EXECUTIVE SUMMARY

STEPS PROGRAM

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STEPS Simulation Technician Program

OntarioTech UNIVERSITY

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SIMULATION COMMUNITY QUOTES

“As a manager of a multi-site simulation program, having highly competent, well-trained simulation specialists are the perfect complement to our simulation educators and the broader team. With technical expertise and a deep understanding of simulation best practices and patient safety, they are integral members of my team who enable our day to day simulation programming.”

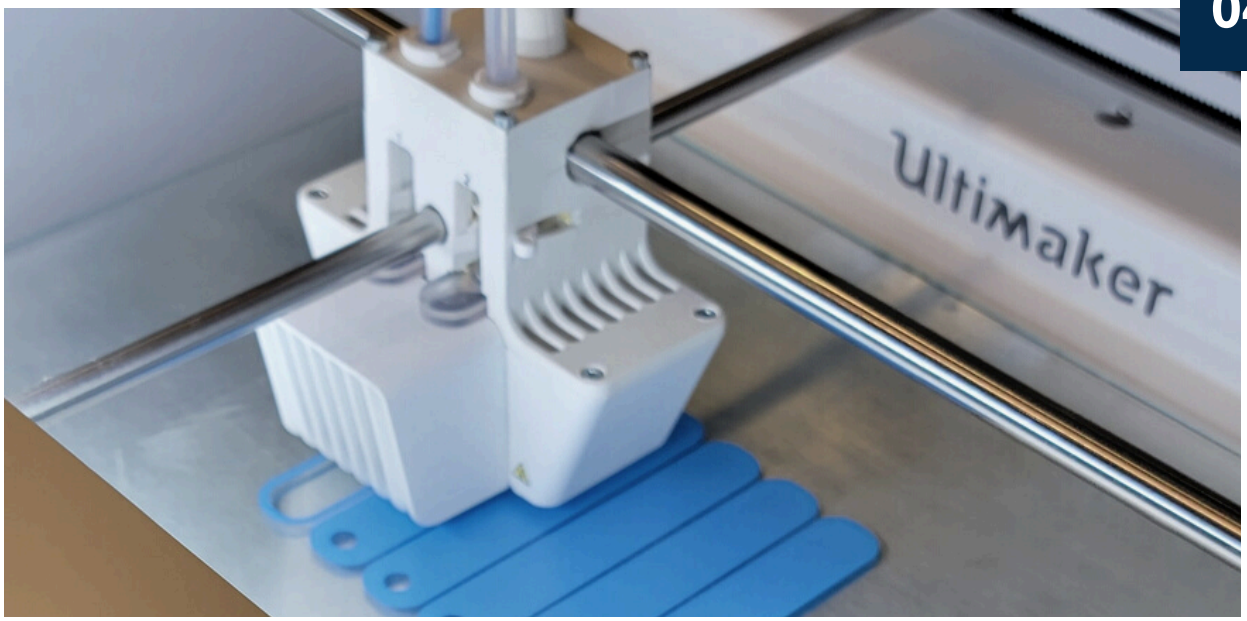
Lindsay Beavers
Manager of the Simulation Program, Unity Health Toronto

"Impressive! This represents a groundbreaking concept whose time has arrived. Individuals involved in simulation, irrespective of their roles, need specialized knowledge and skills that are currently absent from conventional university-based education."

Elizabeth Horsley
Director of Simulation, The Brooklyn Hospital Center

“The STEPS program strategically fills a market gap by addressing the shortage of simulation technicians, offering an innovative solution for their professional development.”

Bruce Karatzoglou
Manager of Educational & Technical Services, Laerdal Medical



BACKGROUND

Simulation in healthcare is a technique used to replicate an environment or experience of a real event to allow healthcare professionals to practice, learn, evaluate, and prepare for real-world scenarios.[1] Simulation enables learners to practice and refine their skills in a safe and controlled environment, allowing them to bridge the gap between theory and application.[2–3]

In addition, simulation is a valuable tool in healthcare for testing safety and quality improvement (QI). It allows practitioners to replicate real-world scenarios, identify potential risks, and practice responses to enhance patient safety. Through realistic simulations, healthcare professionals can refine procedures, communication, and teamwork, ultimately improving the overall quality of care.

