Clare Mulcahy, NORTHERN ALBERTA INSTITUTE OF TECHNOLOGY, clarem@nait.ca
Ashique Khan, NORTHERN ALBERTA INSTITUTE OF TECHNOLOGY, mohammadk@nait.ca

Reimagining Student Success through Engagement and Soft Outcomes: Learning from a Capstone Course in a Canadian Polytechnic

ABSTRACT

This paper uses a capstone class in the bachelor of technology program at Northern Alberta Institute of Technology (Canada) as a case study for reimagining a "successful" student and promoting growth in a variety of learners. In this course, students, guided by faculty advisors, work in teams to address real-world projects solicited by individuals or organizations. Over two years, feedback was gathered through interviews and surveys with graduating students and alumni to identify opportunities for improvement and to gain deeper insight into students' learning experiences. The authors analyze these responses through the lens of scholarship of teaching and learning (SoTL), particularly through literature on soft outcomes. In comparison to hard outcomes like grades or completing a degree, soft outcomes capture student advancement toward the goals of a particular course and can include interpersonal, organizational, and internal development. Ultimately, we conclude that our course promotes students' progress toward soft outcomes through their relationships with their project sponsors, instructors, and teammates. Our findings emphasize the importance of fostering students' social, emotional, and personal growth and suggest that the students who might be perceived as low-achieving can still advance as much on their learning journey as the ones who would be traditionally lauded as high-achieving. We align our findings with scholarship that investigates students' emotional growth and wellbeing, which can be difficult amidst pedagogy, research, and government policy that define the value of post-secondary education primarily in terms of its ability to prepare students for the job market. This paper reframes what being a successful student means, contributes to a wider body of research on soft outcomes, and provides valuable insight for educators and researchers who are invested in students' engagement.

KEYWORDS

soft outcomes, soft skills, polytechnic, capstone

INTRODUCTION

In this paper, we analyze student feedback on the capstone course in the bachelor of technology program (BTech) at Northern Alberta Institute of Technology (NAIT) in order to describe how the class and its instructors facilitate students' growth on a personal and academic level. The function of capstone courses can vary, but in ours, students address problems provided by sponsors, with the guidance of faculty advisors. We position our capstone course as a case study for valuing "soft outcomes" over "hard outcomes" as markers of student success. Hard outcomes include standardized criteria like grades, which are meaningful on an institutional level but can obscure the

more holistic soft outcomes (Zepke 2018; Zepke and Leach 2018). Soft outcomes provide a more complex model of progress by centering the "distance traveled" by a particular student toward course goals (Barkley and Major 2020; Dewson et al. 2000; Zepke 2018; Zepke and Leach 2010b). We align our research with scholarship on students' wellbeing and the role of emotions in academia more broadly, topics that are too often overlooked in an increasingly neoliberal world.

Below, we review SoTL literature to emphasize the importance of student emotions and soft outcomes, provide an overview of our capstone structure, and detail the methodology for collecting and analyzing student feedback. We explore how their experience is shaped by working with a team, sponsors, and faculty advisors and highlight their process of maturation. The paper concludes with recommendations to implement findings into future instances of the capstone course.

LITERATURE REVIEW

SoTL has provided insight into the significant differences between hard and soft outcomes and called attention to and research into the latter. As Zepke and Leach (2010b) argue, there is often an over emphasis on hard outcomes that do not give a complete picture of student learning experiences (662). Hard outcomes can be grades, program/course completion, or other ways for government, post-secondary institutes, and society to measure whether individuals have achieved certain academic standards (Zepke 2018; Zepke and Leach 2018). Yet soft outcomes can provide a more nuanced understanding of student progress (Dewson et al. 2000). In their analysis of extant scholarship on soft outcomes, Zepke and Leach (2010b) state it measures success as "the distance travelled by learners toward programme goals rather than their final achievement" and considers learners' own perception of their progress (662). What this means depends on the individual and the program, but soft outcomes can include interpersonal, organizational, analytical, and personal skills (Dewson et al. 2000). Students' investment in their learning can also indicate "distance travelled" (Barkley 2020; Zepke 2018; Zepke and Leach 2010b). Soft outcomes might not seem significant in comparison to something like completing a course, "but for certain individuals the leap forward in achieving these outcomes is immense" (Dewson et al. 2000). There are many methods of capturing a student's perception of progress, such as reflection writing (Dewson et al. 2000; Schinske and Tanner 2014; Stommel 2020; Quinlan 2016). In our case, student interviews and surveys provided valuable insight into the development of their social, personal, organizational, or analytical skills.

