means of more deeply understanding participant experiences and perspectives. Focus groups unearthed valuable information and ideas that might have potentially been overlooked with surveys. Descriptive statistical analysis was performed on the data collected from Likert scale survey questions. The qualitative data collected through open-ended survey questions and through focus group interviews were transcribed, coded, and analysed for emergent themes.

Because the inquiry process generated through action research parallels the experiential learning cycle (in which practice improves as experiences build upon experiences) [15], personal journaling and reflection on this researcher's own practice as an assessor provided insight on the

impact of assessment on learning process. Furthermore, learner assessment rubrics were mapped to course learning objectives for examination of their utility as assessment tools. Student outcomes, such as the average grade of the group on each assessment, were used to evaluate overall achievement of learning outcomes.

Participants

An invitation to participate in this research study was sent via email to the class of learners who most recently completed the simulation course and were currently enrolled in the clinical placement year of the program, as well as to the instructors of the course and the technical staff involved in the preparation of the course setting. Participants were given the opportunity to provide free and informed consent to take part in this research study. This research project was conducted in compliance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans [16] and received the approval of the Research Ethics Board of Yorkville University and Fanshawe College Research Ethics Board (Protocol # 15-09-24-1).

A total of 51 participants agreed to be a part of the project. Of those 51, 47 were learners, two were simulation technical staff, and three were instructors in the course. This researcher was also a participant in the study as one of the three instructors who actively participated in the course delivery. Forty-seven learners completed a paper-based survey and 16 learners completed an online survey. Eight individuals, including three learners, three instructors, and two simulation staff participated in three different focus groups.

With large classroom sizes, the three instructors of the simulation course were somewhat isolated in terms of teaching and assessment practices, often only seeing each other in passing at the end of one's session and the beginning of the other's. School structure and schedule reduced the available time for collaborative relationships and activities with peers. This is particularly important in a simulation course where the same standards for teaching and assessment must be applied to all learners [5]. It is human nature for each individual instructor to use personal views and practices, even when standard methods of teaching and evaluation are being used. While instructor personal experience and approach can positively shape the learning process of a group of learners, in this case it was important that standards were given appropriate attention.

The technical staff routinely provide support to various healthcare professions and programs, including respiratory therapy. This placed them in a unique position of being able to see different teaching practices and evaluation methods. Although each profession has its own specific requirements and standards, there is opportunity to learn from one another through inter-professional collaboration. Considering that it is the efforts of a complex healthcare team that leads to successful patient outcome in real clinical practice, there is potential for future research on evaluation methods.

Paper-based survey

An anonymous, paper-based questionnaire on the evaluation of simulation activity was offered to participants who provided feedback and rated the simulation activities based on their overall experience with the course. The survey contained ten questions and provided the researcher with the opportunity to understand the groups' perception of the support received during the course in preparation for evaluation. The survey also stood as a message to learners that their opinion and feedback are important to the teaching, learning, and evaluation process for the creation of a true collaborative environment.

Web-based survey

In a second survey, eight questions were used to identify elements of the evaluation process that may benefit from improvement or change in practice as perceived by learners. The survey was administered using an online survey platform (SurveyMonkey). Survey questions employed a Likert scoring system, which Bell and Waters [14] described as "scales are devices to discover strength of feeling or attitude." The questions were also designed to investigate learner perception of the objectivity and effectiveness of the evaluation methods format in helping them achieve their learning goals.

Focus groups

There were three focus group interviews completed: with the instructors directly involved in learner assessment, with simulation technical staff, and with learners who had been assessed in the simulation course. The interviews provided a means of better understanding human emotions and perspectives that accompany any assessment process. It offered insights into the experience of both the assessing instructor and learner, experience that is a complex collection of actions related to the learning processes in preparations for assessment. The same open-ended questions were asked in all three focus groups. This researcher chose focus groups as part of the methods of collecting data because of the interactive aspect, where group opinion was as important as individual opinions [12]. The interviews were held face-to-face in an interview room on campus, with one participant joining the learner's group conversation online via video conferencing. To avoid researcher bias, interviews were facilitated by an unaffiliated research assistant. An audio recorder was used for data collection and to ensure verbatim transcription of data.

RESULTS

Based on participants' qualitative feedback in the paper-based survey, learner assessment was considered generally fair and objective. Table 1 provides a selection of participant comments collected through the survey. Table 2 shows the results of the online survey on learners' perception of assessment methods used in the simulation course. A total of 16 learners accepted the invitation to participate in this survey.

TABLE 1

Selected learners' comments on the simulation (SIM) experience and evaluation collected by paper-based survey

"It was good but the exams were scary."

"I felt that as an RT student, having the simulation course is essential to my learning because I had the opportunity to apply my theoretical knowledge in a clinical setting. The feedback and skills I have learned during simulation will help prepare me to transfer to my clinical placement."