In both applications, education and safety and quality control, successful implementation of simulation relies on the seamless integration of four key components: authentic cases, curriculum grounded in simulation-specific pedagogy, appropriate equipment or technology, and management. Currently, the majority of simulation facilities, often referred to as simulation laboratories, are operated and managed by a simulation technician, who are retrained or up-skilled healthcare professionals.[4]

A CRISIS AND AN OPPORTUNITY

Presently, simulation technicians in healthcare are drawn from within; nurses, paramedics, and respiratory therapists shift from their original roles, exacerbating the strain on the understaffed healthcare system. As an illustration, within the context of Ontario Tech University, our Nursing Educator, tasked with overseeing the nursing simulation labs, has ceased her clinical practice. This decision adds to the strain on healthcare system capacity, exemplifying the impact of professionals transitioning from real to simulated patient care roles. This migration, driven by the growing complexity of digital technologies in the simulation market, results in a dual crisis: individual burnout and system strain. Our proposed program addresses this by training undergraduate health sciences students as simulation technicians, fostering a collaborative simulation delivery team to enhance capacity and mitigate brain drain challenges. This innovative approach necessitates cutting-edge educational pathways for future-ready simulation technicians.

The proposed STEPS program blueprint addresses these challenges by training undergraduate health sciences students as simulation technicians. It shifts from the solitary simulation technician model, where a single individual needs to be versed in clinical, educational, and technical aspects of simulation, to a collaborative simulation delivery team, where our trainees play a vital role. This innovative approach introduces a more effective division of labour, requiring the deployment of advanced educational pathways to prepare simulation technicians for future roles.

OVERVIEW OF THE PROGRAM'S BLUEPRINT

The initial blueprint for the STEPS program will be developed as a minor within Ontario Tech's Bachelor of Health Sciences (BHSc). This program will rest on three fundamental pillars, mirroring its name: Simulation Technologies, Educational Principles, and Safety. These pillars will underpin an innovative curriculum grounded in the concepts of the infusion approach to curricular design and competency-based education. Thus, the resulting curriculum will be firmly rooted in program-specific competency and work-based assessment frameworks. The program's strengths lie in its design process, drawing from education, clinical, and implementation science methodological frameworks. Additionally, the construction of the STEPS program blueprint is led by a team of highly qualified personnel (HQPs) and involves active participation from academia and industry, aligning closely with the university's priorities and considering both local and global contexts.

GROUNDBREAKING CURRICULUM

One of the most unique aspects of the STEPS program blueprint is that it introduces a groundbreaking approach to education, characterized by a student-centric, flexible (micro-learning), and work-based experiential learning and assessment model. The STEPS program will be supported by a blend of two contemporary pedagogies rooted in the infusion approach and competency-based education.[5–8]

A contemporary educational theory is vital for program development, as it provides a structure linking educational objectives, curriculum, available resources, and partnerships, and informs effective teaching strategies. Furthermore, it ensures coherence, consistency, and adaptability, fostering student engagement through meaningful learning experiences.

With two educational theories at its core, the STEPS program blueprint will be purposefully designed to be effective and fitting with both internal and external contexts, as well as evolving job markets. Thus, it will enhance the likelihood of achieving educational objectives and contributing to the ongoing advancement of effective teaching and learning practices, and most importantly preparing workers ready to contribute to new and exciting jobs.

Competency-Based Education: The STEPS program is innovative in its design; shifting from traditional instruction to competency-based education (CBE), emphasizing skill demonstration over time-based metrics.[9–10] CBE ensures that students achieve predefined competencies before entering the workforce.[7] Within the STEPS program, CBE will enable personalized learning paths aligned with varying expertise levels. CBE's emphasis on real-world application enhances immediate employability and on-the-job productivity, underscoring its relevance in the dynamic healthcare industry.

Infusion Approach: The STEPS program will also adopt the infusion approach, prioritizing a student-centered, cohesive, and interconnected learning experience.[6] This approach seamlessly integrates specific concepts, skills, or themes across various **already existing** courses and activities, emphasizing incorporation into new educational structures.[5] Working synergistically with CBE, the infusion approach will provide a flexible, learner-centric model. Students will be able to progress at their own pace, focusing on competency mastery.[9] The integration minimizes the need for new courses, streamlining education and reducing operational costs, demonstrating the effectiveness of the infusion approach in enhancing program development.

