

Equipping Students as Changemakers Within a Health Sciences Capstone Course at the University of Waterloo

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Abstract

This paper explores the research question, “How does classroom-based work-integrated learning influence health science students’ personal and professional development?”. Co-instructors from the School of Public Health Sciences at the University of Waterloo designed and delivered the course in collaboration with United College’s GreenHouse, a social impact incubator; the Centre for Career Development; and eight partner organizations, including KidsAbility, featured as a case example in this paper. The course assignments were designed with learning outcomes that aligned well with the four key competencies outlined in the University of Waterloo’s Future Ready Talent Framework. Students, guided by course instructors, incubator, and career development staff, engaged in reflections about their development throughout their undergraduate degree as well as a design sprint featuring social innovation challenges identified by health organizations. Students were supported by design-thinking workshops as they actively engaged in understanding their social innovation challenge and developed solutions to pitch to their organization. The case example illustrates how this WIL opportunity motivated and engaged students to see themselves as changemakers, improved their future-ready skills, and engendered a feeling of optimism about achieving success in their future fields. In addition, perspectives are provided on the benefits to the various partners from engaging in collaboration with each other to deliver the WIL experience.

Introduction

Many colleges and universities recognize the value of providing work-integrated learning (WIL) opportunities to students to prepare them for the future of work, especially in a volatile, uncertain, complex, and ambiguous (VUCA) world in which problems are not well-defined and solutions require innovative thinking and interdisciplinary collaboration (Pretti et al., 2021). Examples of WIL include internships, co-op and practicum placements, field experience, apprenticeships, applied research projects, hack-a-thons, social entrepreneurship, as well as service-learning projects (Sattler & Peters, 2013; Kay et al., 2019). WIL opportunities bridge the gap between theory learned in the classroom and practice via hands-on learning and authentic assessment. These experiences, which emphasize navigating a VUCA world, help students develop transferable skills and build relationships (Pretti et al., 2021).

According to a 2012 survey administered by the Higher Education Quality Council of Ontario (HEQCO) to over 10,000 graduating students, most college and university students strongly agreed that WIL was a valuable experience that helped them to clarify their career interests and influenced their career goals (Sattler & Peters, 2013). A 2016 survey from ABACUS data administered to 1,000 students or recent graduates from post-secondary education programs in Canada found that 89% of respondents support more WIL in programs, and 88% think that graduates with WIL experience have an advantage when it comes to finding employment (ABACUS Data, 2016). In addition, those with more WIL experience felt confident to enter the workplace and in their ability to succeed, particularly in terms of having good people skills, public speaking and presentation skills, being able to lead a team, and skills in creativity (ABACUS Data, 2016). When the HEQCO survey data were stratified by program, it became apparent that students in health sciences programs agreed more strongly than students from other programs (e.g., social sciences) about the benefits of WIL, and for these students, employment-related motivations were highly influential (Sattler & Peters, 2013). This is relevant since the course that is the focus of this article was designed for students in a BSc Health Sciences program who aspire to work in healthcare or public health organizations.

In addition to providing value to students, WIL provides value to future employers. As the workforce and economy evolve, WIL opportunities that develop skills in agility and innovation, such as entrepreneurship, hackathons, and design sprints, have started to gain more traction (BHER, 2016). Many industries can benefit from open innovation, an approach that uses intentional inflows and outflows of knowledge (e.g., between community partners and post-secondary students) to accelerate innovation and generate sustainable solutions to pressing challenges (Chesborough et al., 2014). For organizations that lack the organizational slack and knowledge bases required for creating new products and services, design sprints as a model of WIL can offer an opportunity for collaboration that provides value for both parties (Wylie-Toal, 2021).

Work-integrated learning may provide unique benefits to public health organizations, which often differ from other industries because rather than being driven to innovate for primarily financial reasons, they are pursuing improved efficiencies and public health outcomes. Equipping a workforce with skills in creative problem-solving is essential when “innovation is uniquely challenging in public health, as problems tend to be complex, dynamic, and context-specific, and can at times arise quickly and unpredictably, raising the urgency for rapid and efficient responses” (Abookire et al., 2020).

The University of Waterloo (UW) is a public research university located in Waterloo, Ontario, Canada, with an overall enrolment of ~38,000 students, including ~34,000 undergraduate students. UW is a well-known leader in WIL as it operates the world’s largest cooperative education program. Further, UW has a strong focus on innovation and entrepreneurship with on-campus support from the Velocity incubator, the GreenHouse social impact incubator, and via curricular opportunities such as a minor in Entrepreneurship, a minor in Social Innovation and Impact, and a Master of Business, Entrepreneurship, and Technology. In addition, with an emphasis on STEM education, UW students in programs such as engineering have the

opportunity to apply design thinking to solve real-world problems via a required 2-term, fourth-year capstone course.