"I would prefer if we had a chance to go back into the SIM room for debriefing to go through proper procedures."

"As a student, simulation can be a very valuable experience although I felt some weeks were a little overwhelming. I personally feel I would have benefited more from SIM lab if our other lab courses had the same intensity with regards to hands on experience."

"This course is by far the most beneficial in preparing us for clinical placement. It is very stressful at times, but I love it."

"Discussing the pre-brief before starting the scenarios may be helpful."

"Clinical simulation would be a great idea to simulate actual scenarios for a graduate RT. It puts students in a situation that is high stress with no preceptor with experience to help guide our interventions. The course however gets us ready for basic interventions."

"I have learned the most about this program in SIM. I have been able to become more confident in my skills because of SIM."

"I would like more constructive feedback on the SIM evaluations."

"This course is a good way to continually reinforce the skills we've learned over the last 2 years. More prep beforehand would be nice."

"Overall it was a helpful experience to apply what we learned. The only thing I thought could be improved was that during the first SIM evaluation, the patients were both trached and we hadn't had any trach scenarios up to that point. It would have been helpful to review that heading into the evaluation."

TABLE 2

Learners' perception on the assessment methods in the simulation course (*n* = 16)

Question	Strongly disagree	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)
The course format was adequate in preparing me for assessment.	0	0	6.25	62.50	31.25
The frequency of assessment in the simulation course was adequate.	0	6.25	6.25	50	37.50
The time allotted for performance during assessment in the simulation course was adequate.	0	0	0	82.25	18.75
The format used for assessment was effective in assessing my skills.	0	6.25	12.50	68.75	12.50
The assessment methods in the simulation course were effective in helping me achieve the learning objectives as outlined in the course information sheet.	0	6.25	6.25	50	37.50
The assessment methods used in the simulation course met my learning needs.	0	6.25	6.25	43.75	43.75
I was satisfied with the assessment process in the simulation course.	0	6.25	18.75	31.25	43.75

Five themes that relate to the assessment tools used in the simulation course emerged from the qualitative data collected through the three focus group interviews: authentic evaluation, learners' satisfaction with evaluation methods, evaluation and learning objectives, evaluation and learning outcomes, and evaluation and learner self-reflection.

DISCUSSION

Authentic evaluation
The paper-based survey of the simulation experience provided information about the overall learner satisfaction with the course, including the assessment methods used. The survey questions investigated topics such as the impact of the amount of information received by learners prior to each simulation session and the meaningfulness of simulation scenario in relation to learning outcome. Input from the paper-based survey shows that 53% of the 47 learners were satisfied with the information received prior to weekly practice sessions. This topic was further discussed in the learners' focus group where three participants stated that background information on the situation prior to each simulation was sufficient and sometimes useful in creating a plan of action for the simulation. This speaks to the authenticity of the evaluation process. The course design and format provided learners with multiple opportunities to practice their critical thinking skills in various situations, making these skills predictable for future situations. These skills became useful indicators of learning. Authentic evaluation also provided diagnostic information and feedback to learners so that they know how and where to make improvements [17] (as cited in Svinicki [18]).

Learners' satisfaction with evaluation methods
Data from the paper-based survey indicated that 75% of the 47 participants were satisfied with their experience in the simulation course, including the methods of evaluation used in the course. Nineteen percent of participants were neutral, and 6% of participants were dissatisfied. The inconsistency in practice between instructors, where only one instructor provided formative assessment based on the course rubric, led to some learners' dissatisfaction with the support received in the course in preparation for summative assessment.

The latter group expressed some of the reasons for their dissatisfaction with evaluation methods such as: being evaluated individually, insufficient practice time, insufficient information received prior to simulation, and the exercise being too stressful for inexperienced second-year learners.

Evaluation and learning objectives
The course learning objectives as listed in the course information document were mapped to the course evaluation rubric to assess how learning objectives have been addressed in evaluation. This activity indicated that learning objectives had been fully captured in the evaluation rubric. The goal of this course is to ensure that learners achieve learning objectives that we as instructors expect them to. When assessing outcomes of the learning process it is important that instructional practice not only aligns with learning objectives but also with evaluation practice [3].

Discussions in the learners' focus group revealed that learners agreed the evaluation process was fair and objective. When discussing the fairness of the evaluation process, the majority of participants, including learners, simulation staff, and instructors, expressed concern over the confidentiality of the simulation scenario during evaluation. Due to the large number of learners, evaluations are scheduled over two days. From discussions with the learners' focus group it was found that some of the learners being evaluated on the first day breached the confidentiality of scenarios by disclosing the information to learners being evaluated on the second day. Unfortunately, instructors have no control over this process and it is difficult to identify the individuals responsible for this breach of confidentiality. For future practice this researcher suggests changing the scenarios for the second day of assessment, while still maintaining objectivity by assessing skills and scenarios that have been practiced.