COMPETENCY AND ASSESSMENT FRAMEWORKS

To construct a competency-infusion-based curriculum for the STEPS blueprint, it is imperative to establish a competency and assessment framework, contributing not only to the foundation of STEPS but also addressing the current lack of such frameworks in the broader simulation community.[4] This framework will follow a 6-step model proposed by Batt et al.[11]

The development of the competency framework involves several key steps.[11] Initially, it is essential to identify the framework's purpose, uses, scope, and stakeholders. For trainees, the aim is to outline essential skills, knowledge, and attitudes necessary for proficient simulation technician activities, guiding excellence in research-focused endeavours. Subsequently, understanding the contexts of "real-world" practice is crucial, considering the dynamic nature of simulation in various professional settings. The exploration of alternative practice methods and identification of competencies required for professional practice are intertwined, involving active engagement with local and global stakeholders through interviews and focus groups. This collaborative approach aims to define the characteristics of an "Ontario Tech graduates simulation technician day" and the competencies enabling effective participation in simulation teams. The process and outcomes of identifying these competencies will be documented in technical reports, academic papers, and research publications, rooted in scholarly endeavours. To ensure ongoing relevance, strategies for continuous evaluation, updating, and maintenance of the framework are established. Competency and deployment methods will undergo annual evaluation during the summer term, incorporating feedback from both trainees and faculty/supervisors. Once constructed, the STEPS competency framework will align with the Certified Healthcare Simulation Operations Specialist® (CHSOS®) certification, enhancing the marketability of our graduates.[12]

Competencies are typically assessed through a combination of formative and summative assessments. Formative assessments, occurring throughout the learning process, provide ongoing feedback and guide instruction. Summative assessments, evaluating overall competency, may include tests or larger projects. The STEPS program blueprint will employ authentic workplace-based assessments. Entrustable Professional Activities (EPAs) can serve as a form of such summative assessments.[13] These tasks or activities, expected to be performed independently by students once competencies are acquired, can serve as authentic assessments in an educational setting. By incorporating EPAs, simulation preceptors can assess not only the acquisition of competencies but also the ability to apply them in practical situations, providing a comprehensive measure of a student's capabilities.

STEPS ARCHITECTURE

The architecture of the STEPS program (Figure 1) comprises both traditional courses and an innovative micro-learning, 2-credit course, blending asynchronous online components with experiential learning and reflective practices. Students will take the Durham College Paramedics Clinical 1 course to understand diverse clinical practice settings. Of the two new courses that will be introduced, one will be in the initial term focusing on the fundamentals of simulation practice (SIM 101), and another in the final term adopting a learning symposium format (SIM 301). Additionally, a research practicum course will be required in the last two terms, providing competencies in evaluation and assessment methods.

The development of the new micro-learning course will follow a CBE and infusion approach, integrating predefined competencies into authentic activities.[14] For instance, operating a high-fidelity mannequin requires competencies such as communication with the simulation team, troubleshooting, moulage, and software operation, all of which needed to be acquired and demonstrated in an authentic setting. First, the students will earn a digital badge through a brief online module to acquire prerequisite skills before engaging in activities related to operations of a high fidelity mannequin within existing courses or laboratory sessions supervised by a preceptor. Next, they will engage in an authentic learning and assessments setting using the EPA system tailored to their program level. Finally, they will be asked to write a graded reflective essay addressing identified strengths and weaknesses. This innovative micro-learning course will span six terms, totaling 160 hours of work and culminating in a mock exam to prepare students for the CHSOS® exam offered by the Society for Simulation in Healthcare.