Despite these opportunities and the clear benefits of WIL opportunities for UW students in health programs, not all health students can participate in meaningful learning experiences to build skills relevant for future careers in health. For example, only about half of students in the BSc Health Sciences program at UW are in the co-op program. Since the curriculum is focused on covering content in human biosciences, health research methodology, and public health, there is little opportunity for students to apply innovative thinking to tackle complex health challenges, particularly in partnership with community organizations. In addition, students face barriers, including resource constraints that reduce the number of available and relevant WIL opportunities, particularly for students in some programs (e.g., health) in comparison to others, such as business and engineering (BHER, 2016). There are also logistical barriers (e.g., commuting, childcare) and financial burdens (e.g., co-op fees, cost of relocation) that can prevent some students from participating in a WIL opportunity (BHER, 2016).

There are also barriers and challenges for institutions to implement or grow WIL programs and for employers and community organizations to provide WIL opportunities due to administrative demands, allocation of staffing resources, financial burdens, the time commitment required to establish and maintain partnerships with organizations, and matching supply with demand (BHER, 2016).

Given the benefits of WIL, the instructors for a new capstone course for students in the BSc Health Sciences program at UW decided to lower the barriers to participation by intentionally building a meaningful experiential learning opportunity that would allow students to further develop skills needed for their future careers in health. The HLTH 480 Competencies in Health capstone course provides an opportunity for students in their final year to reflect on what they have learned throughout their undergraduate degree, showcase their achievements, and further develop the skills needed as they transition into their careers. The Health Sciences program was accredited in 2019 by the Council on Education for Public Health (CEPH), an accrediting body in the United States that is recognized around the world for its emphasis on high-quality, innovative, and adaptive public health education that equips graduates with relevant skills for a rapidly changing and challenging world. One of the requirements of CEPH accreditation is to provide opportunities for students to integrate, synthesize, and apply knowledge through cumulative and experiential activities. Thus, this new capstone course was designed to ensure that all the graduating BSc Health Sciences students meet this requirement.

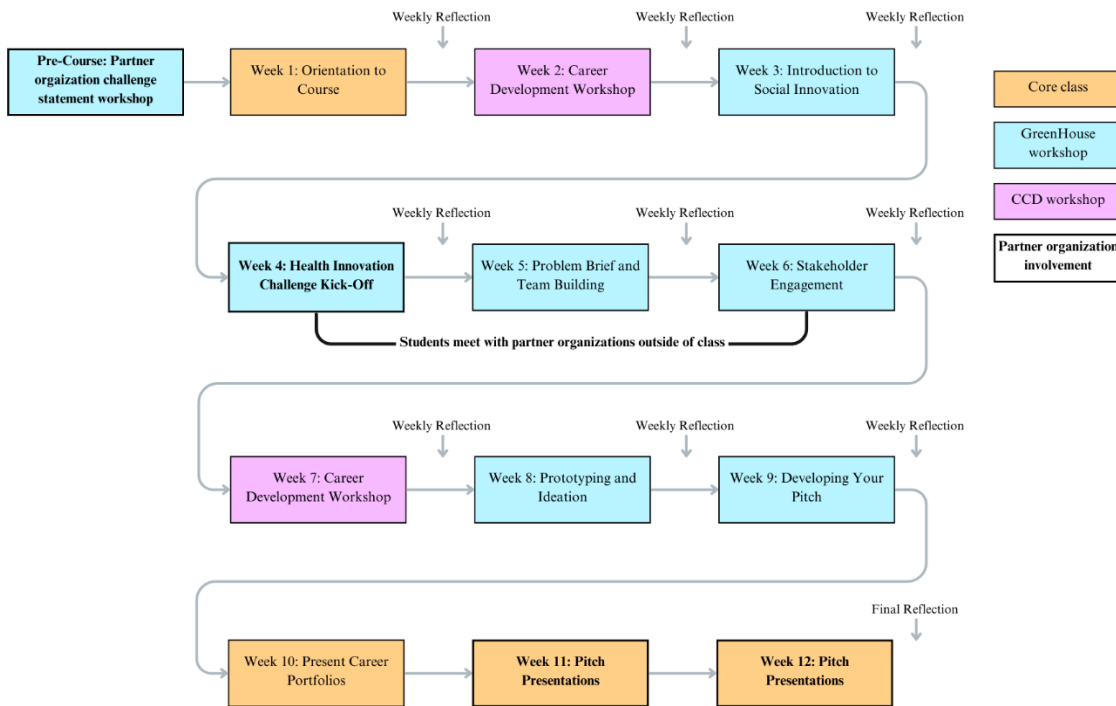
Partnerships in Course Design and Delivery