In analyzing feedback, we explored students' emotional experiences, which are too often dismissed as pedagogically unimportant. Emotions have historically been overlooked in SoTL (Quinlan 2016). In recent decades, scholarship has increasingly investigated emotions within higher education, including through feminist, sociological, and psychological lenses in order to foster positive outcomes, such as pride, in students (Knupsky and Caballero 2020; Quinlan 2016; Tormey 2021), and to provide strategies for promoting their wellbeing (Yorke 1999; Zepke, Leach, and Prebble 2006). These are worthy goals, but scholars have also argued that we cannot and, in some cases should not, eradicate negative emotions. Frustration and discomfort are often present as students navigate challenging ideas, work through difficult sections of a course, or engage in transformative learning (Alexander 2012; Barkley 2020; Knupsky and Caballero 2020; Mason 2021; Quinlan 2016). In this paper, we looked for moments of growth toward soft outcomes in students' positive and negative emotions, and for what we can learn from them in turn.

We also analyzed students' individual experiences and how this emotion arose and was processed socially (Knupsky and Caballero 2020). In her discussion of "affect," or the critical study of feelings, Quinlan (2016) notes that much of the psychological scholarship on affect in the classroom interprets it as private and in need of management. In contrast, she argues that "education is

relational, and emotions are central to relationships" and that those relationships "are vital to the learning process in higher education" (Quinlan 2016, 102). Chinn (2012) similarly affirms that students "learn to feel" about their academic experiences through their connections with peers, parents, and other communities (15). Being attentive to this social context allows educators to gain a deeper understanding of key dynamics for student learning (Quinlan 2016). In this paper, we studied the relationships students formed with their sponsors, faculty advisors, and teams, and how they connect to soft outcomes, engagement, and emotional experiences.

As Knupsky and Caballero (2020) state, "Affect in the classroom is not new, nor is the study of it. But the impact of this affect on students and instructors has become an issue that higher education can no longer afford to ignore" (116). COVID-19 has made teaching and learning more challenging, not to mention the impacts of the pandemic on people's mental and physical health. Global issues like economic depressions, climate change, and the Russian invasion of Ukraine can cause additional stress, and more locally in Alberta, many post-secondary institutes have raised tuition (Anchan 2022; Patterson et al. 2021). Within this context, there is more reason than ever to study the emotional experiences of students and apply lessons learned.

By celebrating students' messy progress, this paper contrasts much of the culture at our own and other post-secondary institutions. NAIT is a polytechnic that was founded in 1962 to offer vocational and apprenticeship training, and that remains a key part of its focus (History – NAIT). For example, in the "Vision and Promises" section of its website the first "quick fact" it offers is "90% employment rate within 9 months of graduating," positioning employment as an essential part of its brand (Quick Facts—NAIT). Scholarship on polytechnics can similarly define them as valuable because they act as a bridge to a career (e.g. Amankwah 2011; Brown [2011] 2012; Effah et al. 2014; Pontillas 2018; Suarta et al. 2020). Even researchers who promote soft skills often do so by arguing that they are essential to securing jobs (e.g. Brown 2011–2012; Esa et al. 2015; Loquias 2015; Ojonugwa et al. 2015; Rahmat, Ayub, and Buntat 2016; Zainuddin and Abd Aziz 2012). This understanding of polytechnics is likely rooted in its history of vocational training, but it can also be seen as part of a neoliberal ideology in which knowledge is only seen as pedagogically important if it has proven useful in the marketplace (Quinlan 2016; Zepke and Leach 2018). Recent decades have witnessed the increasing marketization of higher education in Canada and globally through, for example, the commercialization of research, the blurring of boundaries between academia and industry, and the positioning of teaching and learning as an extension of capitalism (Fisher, Metcalfe, and Field 2016; Quinlan 2016). For many members of government, researchers, and educators, an alumni's ability to acquire jobs becomes a hard outcome that indicates their success and the quality of their education. Our own provincial government laid out its educational strategy in *Alberta 2030: Building Skills for Jobs*, the name signifying its neoliberal approach (Alberta Advanced Education 2021). *Alberta 2030* emphasizes work-integrated learning for all students and creating "a parity of esteem between trades and academic learning" (23). The provincial government has also implemented performance-based funding, which links funding for post-secondary institutions to their ability to commercialize research and to their post-graduate employment rate, amongst other criteria (Adkin 2021).