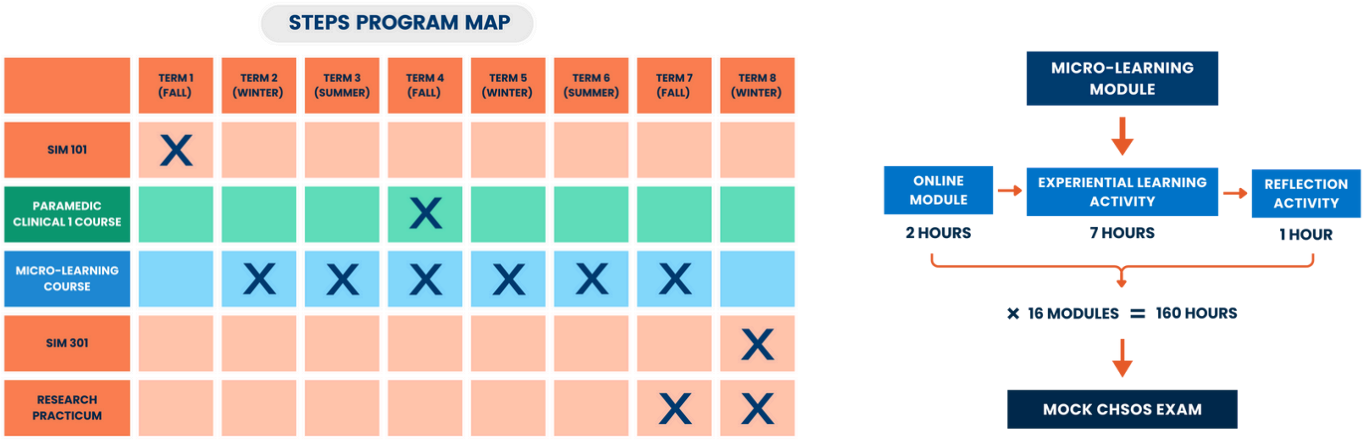


Figure 1: The STEPS program map [left], where orange indicates the traditional courses, green indicates the Durham College paramedic course, and blue is used to represent the new micro-learning course. The micro-learning module structure [right] shows the breakdown of one of 16 modules that will be part of the micro-learning course.

RESEARCH DESIGN AND IMPLEMENTATION PROCESSES

HIGHLY QUALIFIED PERSONNEL

The development of the STEPS program is spearheaded by a dynamic team of graduate students under the guidance of experienced faculty members. All of these graduate students have completed their academic journeys at Ontario Tech University in diverse faculties and programs, thus they contribute a multifaceted perspective to the program's creation. Their varied academic backgrounds bring unique insights, enriching the development process with interdisciplinary approaches. The involvement of these students not only showcases their dedication to advancing education but also reflects the university's commitment to fostering a collaborative and inclusive environment for program development, and embodies the idea of a “sticky campus”.

Refka Al-Bayati (BHSc, MLT)

“I joined the STEPS team in September 2023 as a MHSc student. My work focuses on developing a competency framework for simulation technicians derived from the ones already established for other healthcare technician positions. This framework will serve to build an accompanied assessment framework and structure the STEPS minor, and any future additions to the program.”

Krystina Clarke (MHSc, PhD Candidate)

“I've been working on the development of the STEPS minor since its inception. Building on the competency framework, I am responsible to develop and assess the infusion-competency informed curriculum.“

Julia Micallef (MHSc, PhD Student)

“In my work, I will be focusing on the pre-implementation aspect of STEPS, ultimately leading to the development and testing of a robust implementation strategy, along with an evaluation framework that can be used in the future to test the fidelity of the implementation process. As part of this work, I will also explore factors that will help us scale the STEPS minor into a graduate diploma level.“

GOVERNANCE

The development of the STEPS program will be steered by an influential advisory board, comprising local leaders, faculty members, and strategic partners and stakeholders. This diverse group will ensure alignment with the university's priorities, facilitating seamless integration with existing curricula and activities. The advisory board's involvement will guarantee relevance to real-world practice and industry requirements, fostering a program that addresses current needs and challenges. Moreover, the collaborative efforts will aim to create new job markets, positioning graduates as integral members of simulation teams equipped with a distinctive skill set. The inclusion of local leaders and stakeholders underscores a commitment to community engagement and responsiveness, ensuring that the STEPS program not only meets academic standards but also serves as a dynamic and valuable asset within the broader socio-economic and work contexts.

METHODS

Another very unique aspect of this program is that it will be designed through a rigorous, scholarly design process with continuous input from stakeholders and end users. To achieve this, we will employ an iterative design method,[15] with a unique focus on pre-implementation considerations.[16] Paying concurrent attention to both program development and pre-implementation processes will ensure maximum effectiveness and perfect alignment with both local and external contexts upon potential deployment of the STEPS program blueprint.