The co-instructors for the HLTH 480 course brought complementary expertise into the design and delivery of the course. One of the co-instructors is the associate director for the undergraduate programs and is very familiar with the health sciences curriculum as well as what knowledge and skills students would have by their final year, and the other co-instructor has extensive teaching experience with incorporating work-integrated learning. The instructors envisioned the HLTH 480 capstone course as an opportunity for students to make a positive impact on community health, gain relevant experience needed for their future careers in health, and learn tools used for innovative problem-solving. With this vision in mind, the instructors

sought to collaborate with colleagues with expertise in career counselling, professional development and social innovation.

Over the 12-week course, students engaged in classes and workshops delivered by the course instructors, the Centre for Career Development (CCD), and the GreenHouse social impact incubator. As illustrated in Figure 1, the students completed weekly self-reflections and worked on milestones related to their career E-portfolio and health design sprint assignments. Eight partner organizations worked with students on three separate occasions as part of the health design sprint.

Figure 1: Components of HLTH 480



The instructors partnered with the Centre for Career Development (CCD) at UW to prepare students to meet learning outcomes related to articulating their skills, networking with partner organizations as part of their WIL experience, and reflecting on their values in relation to their future career goals. These workshops had two objectives: to have students reflect on their learning and to equip them to market themselves to future employers. The workshops encouraged students to reflect on why they entered the undergraduate program, consider pivotal experiences that influenced their perspective, identify growth experiences, and reflect on the evolution of their desired career path throughout their undergraduate degree. The CCD also delivered content on career branding to help students communicate the skills they were learning in their WIL experience and how these skills relate to their future career goals. Students were given support on how to develop a professional LinkedIn profile and use social media posts to create connections with other professionals who have shared interests.

Drawing upon the CCD workshops, the students created a cumulative project to showcase their skills via a career ePortfolio. Regular reflection is an important component of solidifying students’ understanding of the skills they are learning while participating in a WIL experience (Winchester-Seto & Rowe, 2019). Thus, students in the HLTH 480 course were required to write short weekly reflections that prompted them to articulate their learning from their experiences, make connections to past experiences or personal goals, and describe how they developed new modes of thinking as a result. Students were encouraged to reflect on their journey throughout the course, including getting to know their group members and how to work well together to ideate different solutions and come to a consensus on the best approach, and finally, how to best pitch their solutions in an engaging manner.

In addition to collaborating with the CCD, the instructors partnered with United College, the campus lead, to provide specialized social innovation training and support for students through GreenHouse, its social impact incubator. Drawing from their ten-year history of collaborating with partner organizations on youth-led social innovation projects, GreenHouse staff worked with the instructors to integrate a design sprint into HLTH 480. Through this experience, students iteratively engaged in principles of design thinking (e.g., empathize, define, ideate, prototype, test) to solve a challenge brought forth by a partner organization. This collaborative effort addressed a commonly cited barrier faced by instructors, who often don’t have the capacity to create and sustain relationships with partner organizations interested in WIL (BHER, 2016). Several alumni of GreenHouse’s social innovation programs were involved in the delivery of workshops by sharing their own health innovation experiences or as representatives from partner organizations. Table 1 provides an overview of the workshops.

Workshop	Learning Outcomes and Skill Development
Introduction to Social Innovation, Entrepreneurship & Health	<ul style="list-style-type: none"> • Identify the traits of an entrepreneurial mindset • Understand how social innovation and entrepreneurship can be applied to address challenges in health system
Problem Definition & Team Formation	<ul style="list-style-type: none"> • Define your problem statement • Understand the content elements of a problem brief • Develop a team charter to define roles and responsibilities of team members
Stakeholder Interviews	<ul style="list-style-type: none"> • Define interview goals and develop interview questions • Practice interview techniques that result in meaningful insights • Extract patterns, needs, and insights from interviews
Prototyping and Ideation	<ul style="list-style-type: none"> • Understand ideation and prototyping techniques • Use ideation to generate solutions • Use storyboarding as an early prototyping technique
Pitching	<ul style="list-style-type: none"> • Understand the core elements of a pitch deck and how to connect with diverse audiences • Design and deliver a compelling pitch

Design sprints fall under a category of emerging WIL models where students are engaged in short, industry-partnered sessions that allow them to apply their learning to solve challenges, learn about industry needs, and build connections. Emerging WIL models offer many benefits to students, including improved learning outcomes, increased employability, and personal development (BHER, 2016).

