PURM
Perspectives on Undergraduate Research & Mentoring

Star-Gazing for Global Challenges: A Constellation of Relational Mentorship for Online Course-Based Undergraduate Research During a Pandemic

Kara Loy, M.Ed., University of Calgary (kara.loy@ucalgary.ca)
Owen Brierley, Ph.D. Candidate, University of Calgary
Kaitlyn Berger, M.P.P., University of Calgary
Kyla Flanagan, Ph.D., University of Calgary

Introduction

The COVID-19 pandemic dramatically and rapidly changed how undergraduate research education occurred on campuses worldwide. The already challenging nature of mentoring undergraduate research was exacerbated by students and mentors working remotely, technology limitations and barriers, transition of planned in-person projects to online, and social and emotional pressures students and mentors faced during the pandemic. Amid the crisis, instructors and mentors were forced to critically assess their curricula and mentorship practices to reconcile the unbelievable challenges students and mentors faced while realizing the goals of undergraduate research.

Here we describe the design of a research-based course with a constellation mentorship model that included research coaches, academic research supervisors, librarians, an instructor, and an educational development consultant. We highlight the key course design elements, instructional philosophies, and practices that supported students conducting research during a global pandemic. The authors of this article, including an educational development consultant, two research coaches, and the instructor, together undertook a year-long experiential dialogue to critically reflect on mentorship approaches, including processes, challenges, and successes during uncertainty. The educational development consultant supported the post-course reflective dialogue. However, given that they were not directly involved with the undergraduate students' course-based experience, their contributions in this article focus on integrating the instructor's and research coaches' perspectives within the scholarly context. The reflections of the instructor and research coaches, the instructional team, are based on their experience during and following the crisis. The team's experiential dialogue was emergent, with a selection of organically determined responses included here. As a composite, this discourse explores how course-based undergraduate research can ideally be supported by a constellation of mentors that offers students hope, growth and reflection opportunities through compassionate course design and cultivating community. Through these reflections, we came to recognize that mentors need to be even more intentional and relational during a crisis to find opportunities to guide learners, build flexibility into the curriculum, and account for mentors' and students' mental health and well-being.

Relational mentorship encompasses teaching and learning approaches informed and summarized by Dolan and Johnson (2009) whereby a constellation—comprising an instructor overseeing graduate students mentoring undergraduate students' research in a research university—is nested within and influenced by other relationships; in turn, all of these relationships evoke positive and developmental mutually beneficial and reciprocal qualities encouraged via critical reflection (p. 489-496). Pandemic

pressures warranted intentional approaches to realize the ideals of relational mentorship as part of curricular programming.

UNIV 401: Research on Global Challenges, or Global Challenges for short, provided students with an opportunity to explore interdisciplinary and multidisciplinary solutions to Global Challenges by conducting a deep, authentic team research project under the mentorship and guidance of the course instructor, an academic research supervisor, and a student research coach over 13-weeks of the winter academic term in 2021 (from January to April) at a research-intensive university in Western Canada. This course focused on developing students' knowledge and competencies in research foundations, community and collaboration, reflection, skills articulation, and research dissemination. When identifying qualities that resilient instructors apply to meet current student needs, McGowan and Felten (2021) listed responsiveness, risk-taking, personal agency, the inclusion of equity and social justice goals, and hope (p.474-475). During the global pandemic, we applied an approach to mentorship informed by these qualities in a context of a research course.

Course Design

The design of the structure and support for course-based, student-produced research was fostered by mentorship across roles and disciplines. Projects were based on research topics proposed by academic staff members from across the university who served as research stream supervisors. These academic staff volunteered from across campus to take on a research supervisory role in this class in addition to their other duties including teaching, research, and service. Research stream supervisors invested two to three hours per week mentoring students in their research stream and were not compensated for their time. Faculty and postdoctoral scholars in Canadian universities are known for being intrinsically motivated to provide research mentorship and teaching to students as part of a tradition of “a deep commitment to social consciousness, community action, and social justice” (Groen & Kawalilak, 2019, p. 2). Notwithstanding, such additional activities may also count toward individual’s tenure as well as merit and promotion applications. Importantly, academic staff may take on additional research mentorship for intangible or long-term gains, including attracting future graduate students or having more contributors to their research endeavors, increasing outputs such as data sets, analysis, or even peer-reviewed manuscripts. Academic staff have also reported value in being part of a novel, interdisciplinary cohort where they learn and benefit from engaging with peers from other disciplines and being exposed to novel teaching approaches, such as those provided in the Global Challenges course (Al-Mahmood et al., 2020). Other institutions may have or want to introduce formalized compensation arrangements, such as a teaching release, to encourage and compensate academic staff as research stream supervisors.