As a first-of-its-kind undergraduate program in Canada, with only 14 similar programs offered globally at graduate or professional development levels targeting practicing healthcare professionals, the development process emphasizes the importance of a scholarly approach. Specifically, the STEPS program blueprint will be developed based on a hybrid methodological framework combining the Medical Research Council (MRC) and Design-Based Research (DBR) frameworks (Figure 2). This dual framework synergizes rigorous scientific methodology with iterative, user-focused design. In this context, the MRC framework provides a structured approach for developing evidence-based interventions, ensuring clinical relevance and effectiveness. Simultaneously, DBR facilitates ongoing refinement through iterative cycles, involving stakeholders to enhance user experience, program adaptability, and implementation-focused exploration of fit (Refer to Appendix A for an illustrative map of the theory-informed blueprint development of the STEPS Minor).

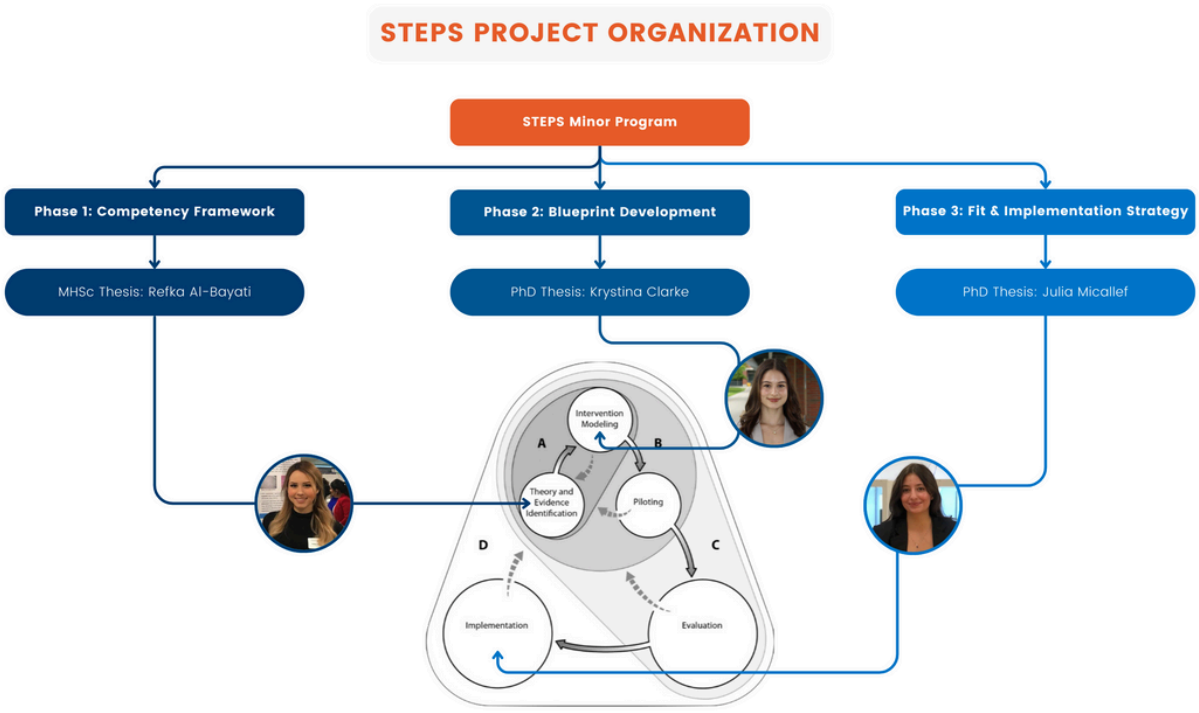


Figure 2: Adapted Medical Research Council Framework applied to the STEPS Minor Program.

In sum, this dual framework integration optimizes both scientific rigor, user-centered design, and attention to the assessment of pre-implementation factors, all fostering a simulation training program that not only meets standards but also evolves dynamically to address emerging educational needs, enhances overall program quality, as well as the quality of implementation of the program in the future.

ALIGNMENT WITH INSTITUTIONAL PRIORITIES

In addition to paying attention to factors that will enhance future implementation, we use Ontario Tech University's five key priorities as a guide. By purposefully aligning the STEPS program with three of these priorities (tech with a conscience, learning re-imagined, and partnerships) and positioning it as a pipeline program for future graduate-level diploma and degree programs (creating a sticky campus), we not only enhance the alignment but also position Ontario Tech as a global leader in healthcare simulation and academic programming (Figure 3).