Working with Partner Organizations

Eight partner organizations participated in HLTH 480, putting forth nine social innovation challenges for students to explore (see Table 2). Partner organizations were selected for their diverse public health mandates and potential for challenge statements to cover broad student interests in health communication, clinical health interventions, social determinants of health, and more. Several organizations had pre-existing relationships with GreenHouse.

Partner organizations participated in an onboarding workshop hosted by GreenHouse on the importance of problem definition as the foundational first step in an innovation process. Participants were encouraged to reflect on inefficiencies or challenges present in their roles, organizations, or industries. By participating in several activities grounded in design thinking, participants created a one-pager outlining their organization’s mission, their challenge statement, a narrative example to illustrate the impact of the challenge and further resources for the students to explore.

Table 2: Social innovation challenges used in HLTH 480

Partner Organizations	Social Innovation Challenges
Bladder Cancer Canada ¹	How might we raise awareness of bladder cancer symptoms?
Canadian Mental Health Association: Drug Treatment Court Program	How might we design more tailored support services for addiction recovery?
Canadian Mental Health Association: Your Health Space Program	How might we provide programming that supports the mental health of primary healthcare practitioners?
Canadian Social Prescribing Student Collective ²	How might we integrate social prescribing into primary care?
CanPKU and Allied Disorders ¹	How might we advocate for the early detection of homocystinuria in newborns?
City of Waterloo ¹	How might we address local climate anxiety amongst residents of Waterloo?
KidsAbility ¹	How might we use biomarkers to alert that a stress response is occurring before the dysregulated behaviour occurs? How might we equip augmentative and alternative communication devices with tools for real-time translation?
NewGen Health ²	How might we raise awareness on the importance of early detection of kidney disease?

¹ Participated in previous engagements with GreenHouse

² Alumni of GreenHouse entrepreneurship programming

Staff from each organization attended the fourth week of the course to ‘pitch’ their challenge statements to the students and draw awareness to the importance and impact that a solution would have. The 48 students enrolled in the course were placed into groups of five to six peers based on their rankings and justification of interest for each challenge. After being assigned a challenge statement, students conducted initial research on the challenge and then developed an interview guide to meet with staff to learn more. Staff from each partner organization dedicated at least an hour of time to answer student questions, with many going beyond the initial time commitment to provide site tours, make introductions, and provide early feedback. Partner organizations returned during the final weeks of class to watch students present their top three ideas and share feedback.

Health Challenge Example

The following vignette illustrates one of the health challenges addressed by a student team that partnered with KidsAbility, a child development centre that assesses, diagnoses, and provides clinical treatment to children and youth with communication, physical, or developmental needs. KidsAbility serves many children diagnosed with neurodevelopmental conditions such as autism and ADHD who have difficulty with self-regulation. The struggle to manage strong emotions, self-calm, shift focus, and adapt behaviour to suit different environments can cause undue stress on the child and others in their vicinity. This struggle with self-regulation often leads to a dependence on an adult to identify when a child is dysregulated and implement strategies to help them. In the context of classrooms, this often means a teacher taking time away from general classroom management to assist the dysregulated child. Given this context, one of the social innovation challenges put forward by KidsAbility was centered on how biomarkers might be used to better predict and prevent dysregulated stress responses in neurodivergent children and youth.

The five students assigned to this challenge took on tasks and roles that aligned with their specific strengths and interests. For example, a student whose strengths reside in communication took the lead on maintaining the relationship with staff from KidsAbility. Another student wanted to use Figma to develop skills in prototyping the technical components of their solution. Throughout the design sprint process, students were asked to reflect on their learning, how they would apply what they had learned, and how they would engage with their peers and partner organizations. During the “Introduction to Social Innovation, Entrepreneurship, and Health” workshop, students met GreenHouse staff and alumni and learned how alumni had turned their ideas into action by engaging in the social innovation process. Student reflections demonstrated that they were inspired by hearing from GreenHouse alumni and understood that as young people, they bring a creative mindset, are more likely to take risks, and are willing to challenge the status quo; hence, they are primed to drive new innovations forward. These reflections set the stage for students to have confidence in their abilities to engage in social innovation.

Students were provided with resources on best practices for teamwork and asked to reflect on previous teamwork experiences in terms of what worked well and the challenges they encountered. Students discussed the types of roles they had in previous group projects, how they demonstrated leadership, and challenges such as disagreement during brainstorming or how

some group members did not contribute as much. In their reflections, students explored how to address potential challenges by creating a safe space and judgment-free zone, assigning roles on the team based on everyone's strengths and preferences, and the importance of effective communication and active listening.