Lack of objectivity and effectiveness in evaluating teamwork and communication as stated in the evaluation rubric is another topic that was brought up in the learners' focus group discussions. During weekly simulations, even though learners were given an opportunity to lead they worked as a group, whereas during evaluation they worked individually. They felt that this discrepancy and the evaluation rubric did not address teamwork effectively. This is an important finding that needs attention, because team communication is a key element in healthcare. Participants were also asked if they found the frequency of evaluations adequate. Data from both the online survey and focus groups suggest that more than three evaluations as well as more practice sessions are perceived as potential elements that can help in achieving learning objectives. One learner stated:

"A few more evaluations with lower weighting would allow for a more relaxed and competency-focused approach for the students. High weighted evaluations prove to be unrealistically stressful and cause some of the students to perform poorly regardless of actual clinical knowledge."

Evaluation and learning outcomes
To assess the effectiveness of the assessment format in achieving learning outcomes, this researcher looked at the quality of learners' work, specifically, class results on each of the three evaluations offered during the duration of the course. Over the duration of the semester, the class average improved progressively, from 67.67% in the first evaluation to 73.77% and 75.53% in subsequent evaluations, suggesting that learners improved their critical thinking skills and knowledge. Further discussions with the learners' focus groups shows that most learners were also satisfied with the support received in preparation for evaluation. One learner from the group receiving weekly feedback based on the evaluation rubric stated:

"Seeing the evaluation rubrics every week was effective in achieving my learning goal. Instructor comments were also effective in my learning; we came out every week with clear learning objectives achieved." (personal communication, November 27, 2015)

This was an interesting observation because input from the instructors indicated similar preference for the rating scale-based rubric. In their comparison of global rating scale and checklist scores, Kim et al [6] found that both tools have the ability to evaluate performance based on level of training; however, the rating scale appears superior in providing the opportunity to rate overall performance. The rating scale was also preferred by all raters involved in this study due to ease of administration and scoring. Data collected indicates that 75% of participants were

satisfied with the effectiveness of evaluation methods in assessing their skills. This suggests that most learners' needs in achieving their learning outcomes were met. The assessment rubric used in this course addresses communication skills; however, the concern around the effectiveness of the assessment tool in assessing teamwork should be addressed in the future as there may be a more efficient way for assessing this skill.

An expected yet interesting observation was the difference in the practice of individual instructors and its impact on students' perception of learning. Learners who received weekly formative assessment of their performance based on the summative assessment rubric felt that this practice, in combination with the background information received prior to simulation, was very helpful in preparing for class, including developing a plan of action, compared with students who did not receive weekly evaluations. The latter said that they did not pay much attention to the evaluation rubric until it was used for summative evaluation. They also did not prepare an action plan prior to weekly practice simulations. This perceived difference in preparation did not appear to have a significant impact on learner summative evaluation outcome, as demonstrated by the consistency noted in between group evaluation scores. These results also implied that there exists a high degree of agreement between instructors in assessing learners. The same assessment rubric was used each time, even though the three assessments included a different scenario, reflective of a different clinical setting (intensive care/unit, emergency room, and wards). These findings were reassuring that evaluation is fair and objective for all learners since the three instructors are in tune, aware of each other's practice, and are similar in their observations and assessment of learners. Consistent use of the standard assessment rubric and clear guidelines for the assessment process strengthened the inter-rater reliability and demonstrated objectivity in assessment practice.

Evaluation and learner self-reflection

Each of the three evaluations also included a self-reflective component assessed based on criteria listed in the self-reflection evaluation rubric. This researcher found self-reflection a very important tool in the learning process, though it was questioned if it was a useful tool when used only for summative assessment purposes. Emotions were high during summative evaluations; often, learners felt overwhelmed and in a hurry to leave the school premises. This raised the questions: Were learners truly reflecting on their performance immediately after being assessed? Were they using the reflective moment as a learning opportunity? The information received from the learner's focus group suggests that in this course, reflection was not necessarily used as a learning tool. One learner said that it made her stress about her performance even more, which caused her a lot of anxiety. Another learner said that other than during evaluation when it was required, she did not reflect on her weekly performances because feedback from the instructor was given to her.

Discussions during the focus groups with the instructors and simulation technical staff highlighted the idea of encouraging learners to practice self-reflection during the practice simulations preceding the evaluation rather than as a post-evaluative reflection. In this manner they will be able to build on each simulation experience, leading to evaluation further enhancing the learning process.