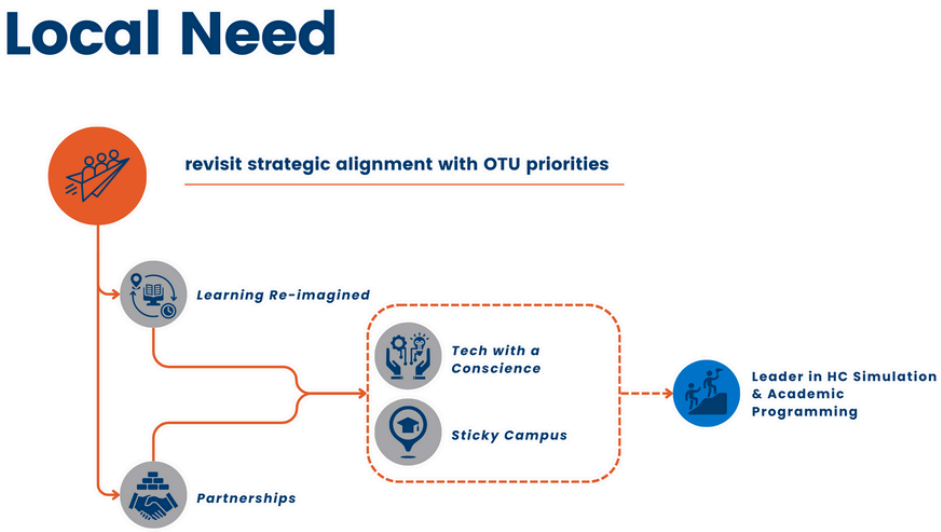


Figure 3: Alignment of Ontario Tech's key priorities with the STEPS program.

ALIGNMENT WITH GLOBAL CONTEXT

Finally, to ensure relevance and alignment with the broader context, as well as the growing and continuously changing needs of the healthcare simulation industry, the STEPS program blueprint will be co-developed with support from existing as well as new local, national, and international partnerships. Table 1 illustrates some of these partnerships, which are divided into formal (already functioning) and informal (initial work has been performed).

Formal Partnerships	Informal Partnerships
Faculty of Health Sciences • Nursing, • Medical Laboratory Science, • Kinesiology	Society for Simulation in Healthcare • Simulation Operations Specialist® (CHSOS®) certification program
Faculty of Business and Informatics Technology • GaMER Lab	University of Montreal • Centre hospitalier de l'Université de Montréal
Faculty of Education • Educational Informatics Laboratory	University of Toronto • Unity Health
Durham College • Nursing • Paramedic	Memorial University • Clinical Learning and Simulation Center
Lakeridge Health • Lakeridge Health Education and Research Network (LHEARN) • Centre and Central East Prehospital Care Program • Central East Regional Cancer Program	Laerdal Inc.
The Durham Region Health Department	Advance Performance Inc.
Simulation Canada	
Society for Rural Physicians of Canada	

In summary, we believe that the STEPS program blueprint, fortified by groundbreaking educational theory, research-based design, and meticulous pre-implementation processes, will be a unique game-changer program in the area of training future simulation technicians. Its strength lies in the seamless alignment with institutional priorities, positioning Ontario Tech as a leader and innovator in simulation education in healthcare, ensuring a focused impact on our institution. Moreover, its adaptability and alignment with the global context make it a robust and innovative solution, transcending local boundaries for broader efficacy, and responsiveness to the industry's growth.

POTENTIAL IMPACT AND FUTURE DIRECTIONS

Introducing the future STEPS program at the undergraduate level aims to tackle the pressing issue of healthcare workforce shortages and the increasing demand for simulation technicians. This groundbreaking program, a first-of-its-kind globally, has the potential of transformative impact on simulation practices. It envisions a shift towards role clarification and teamwork, with clinical experts contributing their expertise while our graduates manage technology and day-to-day simulation operations.

Future implementation of STEPS will create opportunities for further advancements, including a diploma-level master's program aligned with the STEPS competency framework. This program offers graduates from various professional programs, such as nursing and medical laboratory sciences, a chance to enhance their marketability in the healthcare sector.

