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Coláiste na hOllscoile Corcaigh

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Quality Enhancement

ASSERT CENTRE

CoMH



QUALITY REVIEW

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GOOD PRACTICE CASE STUDY

COMPETITIVE LEARNING IN MEDICAL EDUCATION: A PILOT STUDY

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Section One: Contextualisation of the initiative: Origins and Overview

The ASSERT Centre (Application of Science to Simulation in Education, Research and Technology in medicine) is located within the College of Medicine and Health (CoMH), in University College Cork (UCC). ASSERT was established by the CoMH as one of its 5 key strategic priorities within the CoMH 2013-2017 five-year planning cycle.

The traditional curriculum in medical education has undergone significant changes over the past decade. This occurred because of the changing skills required of the future medical practitioner. The General Medical Council in its publication *Tomorrow's Doctors* has set out the knowledge, skills and behaviours that medical students should acquire in medical school along with the standards for teaching, learning and assessment of these skills. These guidelines place particular emphasis on the core competencies required of a newly graduated doctor. These guidelines have been extensively incorporated into the medical curriculum at UCC.

Presently healthcare education and practices are on the precipice of significant diverse and disruptive developments. Substantial disruptive influences range from current factors such as the Covid-19 pandemic, the working time directives for healthcare workers to healthcare education and training moving from a process-driven approach to an outcome-driven approach. They also include factors such as the impact of disruptive technologies and processes on education, training and practice.

Simulation-Based Education (SBE) as a form of teaching and learning has been used in medical education in one form or another for many centuries with the impetus for the modern use of simulation starting in the 1960s and gathering momentum ever since. Simulation is becoming more and more an intrinsic element in medical education at both undergraduate level and postgraduate level. Simulation has been defined as *"a technique, not a technology, to replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully interactive fashion. "Immersive" conveys the sense that participants have of being immersed in a task or setting as they would if it were the real world"*. SBE is an established method of supplementing and enhancing the clinical education of medical students and is well suited for use as a competitive learning pedagogy. Experiential learning, deliberate practice, and the ability to provide immediate feedback on performance are the primary advantages of SBE. SBE is an effective way to develop new skills, identify knowledge gaps, help in the reduction of avoidable medical errors and maintain infrequently used clinical skills even among experienced clinical teams.

Competitive learning is a potentially effective method to increase students' motivation, satisfaction and improve learning outcomes. Competitive learning has characteristics that lead to a greater engagement of students by arousing their competitive instincts and has been applied and analysed in different disciplines. ASSERT's interdisciplinary faculty, identified that this social competitive learning space created during competitive learning spoke to an innovative form of learning and teaching. In doing so we focused on sound pedagogical values including the application of the principles of signature pedagogies, threshold concepts, the teaching for understanding framework, technology enhanced learning, cross professional education and feedback on performance delivered in a high fidelity simulated environment.

We briefly outline below our approach and application of the pedagogical frameworks in the development of this pilot.

ASSERT faculty created simulated emergency case scenarios to engage students and enable them to develop their understanding of the discipline of emergency medicine. The design, content and context of these scenarios were informed by applying sound educational theoretical frameworks supported by the evidence base in applying the principles and practices of simulation in medical education. In doing so we considered and applied Shulman's concept of signature pedagogies as "the types of teaching that organize the fundamental ways in which future practitioners are educated for their new professions incorporating the three dimensions of signature pedagogies namely surface structure, deep structure and an implicit structure into this process. We were also cognisant of Myer's and Land's concept of "threshold concepts" or troublesome knowledge to inform design and content of the scenarios; specifically, we identified performances and approaches of experienced clinical practitioners that are not usually displayed or applied by novices that may be transformative for the student's learning in relation to clinical performance. Equally, we considered Schön's Veblenian argument to ensure that the content of teaching and learning that is required was not at variance to what the content of teaching and learning should be to prepare the student for the demands of real-life practice.

We used the teaching for understanding framework to appreciate what should students come to understand, how this understanding can be linked to performance, how learning can be promoted and assessed and what role should technologies play in these matters. We identified the important ideas within the subject matter or the generative topics of the clinical scenario and emphasised these within the simulation. New technologies are often particularly appropriate and valuable for enhancing the teaching and learning of generative topics within the curriculum. We identified "targets of difficulty" in the curriculum as worthwhile topics on which to focus on that may be aided by using new technologies. Finally, these topics are likely to be made more understandable through the use of new technologies.