Students noted in their reflections that the ideation and prototyping, as well as the pitching workshops, were very helpful in moving their ideas forward and coming up with an engaging way to communicate their ideas. They enjoyed brainstorming different ideas during the ideation workshop and were inspired to step outside their comfort zone and explore more complicated and innovative solutions. They were inspired by other student health entrepreneurs during a panel discussion on health innovation and entrepreneurial mindsets. Seeing peer examples of possible innovations helped the students to imagine possibilities beyond the answers and ideas that first came to mind. The pitching workshop equipped the students to tell a compelling story about a child with autism spectrum disorder and to use engaging visuals to showcase the app using a prototyping tool.

During their final in-class presentation, students pitched three possible solutions back to KidsAbility. These included offering workshops to parents and caregivers about biomarkers and how to recognize a stress response, using a watch to measure heart rate, skin temperature, and respiration, and developing a wearable patch to predict a stress response. While education workshops presented a simple solution, stress response can be inconsistent and vary greatly between children, thus making accurate recognition of dysregulation difficult. The biometrics you can gather with a watch has drawbacks as it is not as specific for indicating a stress response, and elevated heart rates may also apply to activities like vigorous exercise. The most ambitious solution proposed a wearable patch that measures the stress hormone cortisol from interstitial fluid and heart rate using an optical sensor to predict a stress response that pairs with a mobile app to provide accessible monitoring of dysregulation for individuals or groups.

In coming up with solutions, the students demonstrated the application of knowledge from their courses in biology and physiology, health informatics and data privacy, health communication, and program planning and evaluation. Students applied what they learned from the design sprint workshops and the reflections they wrote after each workshop to mentally prepare for the next steps of the design sprint, including making efficient use of their time with KidsAbility by being well-prepared for meetings and maintaining professional communication.

The students received positive feedback from KidsAbility, and with encouragement from GreenHouse staff, three of the five students on this team chose to enroll in a co-curricular program with GreenHouse to continue developing their ideas after the conclusion of the course. Through this program, the students spent ten weeks deepening their knowledge of social innovation and entrepreneurship and exploring pathways to bring their proposed solution to life. KidsAbility invited the team of students to present their ideas at their research symposium, which showcased work addressing accessibility challenges relevant to their clientele. The students presented their work alongside graduate student-level researchers from a variety of disciplines. The team received enthusiastic support and interest from much clinical staff at KidsAbility, who offered insightful feedback and were eager to support a pilot of their device within programs at KidsAbility's child treatment centre.

Lacking the technical knowledge to develop the device themselves, the students explored several pathways to develop a higher fidelity prototype of their wearable patch, including sourcing external developers or working with an undergraduate engineering capstone design team. Ultimately, due to time constraints, lack of financial resources, and approaching the end of their undergraduate studies, the students did not progress past the idea phase. KidsAbility staff indicated that even when student project ideas do not materialize into reality, it is often energizing to work with students and imagine new possibilities for the type of care they might provide.

The students have since graduated from UW and are pursuing nursing school, graduate degrees, and full-time work in public health. In their reflections, the students noted that the design sprint experience opened their eyes to pathways and careers in public health that they had not previously considered, such as product development and entrepreneurship. One student felt that the innovation process was future-oriented, pushing her to develop a growth mindset, take on new perspectives, and think creatively. Another wrote that the course gave her *“the opportunity to cultivate new and meaningful relationships, apply relevant skills, and knowledge acquired throughout [her] undergraduate degree”*, adding that *“it was exciting to see, how we as social innovators, can create original solutions to make an impactful change in the healthcare realm”*.

Research Approach

The research question we explored in this paper is ‘How does classroom-based work-integrated learning influence health science students’ personal and professional development?’. To assess the influence of this experience on students, instructors, and partners, data from different sources were gathered and synthesized. Data include responses to standard course evaluation surveys conducted by the University of Waterloo that were anonymous in nature, student reflections in response to weekly prompts throughout the course, reflections extracted from student Career Portfolio assignments, discussions with students, and feedback from partner organizations from a formal survey and open-ended discussion. The findings from students’ anonymous responses to the Business + Higher Education Roundtable (BHER) survey conducted both before and after the student work integrated learning experiences in the course add relevant insights into students’ prior experiences and learnings during the course.

Themes and main ideas emerging from student reflections were brought together with survey findings to make sense of the data. The instructional team from the School of Public Health Sciences and GreenHouse considered the survey findings and qualitative themes while sharing their experiences and lessons learned from the course. Findings are integrated in the discussion. Permission to include reflections was obtained from students before sharing their quotes and comments in this article.