Our vision is for both the STEPS minor and diploma programs to culminate in a custom-designed mock exam, preparing graduates for the Certified Healthcare Simulation Operations Specialist (CHSOS®) exam. This mock exam can be promoted as a valuable resource for simulation technicians, from Ontario Tech and globally, preparing for the CHSOS exam.

Beyond transforming simulation practices, this initiative addresses a critical gap in foundational undergraduate education for aspiring researchers. In the dynamic and interdisciplinary field of emerging research, nurturing growth and innovation requires providing young researchers with essential foundational knowledge at the undergraduate level. Currently, there are no programs worldwide that cater specifically to this need.

In conclusion, STEPS holds the promise of reshaping simulation operations, improving educational pathways, and cultivating a skilled workforce, contributing significantly to advancements in healthcare and simulation.[4]

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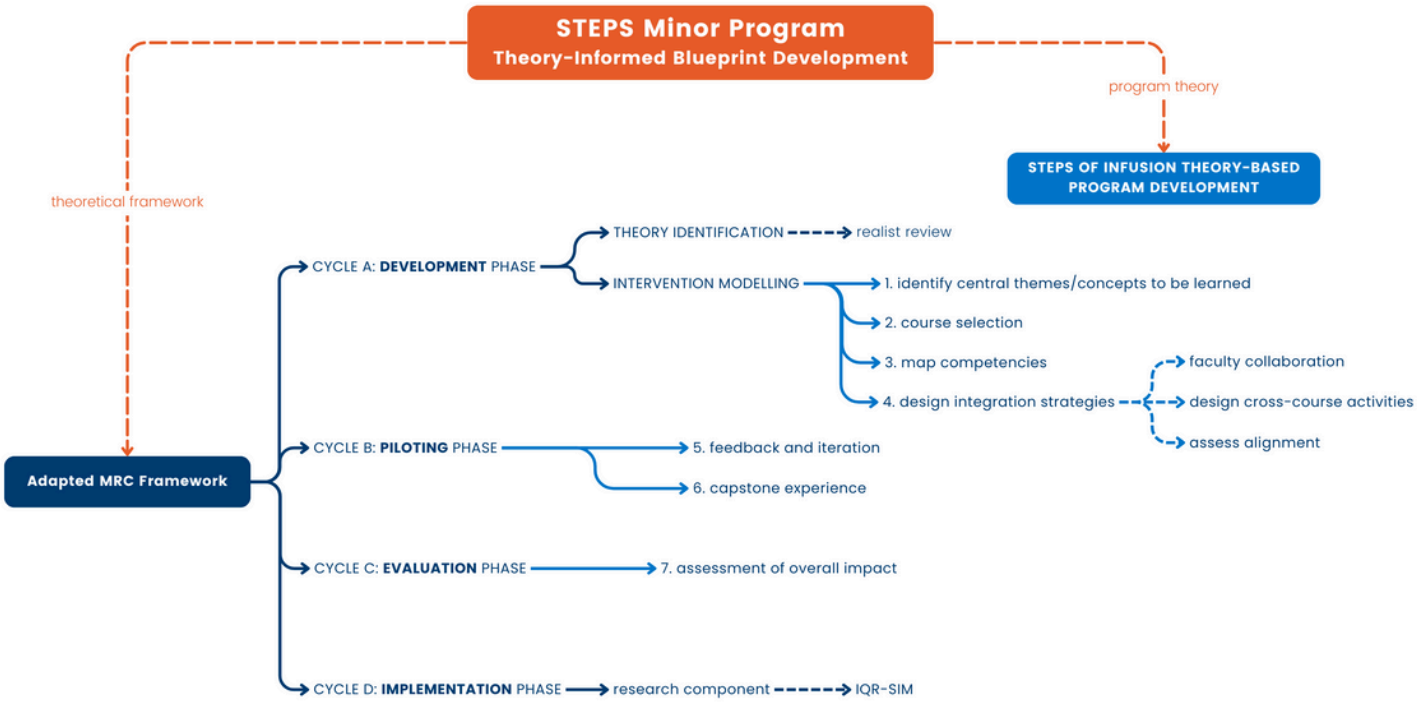
APPENDIX

Appendix A: Visual mind map illustrating the theory-informed blueprint development of the STEPS minor, mapping the infusion approach onto the MRC framework cycles.



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