We used simulation as it produces an environment in which learners can successfully master the skills relevant to clinical practice without undue risk to the learner, other staff members or to the patient. It also permits errors of either diagnosis or management to be allowed to develop and followed through to their natural conclusion. It has many advantages, which include decreased risk to patients, insurance that the learning outcomes are addressed; it also enables deliberate practice, and it allows immersion in learning tasks. It enables tasks to be structured in staged learning chunks and provides a controlled environment in which it is safe to learn from errors. It is a way of skill development, transfer and maintenance that can support the learner on the path from novice to expert, from the classroom to the workplace in a safe and controlled manner. It is not a mere focus on procedural skill or performance rather it has a much more expansive perspective incorporating the affective and cognitive domains. Continuous practice involving medical simulations is linked with better-quality learner outcomes and this relates to diverse levels of learners from a broad spectrum of clinical specialties. It appears to deliver a dose-response relationship in terms of accomplishing desired learning outcomes. Simulation gives the learner the opportunity to experience a learning environment that is immersive and experiential. By engaging learners in a clinical exercise using simulation, it gives both the realism pertinent to the learners'

experience and the time for them to evaluate and understand different potential scenarios and their outcomes. The experiential learning process using simulation methodologies allows learners to critically reflect on how they have felt during the exercise. They can then begin to create concepts and hypotheses relating to the experience through dialogue with others and personal reflection.

Feedback is an essential component within simulation it is the way to close the learning loop. We applied van de Ridder's definition of feedback "*Specific information about the comparison between a trainee's observed performance and a standard, given with the intent to improve the trainee's performance*" and delivered feedback based on McKinley 's approach that focuses on performance, and focused on the following five questions. What was performed well? What could be performed differently? What step(s) was (were) missed out? What is the priority for improvement? What must the learner do to make this improvement? Generic discussions on each scenario enabled the discussion of threshold concepts by faculty.

The WHO identifies the educating of healthcare professionals for collaborative practice as essential for well-functioning inter-professional teams. The exposure of students from one profession to learning from other professions is considered by many to be an important part of this preparation. Cross professional education occurs when students of one profession are taught by faculty members of a different profession. Feedback enables both student reflection in action and reflection on action. Both may be considered as iterative processes where insights and learning from one experience may be incorporated into future practice.

We believe that this development is in line with several thematic areas in relation to UCC. Our innovation is an innovative pedagogical approach appropriate to our discipline. It draws on and applies the potential of simulation, competitive learning, and technologies to enhance teaching and learning based on sound pedagogical frameworks. The process incorporates assessment for learning, and student feedback that enables further development of the simulation to meet the needs identified by students.

We have engaged in the Scholarship of Teaching and Learning; our pilot has been accepted for publication at a conference and published in MedEdPublish, a highly visible, open access, specialist practitioner e-journal that enables academics, teachers, clinicians, researchers, and students to publish their experiences, views and research findings relating to teaching, learning and assessment in medical and health professions education.

- Conference: Abstracts of the Association of Simulated Practice in Healthcare, 10th Annual Conference, Belfast, UK, 4–6 November 2019, BMJ Simulation and Technology Enhanced Learning 5 (Suppl2):A91.1-A91

DOI: [10.1136/bmjstel-2019-aspconf.168](https://doi.org/10.1136/bmjstel-2019-aspconf.168)

- A contest without losers – The value of extracurricular simulation competition in undergraduate medical education. September 2020 MedEdPublish 9(1)

DOI: [10.15694/mep.2020.000201.1](https://doi.org/10.15694/mep.2020.000201.1)

Section Two: Purpose

Simulation-based education (SBE) is an established method of supplementing and enhancing the clinical education of medical students and is well suited for use as a competitive learning pedagogy. Experiential learning, deliberate practice and the ability to provide immediate feedback on performance are the primary advantages of SBE. SBE is an effective way to develop new skills, identify knowledge gaps, help in the reduction of avoidable medical errors and maintain infrequently used clinical skills even among experienced clinical teams.

Competitive learning is a potentially effective method to increase students' motivation, satisfaction and improve learning outcomes. Competitive learning has characteristics that lead to a greater engagement of students by arousing their competitive instincts and has been applied and analysed in different disciplines. However, this has not been to date explored in the context of clinical learning.

ASSERT's interdisciplinary faculty, identified that the social competitive learning space created during the competition training, spoke to an innovative form of learning and teaching. We believe that competitive learning is an innovative pedagogical approach in medical education, that creates a social learning environment, draws on both competitive and cooperative learning and supports both technical and non-technical or human factors skill development.

We therefore sought to undertake a pilot study to explore the effect of a simulation-based competition on undergraduate medical students' performance in both technical and communication skills within emergency medicine.

Section Three: Design

The student “Emergency Care Society” (ECS), a UCC student society, approached ASSERT Faculty to support them in enhancing their emergency care knowledge and skills, in preparation for the 2018 SimWars competition. SimWars Ireland an intervarsity simulation-based competition for medical students with a special interest in Emergency Medicine was founded in 2017 at University College Dublin. We therefore undertook a pilot study with the ECS students to explore the effect of a simulation-based competition on undergraduate medical students’ performance in both technical and communication skills within emergency medicine.