During the winter of 2021, local and global restrictions resulting from the COVID-19 pandemic meant that many university courses, including Global Challenges, were limited to online or distance formats of teaching and learning. In the course, UNIV 401: Research on Global Challenges, students attended weekly, sixty-minute online classes with the course instructor. Sixty-minute, online research stream meetings with the research supervisor and research coach immediately followed these weekly online classes.

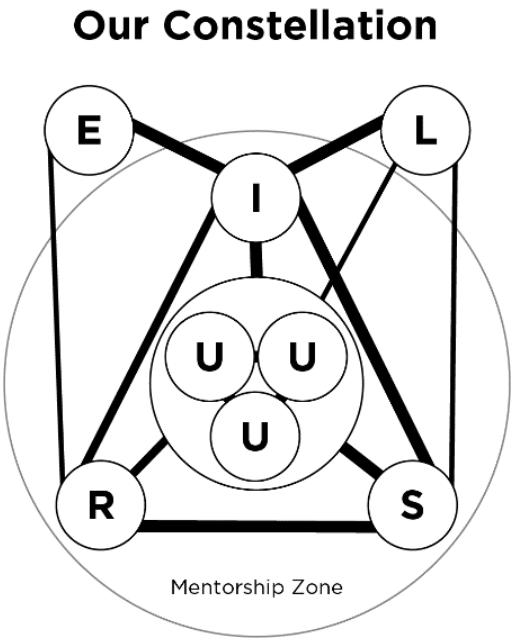
Each research stream's project topic was aligned with one or more of the United Nations' Sustainable Development Goals (2015). The research stream topics and supervisors in the course included:

- Indigenous Experiences with the Police: supervised by an Assistant Professor in the Department of Psychology, Faculty of Arts
- Carbon Dioxide Removal: supervised by an Associate Professor in the Department of Geoscience, Faculty of Science

- Humans, Animals, and the Environment: supervised by an Assistant Professor (Teaching) in the Department of Political Science & International Indigenous Studies, Faculty of Arts
- Pandemics: supervised by a Professor in the Department of Computer Science, Faculty of Science

Of note, every research stream was also supported by a part-time, paid research coach who was a graduate student or an experienced undergraduate student mentor with an academic background relevant to the stream topic. The research coaches were mentored by the instructor, the stream supervisor, and the educational development consultant from the teaching and learning center who specialized in undergraduate research. In addition to guiding the research stream topic, the research coaches provided disciplinary research expertise and mentorship to their stream's students. Students were placed into teams of two to six within each research stream. Two librarians offered expertise to complement that of the instructor, stream supervisors, and research coaches. They provided instructions on procedural content, such as conducting systematic reviews, database searches, and academic referencing. Their involvement was an example of how the relational mentorship structure was key to the success of these ambitious student projects, especially given that the students were generally identified as having little to no prior research experience (Figure 1).

Figure 1. *Constellation Mentorship Model for Global Challenges*



Notes: E: educational development consultant; I: instructor; L: librarians; U: undergraduate student teams; R: research coach; S: research supervisor

Research coaches acted in an intermediary role within and across the research streams. To best support each research stream, coaches served as a bridge between the goals of the research stream supervisor and the needs and goals of the students. It was up to the coaches to keep the supervisors aware of what the students learned in the weekly lectures, of timelines, and expectations for course assignments. Research coaches were most often the first line of contact when students had inquiries or concerns about their research or the course. Coaches then relayed relevant information to the stream supervisor or instructor. Additionally, coaches upheld the objectives of the research stream supervisor when providing mentorship and feedback to students. To complement the liaising

between the stream supervisors and the research coaches, the instructor also met online monthly with research stream supervisors. These online gatherings kept the mentorship constellation (Hetty van Emmerick, 2004) cogent and cohesive and served to track the progress of student projects across the term.