Discussion

The University of Waterloo’s Future Ready Talent Framework outlines four key competencies that students will need to navigate the future of work and learning in an increasingly VUCA world: expand and transfer expertise, develop self, build relationships, and design and deliver solutions (Pretti et al., 2021). The learning objectives of each of the key assignments in HLTH

480 (the health innovation design sprint, personal reflections, and the career portfolio) align with the talents outlined in the Future Ready Talent Framework, as shown in Table 3. While the talents were not formally assessed in the course, each assignment provided students with training and opportunities to develop the key competencies.

Table 3: The Waterloo Future Ready Talent Framework		
Key competency	Talents	Course assessment that targeted key competencies and talents
Expand and Transfer Expertise	Discipline and Context-Specific Skills	Design Sprint; Reflections
	Information and Data Literacy	Design Sprint
	Technological Agility	Design Sprint **
Develop Self	Self-Management	Design Sprint
	Self-Assessment	Career Portfolio; Reflections
	Lifelong Learning and Career Development	Career Portfolio; CCD workshops
Build Relationships	Communication	Design Sprint; Career Portfolio; Reflections
	Collaboration	Design Sprint
	Intercultural Effectiveness	Design Sprint **
Design and Deliver Solutions	Innovation Mindset	Design Sprint
	Critical Thinking	Design Sprint
	Implementation	No opportunity within the course**
<i>** Indicates skills where we could draw stronger connections in a next iteration of the course</i>		
Table adapted from Pretti et al., 2021. "Development and validation of a future ready talent framework" in the Journal of Work-Integrated Learning.		

The discussion will be framed by the Waterloo Future Ready Talent framework to share competencies developed in HLTH 480 via the various data gathered. Skills that fall within the "expand and transfer expertise" competency were reflected in the students' core knowledge and understanding of health. This course was specifically designed for students to apply discipline-specific knowledge to a new context by integrating knowledge, skills, and undergraduate experiences. Themes from student reflections indicated that they were applying knowledge from previous courses to their challenges. One student said, "I have some knowledge about biomarkers and what they are. I recognize that I have gaps in my knowledge and need to go deeper" for this challenge. Exploring challenge statements in fields that may be new or unfamiliar, such as investigating augmented communication devices or learning the symptoms of rare conditions like homocystinuria, required students to investigate and understand complex topics using their information and data literacy skills. In student reflections about their experience, they reported excitement about conducting research to apply their understanding to this context. One student said: "I did some research and our group eventually settled on heart rate, which is non-invasive and cortisol, which could be more invasive. I thought about measuring cortisol in the blood as there is a lot of research around that...I felt excited, as it was innovative and something that had not really been done before. Thus, using what information I

did manage to find, I started to put together a unique, plausible mechanism to measure cortisol”. While students were able to develop some skills in technological agility through their prototyping workshop, this skill could be further developed in future terms by more intentionally introducing digital tools to aid in prototyping and pitch creation or using generative AI to support research and implementation.

The ability to develop oneself is another core competency that was a large focus of HLTH 480. Each of the skills contributing to self-development was addressed through the design sprint, writing weekly reflections, and developing a career portfolio. Specifically, the first workshop delivered by CCD helped students view themselves as lifelong learners capable of seeing their building blocks of self-development, including the pivotal moments that influenced their perspectives and career choices. In the course surveys, many students indicated that their participation in HLTH 480 gave them a better understanding of future job opportunities and that they felt optimistic about achieving success in the field of their choice. By reflecting in and outside of class, students revealed new insights about themselves, which aligns with Price et al. (2012) assertion that reflection encourages better articulation of growth and development and the ability to assess oneself. In the BHER survey on WIL outcomes, over half the survey respondents indicated that they learned a lot about design thinking, problem definition, ideation, prototyping, and pitching – skills that will help set students up to creatively approach future workforce challenges. Of these topics, pitching and ideation were the most positively received, with 88% reporting that they had learned a lot.

Beyond the skill development, the course also helped students to see themselves as changemakers, with over 94% of respondents to the BHER survey indicating the course helped them to see themselves as a changemaker in the social impact space, at least to some extent. Having the confidence that they can make an impact is a key ingredient in empowering youth with the skills, resources, and opportunities to drive social change. This mindset is an important component of developing oneself and setting students up for success. Students expressed this mindset and confidence at different stages in the learning process, depending on their experience. One student commented on the course perception survey that *“the presenting aspect in this class was nice. I had not presented to a group for over 5 years. This course pushed [me] out of my comfort zone and face my challenges.”* In one student reflection, while practicing their pitch, they indicated, *“Working with my group over the past couple of weeks to develop and deliver our pitch has been an invaluable experience that included lively discussion to determine our best 3 ideas. That process allowed me to practice coming up with unique ideas in a collaborative environment that encouraged thinking outside the box. I believe this will be helpful in the future as I am now more comfortable experimenting with different approaches to problem-solving.”* This is similar to research conducted by Sambell et al. (2020), where they found that a WIL experience for students resulted in greater confidence in participating in work placements and volunteering for future career opportunities.