CONCLUSIONS

The Canadian Society of Respiratory Therapists and the provincial respiratory therapy regulatory bodies outline the standard of practice of the Respiratory Therapy profession via a national competency profile document for entry to practice. This document is used across the country for curriculum development in colleges offering respiratory therapy programs. Standardization of requirements for entry to practice across the profession suggests that consideration that similarly standardized strategies for evaluation may be warranted. The findings of the current action research project may provide a foundation for future research that may seek to identify best practices in simulation-based evaluation methods that could be generalizable to all accredited respiratory therapy programs.

Evaluation in the clinical simulation course appears to be objective and fair as perceived by the majority of the project participants. Valid

concerns and valuable suggestions from project participants will be taken into consideration in regards to the research question: how can improving evaluation practices ensure learner success? The outcomes of this project have led to several recommendations for the simulation course at this College, including:

- the introduction of an evaluation of learner self-reflection during the practice simulations preceding the formal evaluation to enhance independent learning and critical thinking;
- the introduction of peer evaluation/peer feedback to promote development of assessment skills for quality in their own and others' performance, as well as to set their own standard;
- the introduction of teamwork assessment during practice simulation and individual assessment during formal evaluation; and
- to reqeust learner feedback on overall satisfaction with the course sooner than the end of the course so practice can be changed to meet learners' needs.

If not an art, learner assessment is a skill that requires practice leading to experience and, eventually, mastery. This research found that examining learner assessment was a challenging, thought-provoking, yet educational and rewarding task. The findings of this study have the potential to be of influence for other respiratory therapy programs offered at Canadian colleges and universities, and in other programs offering clinical simulation training. The project also has the potential to provide groundwork for future research on incorporating learner assessment in interprofessional practice in clinical simulation.

REFERENCES

1. Jeffries PR. A framework for designing, implementing, and evaluating simulations used as teaching strategies in nursing. Nurs Educ Perspect 2005;26(2):96–103.
2. Tuoriniemi P, Schott-Baer D. Implementing a high-fidelity simulation program in a community college setting. Nurs Educ Perspect 2008; 29(2):105–9.
3. Fenwick T, Parsons J. The Art of Evaluation: A Handbook for Educators and Trainers. 2nd edn. Toronto, ON: Thompson Educational Publishing; 2009.
4. Farell K, Kratzmann M, McWilliam S, et al. Evaluation made very easy, accessible and logical. 1st edn. 2002. Available at: http://www.dal.ca/content/dam/dalhousie/pdf/ace-womenhealth/ACEWH_evaluation_made_easy.pdf
5. Peterson T. Assessing performance in problem-based service-learning projects. New Direct Teach Learn 2004;2004(100):55–63. doi: 10.1002/tl.171.
6. Kim J, Neilipovitz D, Cardinal P, Chiu M, Clinch J. A comparison of global rating scale and checklist scores in the validation of an evaluation tool to assess performance in the resuscitation of critically ill patients during simulated emergencies. Simul Healthc 2007;2(1):48. doi: 10.1097/01266021-200700210-00014.
7. O'Leary F. Simulation as a high stakes assessment tool in emergency medicine. Emerg Med Aust 2015;27(2):173–5. doi: 10.1111/1742-6723.12370.
8. Wall D. Effects of Introducing High Fidelity Simulation to the Preclinical SRT. Unpublished Master Capstone project, Yorkville University, 2014.
9. Stringer E, Genat WJ. Action Research in Health. Upper Saddle River, NJ: Pearson Education, Inc.; 2004.
10. Jackson ET, Kassam Y. (Eds.). Knowledge Shared: Participatory Evaluation in Development Cooperation. West Hartford, CT: Kumarian Press; 1998.
11. Benson R, Samarawickrema G, O'Connell M. Participatory evaluation: Implications for improving electronic learning and teaching approaches. Assess Eval Higher Educ 2009;34(6):709–20. doi: 10.1080/02602 930802474201.
12. Arthur J, Waring M, Coe R, Hedges L. Research Methods and Methodologies in Education. Thousand Oaks, CA: Sage; 2012.
13. Laws S, Harper C, Marcus R. Research for Development. London: Sage; 2003.
14. Bell J, Waters S. Doing Your Research Project: A Guide for First-Time Researchers. Maidenhead, United Kingdom: Open University Press; 2014.

15. Cole AL, Knowles JG. Researching Teaching: Exploring Teacher Development through Reflexive Inquiry. Big Tancook Island, NS: Backalong Books; 2008.

16. Tri-Council Policy Statement. Ethical Conduct for Research Involving Humans. 2010. Available at: http://w3.stu.ca/stu/research/ethics/pdfs/TCPS_2_FINAL_Web.pdf

17. Wiggins G. Educative Assessment: Designing Assessments to Inform and Improve Student Performance. San Francisco, CA: Jossey-Bass; 1998.

18. Svinicki M. Authentic assessment: Testing in reality. New Direct Teach Learn 2004;2004(100):23–9. doi: 10.1002/tl.167.