Research coaches received mentorship in weekly online meetings with the course instructor and the educational development consultant. They also provided peer support to one another. The instructor sent out resources ahead of these coaches' meetings. These resources provided context to the meetings and were discussed in relation to what coaches were seeing with their students. The resources, and expertise of the instructor and consultant, facilitated coaches to deploy responsive and high-quality mentorship to students. Resources included guidance on combating systemic racism in academia, handling academic misconduct, and implementing professional practices. As the course progressed, the weekly research coach meeting ensured the practice of skills around facilitating productive team communication, giving effective feedback, and attuning assessment across streams. Creating a sense of community within each research stream was maintained despite the remote and often unfamiliar qualities of the online learning taking place. Meetings also provided coaches with an opportunity to update the instructional team on students' progress and any concerns that could be remediated by access to the experience of the instructor and educational development consultant. These weekly consultations allowed for calibration and continuity across the research streams and contributed to the research coaches' professional development.

Reflections on Mentoring During the Pandemic

The Global Challenges course instructor, K. Flanagan, and two research coaches, K. Berger, an undergraduate student at the time, and O. Brierley, a doctoral student at the time, reflected on how, despite temporal pandemic challenges, relational mentorship helped students achieve the course's four learning objectives: a) research foundations, b) community and collaboration, c) reflection and skills articulation, and d) research dissemination.

a) Research Foundations

K. Berger: The most rewarding part of this coaching experience, for me, was seeing the change that some students encountered when they realized that they were being asked to be producers rather than consumers of knowledge, what being a producer meant, and how their previous experience as a student helped build the foundation for their new role as a researcher. As a researcher, you need to adopt a producer mindset, while as a student, your success hinges on your ability to consume existing knowledge. Those students who began the transition from consumer to producer, while maintaining the understanding that any new work needed to be supported with prior research and knowledge of how their work fits in the greater body of research in the domain, started to see the knowledge they were previously busy consuming as a resource and foundation for their work.

b) Building Community and Collaboration

K. Flanagan: It was particularly important for students to conduct their research in teams while working online during a pandemic. Students had a group they could draw on for support, and they were able to collaborate in what was otherwise a very lonely period for many. Synchronous meeting times with the teams ensured [that] we had time for students to work together and get to know each other. We also had specific classes focused on collaboration, providing feedback to teammates, [and] peer evaluation to ensure students were communicating about team processes and functions.

K. Berger: With the virtual nature of the course, I put so much more effort into building some sort of community than I would have in person. I think that in person, when you're with people, being physically in the same space already does some of the community-building work that you don't realize. Virtual experiences have taught me that community building needs to be an intentional act.

O. Brierley: I found you had to be much more proactive, and you had to be much more direct in your engagement with people. If you just say, “So, how's everybody doing?” They respond with, “Everything's fine. Everything's fine.” Nobody really wants to talk about issues and certainly not in group settings. One student mentioned a culture of toxic positivity. I think this toxic positivity exists in face-to-face environments and can be the elephant in the room. The virtual environments just exacerbated that because other modes of connection were removed. At the beginning of the course, I wasn't anticipating I would need to put as much energy into attending to this emotional well-being and community-building aspect. I'm just glad that I have this mindset from my theatre training that allowed me to be sensitive to and work with my students on it.

c) Reflection and Skills Articulation

K. Flanagan: Towards the end of term, when everyone was feeling particularly burnt out, we took class time to discuss our mental health and well-being. In Week 10 of the term, morale and resiliency were low. Rather than moving ahead with the regularly scheduled class activities, we took time to check in with each other. We spent 30 minutes in the research streams talking about where everyone was at in the research process and how they were feeling. Many students commented that this was the most important class of the term, and that they so appreciated us acknowledging the difficulties associated with research and being online. Rather than pushing through difficult times without reflecting on it, we welcomed and acknowledged the burnout and created a safe space for students to discuss their struggles.