Another core competency of future-readiness is the ability to build relationships. As graduates in 2024, these students experienced significant disruption to their studies as necessitated by the switch to remote or hybrid learning during the COVID-19 pandemic. As a result, this project was the first in-person collaborative experience that many of the students engaged in. In the course perception surveys, students commented that they enjoyed their experiences with peers, “my

classmates helped me the most with this course.” In their course reflections, students reflected on the importance of collaboration not only to their project’s success but to their ability to function as a team: *“Collaboration also seems to be an important value, and as a result, when brainstorming innovative ideas, we will consider potential partnerships that could be utilized within the community. Additionally, collaboration between our group members is equally as important in developing our plan to effectively problem-solve and do so in a manner that demonstrates initiative and accountability, which are relevant to the goals of this course and project.”* Several students built upon relationships developed within the course to carry the impact of their work outside of the classroom by volunteering with their partner organization or exploring internships. While the course offered some contributions towards building intercultural effectiveness by working cooperatively with people and organizations of different backgrounds, this could continue to be built upon by exposing students to more stakeholders and differing perspectives on health challenges in future semesters.

The last core competency is the ability to design and deliver solutions. This competency captures the justification for integrating a design sprint WIL model into the course. Today’s workforce is faced with tackling many wicked problems that will require innovative and creative solutions. Providing students with a structure that pushes them out of their comfort zones, encourages them to think critically about opportunities for improvement, and provides a safe place to experiment and take risks helps students develop the innovative mindset necessary to address quickly changing problems and circumstances. To propose successful solution ideas to the organization’s challenge statements, students were required to take the time to deeply understand the bigger picture and seek root causes. Rather than moving forward with their first idea for a solution, teams presented three possible pathways and used evidence-based decision-making to decide which would meet the needs of the organization they were partnered with. In their reflections, several students attributed the design sprint to aid in developing their innovative mindsets, noting that *“the assignment encouraged a shift from conventional thinking to a more inventive mindset and was really an opportunity for me to apply the knowledge I’ve gained throughout my undergraduate career.”*

The co-instructors were pleased to see that students were able to successfully integrate their learning from their undergraduate degree to propose innovative solutions, not only for the KidsAbility group but also for the other partner organizations that participated in the course. Partner organizations benefit from the solutions pitched in different ways. One of the partners indicated that *“sometimes it gives us different ideas and approaches we can integrate – even an 80% fail rate is worth it for 20%,”* and it *“gives us skills and abilities that we don’t have in-house.”* The organization indicates that getting solutions from student groups *“creates purpose in moving projects forward and keeps staff engaged in professional development.”*

The HLTH 480 course is quite different from other more content-heavy courses in the health sciences curriculum, with an emphasis on process rather than outcomes, regular reflection, and engagement in social innovation. In their reflections and in the course perception survey, students discussed the value of reflection; for example, one student said, *“I think the thing that helped me learn in this course was the weekly reflections. They helped me solidify what I learned in class and helped me organize my thoughts for the other deliverable components in the course.”*

The co-instructors benefitted immensely from the various collaborations in developing and delivering the course. Iteratively designing the course activities, workshops, assessments, and structure with input from GreenHouse, the Centre for Career Development, and the Centre for Teaching Excellence provided more holistic support for student learning, evidenced by the students' rating of 4.7/5 for a supportive learning environment fostered in the course. Health Sciences students have asked for opportunities to address pressing issues that have an impact in the world; many students in the course expressed the value of working with these organizations. The co-instructors (DW, JY) were invigorated in their teaching as they learned about the social innovation process from GreenHouse (TD, EH) and obtained more ideas for engaging students in active learning. Finally, the co-instructors (DW, JY) were energized by the enthusiasm of the partner organizations and inspired by what they do to make a difference in their communities. Engaging in classroom experiences provides GreenHouse access to new student audiences who may not otherwise participate in innovative WIL opportunities offered outside the classroom. Each classroom engagement helps to build momentum toward students participating in deeper engagements or transferring their changemaking skills to personal passion projects. Students who participate in GreenHouse's incubator programming outside the classroom are often intrinsically motivated and eager to make a difference. Bringing GreenHouse into the classroom allowed this motivation to be sparked in other student audiences and spread an attitude of changemaking across campus. Out of all students in the class, 15% of students were inspired to continue the work started in this course through working with a partner organization in a volunteer capacity, through further research or venture creation.