ASSERT faculty created simulated emergency case scenarios to engage students and enable them to develop their understanding of their discipline. In doing so faculty informed the curricular content by considering the use of generative topics that were central to medical training combined with the teaching for understanding (TFU) framework to provide the students with an opportunity to learn through understanding and student performance. Entry points to generative topics, were supported by technology enhanced learning, such as a simulated patient and structured recorded debriefs. In utilising this technology, it helped ensure that key goals of the competition training were understood by the students. The dimensions of disciplinary understanding in the SimWars simulated classroom, were enhanced by gathering an interdisciplinary faculty to engage in training sessions with the students. By creating an interdisciplinary faculty of Nurses, Fire Service, Paramedics, and Doctors enabled guided student learning from experts, through knowledge, method, form, and purpose.

Members of the ECS expressed an interest in undertaking research, supported by faculty as part of this project. They sought to explore self-perceived levels of confidence in technical skills, communication, and teamwork-based skills, in medical students enrolled in an extracurricular simulation competition, before and after their training and assessed their confidence in internal medicine competencies. ASSERT mentored this research project through to publication.

This initiative aligns with core University’s policies and strategies in the following ways.

Alignment with UCC Academic Strategy (2018 -2022)

- This initiative aligns good practice in the Connected Curriculum at UCC, namely research-based teaching that is inter- and transdisciplinary.
- This initiative aligns with Effective assessment and feedback practices at UCC.
- This initiative aligns with the skills, knowledge and abilities of UCC graduates, beyond disciplinary content knowledge.

Alignment with UCC Strategic Plan (2017 -2022)

- This initiative aligns with implementing an academic strategy to deliver a student-centred teaching and learning experience incorporating and research-led teaching and learning.

Section Four: Implementation

An interdisciplinary faculty helped to ensure the competitive classroom matched real-life emergency clinical situations, where a team-based approach ensures the best outcome for the patient. The competitive learning enabled an exploration of the purpose of the discipline and discussion of key questions key to the development of graduate attributes, such as: Why do they do what they do? What is the goal? How do experts use what they know? Students engaged with faculty in discussions about the method experts use to find out questions about their own discipline, and how interdisciplinary teams communicate, and the tools used by the various disciplines to improve communication.

SimWars was a unique teaching space, interdisciplinary faculty, using hi-fidelity technology within the ASSERT centre, created a social competitive classroom space during the 2019 academic year. The activities the students engaged in during the competition enabled them to demonstrate and develop understanding and has helped influence motivation and effort among this group of students, to learn new emergency skills. SBE and feedback on performance to students through video analysis of performance enabled student learning through both student reflection in action and reflection on action.

The type of learning experienced by the SimWars competitor, emphasises experiential learning and introduces patient case scenarios based on real Emergency Department patient presentations such as abdominal aorta aneurysms, Myocardial Infarction and Upper Gastrointestinal Bleed among others. During the training session debriefs, faculty using structured debrief methods, aim to maximize student learning and translate the lessons learnt to assist the students in applying their learning to improve real clinical performance.

Section Five: Review/Evaluation

Evaluation of student learning through simulation in SimWars demonstrated that it led to an improvement in non-technical skills such as confidence in assuming a leadership role and engaging in closed-loop communication. Similarly, for technical skills there was a significant increase in confidence managing a patient's airway and performing CPR. Following the competition, students identified several specific topics in internal medicine in which they lacked confidence in and to which they considered SBE would be applicable.

This type of learning also offers opportunities for those watching and instructing, as every person involved in the competition can benefit from observing and reflecting on decision making, as well as viewing and discussing practice variations across disciplines and institutions. SimWars combines a group-learning format, peer learning and individual skill assessment to enhance knowledge and skill performance.

The post-training improvement in closed-loop communication and communication of mistakes suggests that the competition develops skills critical for success both as a physician and as a learner in any medical specialty. The increased confidence in technical skills may be due to lack of exposure to the procedural elements of acute medicine. These improvements are undoubtedly associated with increased contact time during training, which should motivate the expanded use of simulation training in undergraduate medical education.

Medical Students are enthusiastic to participate in and learn and practice their clinical skills in this competition setting. This competition model has application for teaching and learning for other clinical domains and healthcare disciplines, with potential to provide opportunities for future research and human factor training through simulation.

Section Six: Conclusion

The introduction of a competitive environment emulates the high-stress environment common to medical emergencies, providing an impetus for extracurricular training and self-learning. This suggests the potential benefit of competitive atmospheres in undergraduate medical education in combination with the well-documented skill development inherent to simulation training. How this improved confidence translates into a clinical environment is yet to be determined.

The overall take away message is summarised below:

- The utility of extracurricular competition is clear; students are motivated to learn while, importantly, exempt from medical school evaluation.
- There is a clear advantage and interest in the development of competitions in other medical specialties, such as internal medicine.
- Increased exposure should eventuate into the emergence of more highly skilled trainees with improved preparedness for practice.

We believe that competitive learning is an innovative pedagogical approach in medical education that creates a social learning environment, draws on both competitive and cooperative learning and supports both technical and non-technical or human factors skill development.