O. Brierley: This course really challenged my students to deal with the expectations of independent research. Those students who tried to figure out “the right answer” were, at first, frustrated with me because I would tell them, “It’s your research. You need to convince me what the right answer is.” My goal in this was to reinforce the holistic nature of the research process being studied with Dr. Flanagan. Over time, my students started to connect the dots on how their research question connected to their research methods, which connected to the work they produced, and how that work connected to the results they could analyze and present in a defensible way. This kind of autonomous thinking was a new set of muscles for most undergraduates whose time is typically spent consuming rather than producing research. Encouraging ongoing reflection and engaging in metacognitive discussions helped to join the ideas presented in Dr. Flanagan’s lectures with the implementation projects in the research stream. For me, seeing the progress from this “right answer” thinking to autonomous and self-motivated thinking was exciting when the students experienced their light-bulb moment--where the course content and the lab work connected.

d) Research Dissemination

K. Berger: I loved seeing their [students’] end products. I gave a lot of feedback [and comments] on their end products, because I was super proud of them. I wanted to give them something they could use after the end of the course.

K. Flanagan: As part of the specifications grading used in the course, we incorporated 3 “free passes” for students. Each free pass could be used in one of two ways. Students could submit a free pass to hand in an assignment up to one week late. Or students could use a free pass to “revise-and-resubmit” work that did not meet the specifications on the initial assessment. The opportunity to “revise and resubmit” [their] work using a free pass was also an important strategy for mentoring undergraduate research. Revising and resubmitting work is a normal part of the research dissemination process, and as part of this course, we aim to normalize receiving feedback and making modifications to work as an important part of the research process. This allowed students to take risks and be creative in their work without fear of losing marks. Students knew that if the work didn’t meet the specifications on the first try, they were going to be able to incorporate the feedback provided by me and the research coaches and submit again.

O. Brierley: It was really nice to see the validation [that] resulted from the work the students produced. It was also really interesting to see how many students got really hungry about getting the work to have final polish. With one of the final research papers, there was [a member of] one group who had used up all of their free passes and the group couldn't technically resubmit for an improved mark. They really wanted that top mark. When we said, well, one of your members has already used up their free passes, they said that it didn't matter, and they were going to resubmit. They wanted feedback, wanted to do something with it, and still sent it [in].

My focus was always on student learning. So, was this a valuable experience for them to go through starting from a blank slate? Coming up with a research question and producing some end result? From that perspective, I thought it was highly successful. We wanted them to strive towards that potential for publication and treat their work as seriously as if they were going to publish. But we knew that if there was anything that was going to come out of the process, it was going to be work that at best could be further refined [in the future].

Conclusion

The Global Challenges course provided multiple layers of mentorship for undergraduate students conducting their first, course-based research project— a student-centric set of relationships with mentors of varying roles, statuses, and types of expertise (Hetty van Emmerick, 2004). "Despite the disappointments and despair," which were ubiquitous during the COVID-19 pandemic, the instructor designed a mentorship environment to support student success in conducting a deep, authentic research project (McGowan & Felten 2021, p. 3). With the guidance of academic supervisors and student coaches with research experience, students not only developed foundational skill sets in research, teamwork, problem-solving and collaboration, but also cultivated tolerance for ambiguity, clarification of research as a process, and confidence in scientific thinking or scholarship. Student projects were based on research topics proposed by academic staff, namely research stream supervisors, and were aligned with one or more of the United Nations General Assembly's Sustainable Development Goals (2015). The importance given to course design and implementation was critical in developing students' skills and providing them with a sense of purpose and accomplishment during online research-based coursework.

Constellations are patterns that form from unrelated objects, representing an emergent formation that occurs after the arrangement has been created. We think of this as an analogy for the Global Challenges course. In this course, we combined multiple teaching and learning strategies as distinguishing characteristics of the overall course design. A sensibility, for both rational professional knowledge and a responsiveness to students' and professionals' emotional or sensory experiences (Bredmar, 2020) realized our aim to remain flexible and adaptable to the needs of the students during the duress of the pandemic. This mentorship model characterizes situations where one mentee has access to multiple mentors who take an active interest in and act to advance the mentee's development. This approach allows mentees to experience mentors with distinct mentoring and leadership styles, providing richer and more in-depth understandings. Having multiple mentors also provides mentees with greater opportunities to expand their scholarly or professional networks and, in turn, supports and reinforces mentors who may be new to mentoring or providing specialized and only slightly overlapping strengths (Nowell et al., 2017).