Conclusion

This course was offered to 48 students in its first iteration. In future terms, this course will be offered to 80 students a term and be delivered by one instructor from the School of Public Health Sciences in collaboration with GreenHouse and the Centre for Career Development. This presents questions on how to scale this course without compromising on the quality of the experience and meaning for both students and partner organizations. A new model of engagement will be explored, inspired by a place-based social innovation lab example shared by Geobey 2024. In this model, students will attend three gatherings of community stakeholders around a broad public health theme, such as health and climate change or health and social prescribing. These gatherings will be facilitated in the form of a world café, and students will identify and arrive at a validated social innovation challenge (rather than choose from a curated set of problem statements), co-create solutions with community partners, and showcase their final assignments to a broad audience of stakeholders. This new model will allow for a wider range of participants from more organizations and will require less preparation time from participants. These gatherings may leave the possibility for engineering students to attend, creating networking and collaboration opportunities across disciplines.

In addition to a new model of stakeholder engagement, we may encourage pathways to further implement student ideas in different ways, such as through engineering capstone projects, with HTLH 480 students serving as subject-matter experts while engineering students focus on technical development. We are also considering partnerships with organizations that offer defined pathways and resources such as internships, co-op, and research positions to support

project continuation. Further into the future, running an interdisciplinary version of this course could foster a diverse skill set among students and clearly defined roles. Implementing these strategies could significantly enhance the practical application of student ideas and contribute to a more dynamic and responsive educational experience.

In conclusion, this paper demonstrates that providing students with diverse sources of mentorship and perspectives creates a positive learning environment, challenging them to develop new skills such as pitching ideas, collaborating with external organizations, and applying the social innovation process. In navigating a VUCA world, these students will be better prepared to develop themselves, build professional relationships, and design and deliver solutions. Students see their futures differently when given an opportunity to participate in this type of learning experience. Future research may explore how WIL influences the organizations that participate and student outcomes over the long term.

References

Abookire, Sylvie, Colin Plover, Rosemary Frasso, and Bon Ku. "Health design thinking: an innovative approach in public health to defining problems and finding solutions." *Frontiers in Public Health* 8 (2020): 459.

Business Higher Education Roundtable. "Taking the Pulse of Work-Integrated Learning in Canada." (2016).

Chesbrough, Henry William, Wim Vanhaverbeke, and Joel West, eds. *New Frontiers in Open Innovation*. Oxford University Press, USA, (2014).

Data, Abacus. "Work integrated learning and post-secondary education: What students think." (2016).

Geobey, Sean. "The Community-Embedded Classroom as a Site for Social Innovation Labs." Paper presented at *RSD13 Online Paper Talks + Presentations*, (October, 2024).

Kay, Judie, Sonia Ferns, Leoni Russell, Judith Smith, and Theresa Winchester-Seeto. "The emerging future: Innovative models of work-integrated learning." *International Journal of Work-Integrated Learning* 20, no. 4 (2019): 401-413.

Khan, Tauhid Hossain, David Drewery, Idris Ademuyiwa, Anne-Marie Fannon, and Colleen Phillips-Davis. "An investigation of barriers experienced by students from equity-deserving groups in a Canadian co-op program." *International Journal of Work-Integrated Learning* 25, no. 1 (2024): 51-65.

Pretti, T. Judene, Brittany Etmanski, and David W. Drewery. "Development and Validation of a Future Ready Talent Framework." *International Journal of Work-Integrated Learning* 22, no. 3 (2021): 369-383.

Price, Margaret, Chris Rust, Berry O'Donovan, Karen Handley, and Rebecca Bryant. *Assessment literacy: The foundation for improving student learning*. ASKe, Oxford Centre for Staff and Learning Development, (2012).

Sambell, Ros, Amanda Devine, Johnny Lo, and Tanya Lawlis. "Work-integrated learning builds student identification of employability skills: Utilizing a food literacy education strategy." *International Journal of Work Integrated Learning* 21, no. 1 (2020): 63-87.

Sattler, Peggy, and Julie Peters. *Work-integrated learning in Ontario's postsecondary sector: The experience of Ontario graduates*. Higher Education Quality Council of Ontario, (2013).

Winchester-Seeto, Theresa, and Anna D. Rowe. "Who is holding the mirror? Debriefing and reflection in work-integrated learning." *International Journal of Work-Integrated Learning* 20, no. 4 (2019): 335-349.

Wylie-Toal, Brendan. "Open-Innovation in Healthcare: an analysis of motivations, learning, and program outcomes." Master's thesis, University of Waterloo, (2021).