With thoughtful sensibilities and wise instructional choices, the constellations allowed for mentorship to be prioritized and to deliver on student skill development and the generative qualities of interdisciplinary mentorship. Levers for the experience include what Singer et al. (2017) described as students working with graduates and academics on faculty-driven projects in ways which equip them with knowledge about methods, data collection, and analysis. Student mentees gained a sense of research as a process through recognizing and interrogating accepted disciplinary norms,

responding to current challenges in the field by critiquing disciplinary and interdisciplinary research methods, generating new ideas and questions, and selecting appropriate research methods for their projects (Singer et al., 2017). Students additionally gained valuable opportunities such as “engaging in disciplinary conversations,” “connecting [with] people and ideas across a campus and beyond,” and “discerning and employing scholarly conventions” (Singer et al., 2017, p. 384).

The course design included interconnected supports for the research coaches and stream supervisors to improve mentorship of students. Offering integrated supports as part of the course design accounted for what McGowan and Felten (2021) refer to as cultivating "hope-full communities" and "teaching to meet evolving student needs" (p. 2). The course design supported students’ opportunities to consider and practice skills relevant to sustainability, climate and social justice, critical thinking, and reflection. Some student research streams used community-based data, which presented ways of mentoring research through connections with real-world issues and challenges relating to interdisciplinarity (Hartwell et al., p. 157). In so doing, inclusion of the United Nations General Assembly’s 2015 Sustainability Goals provided students with a "more democratic approach to knowledge making [that] purposefully mirror[ed] the values .... embedded in the course content, particularly .... issues of social justice" or ecological justice (Hartwell et al., 2017, p. 158).

Interdisciplinarity was an important tenet of Global Challenges, an aspect planned for the course prior to the pandemic. During the pandemic, the instructional team was curious about what aspects of interdisciplinarity would translate to remote and online learning mediated through Zoom, the online meeting platform, and the institution’s learning management system (LMS). Remote and online learning still afforded opportunities for interdisciplinarity in what Singer et al. (2017) called "mak[ing] disciplinary norms explicit and defamiliariz[ing] them so that students can critique them" (p. 378). Global Challenges also resulted in providing students with "the potential to foster a form of interdisciplinarity that is mutually beneficial to all disciplines involved" and "with a wide-ranging set of tools, including both humanistic and scientific inquiry" (Singer et al., 2017, p. 384).

As well, several recommended approaches for teaching across disciplines were included in Global Challenges such as inclusion of "experiential learning," a "repositioning the role of instructor," and "reflection" (Hartwell et al., 2017, p. 157). The instructor role was repositioned in Global Challenges in three ways including through the use of rubrics, specification grading, and critical reflection as a means for assessment of student learning. Students used instructor-developed rubrics to set goals, plan their work, and align their outputs with the grading scheme. Hartwell et al. (2017) explain how this approach works well in multidisciplinary teaching, noting that ahead of deadlines, students can self-asses against the instructor’s rubrics and generate reflections on the learning gained through writing papers or producing assignment artefacts. This same amenity was afforded to students in Global Challenges, who produced project assignments and written critical reflections to articulate their learning at various intervals during the course.

In turn, the constellation of relational mentorship was pivotal to the success of Global Challenges because it offered students a suite of multi-directional support, learning, and responsiveness to help them overcome real or perceived deficiencies in their confidence or research skills. As a course design attribute, relational mentorship provided a constellation of bilateral and interdependent relationships between students, student mentors acting as research coaches, and academic staff in diverse roles, including the instructor, librarians, research supervisors, and the educational development consultant. This mentorship design evoked valuable learning and development and proved worthwhile, effective, and generative (Dolan & Johnson, 2009).

In reflecting on the design and the experience of delivering Global Challenges, research coaches and the instructor noted challenges and disruptions. Yet ultimately, the instructional team asserted how students experienced success concerning the course objectives. Objectives were achieved by developing students' knowledge of and competencies for research foundations, building community and collaboration, cultivating critical reflection and skills articulation, and providing an opportunity for research dissemination. Ongoing reflection and review of the course's design, pedagogical logistics, and first-hand experiences opened the possibilities for valuable relationships among the course's participants, namely for members of the instructional team, enrolled students, academic staff, including educational developer, librarians, and the stream supervisors. Even in times of disruption and adaptation, quality mentorship of interdisciplinary undergraduate research, such as those included in Global Challenges during the COVID-19 global pandemic, accounts for student and mentor well-being. Such mentorship ensures students reach for the stars when starting their research journeys, no matter what is happening globally.

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