Locally and internationally, we see an increasingly neoliberal approach to education and an attempt to use market values as criteria through which to measure success. This trend can also inform the kind of pedagogical studies that are conducted, since researchers, educators and learners who adhere to the neoliberal understanding of education are likely to value scholarship that does the same (Zepke and Leach 2018). Within this context, academic "discussions about intangibles such as emotions and relationships are often sidelined," as Quinlan (2016) notes (108). Yet we would also affirm Quinlan's further observation that, regardless of the current milieu, it is always worthwhile to

foster students' progress toward soft outcomes. We are aligning this paper with extant research that investigates the emotional development of polytechnic students and examines the connection between self-esteem, mental health, and academic performance (e.g. Akinleke 2012; Coker et al. 2019; Ojonugwa et al. 2015; Omar, Jain, and Noordin 2013). Alongside this scholarship, we are not focused on how our capstone course might turn students into better employees, but instead on how the distance they traveled is valuable for students, educators, and researchers.

Next, we provide an overview of our capstone course in comparison with similar offerings elsewhere in the world.

CAPSTONE COURSE OVERVIEW

Capstone courses can have different meanings in different disciplines, institutions, and countries, such as a master-degree thesis work in Sweden or a final-year undergraduate project course in the USA, Australia (Adams et al. 2003), and Canada (Schramm and Chan 2013). The common themes are the student-centered approach (Adams et al. 2003; Schramm and Chan 2013) and valuing the student learning experience (Schramm and Chan 2013). Our capstone course is part of a four-year undergraduate degree program typical in Canada (Schramm and Chan 2013). It closely resembles the "directed" model, one of the four main ones used in Australia, which includes specific client deliverables, extensive support through the teacher, and scheduled classes (Adams et al. 2003). Our capstone course is a six-credit, two-semester long course with defined sponsor deliverables, faculty advisors (including the authors of this paper), and regular meetings for students to update the advisors on their progress. Our advisors provide guidance and mentorship, but do not participate in developing the solution as instructors do in the directed model (Adams et al. 2003). The sponsors come from industry, community, and non-profit organizations, and their needs are varied; students may be asked to build a prototype or implement marketing strategies, for example. Students are grouped into three- or four-member teams with diverse educational and professional backgrounds. In addition to a final report and presentation, teams are required to present their work to peers and advisors every semester. We advisors employ active learning strategies such as experiential, collaborative, and problem-based learning, with the aim to nurture student engagement (Barkley 2020). Engagement can also be promoted through academic challenge, enriching educational experiences, and students feeling supported (Barkley 2020; Bryson 2014; Zepke and Leach 2018). It is often linked to success through increased participation, higher levels of course completions, employment post-graduation, and commitment to lifelong learning (Barkley 2020; Zepke and Leach 2010a). As we discuss in more detail below, student engagement is also one way to facilitate their advancement toward soft outcomes.

METHODOLOGY

A case study approach was adopted to investigate students' experiences with the capstone course within the BTech. Unlike action research that involves resolution of a specific problem (Dresch, Lacerda, and Miguel 2015), the goal was to capture the eight-month long capstone journey of students and to deduce feedback for course improvement. Both individual and group interviews were used in collecting feedback. Open-ended questions were asked to capture students' course experiences and overall journey throughout the degree. The questions were stop, start, and continue types (Hoon, Oliver, and Newton 2015), investigating what worked and what did not. A researcher funded by the Natural Sciences and Engineering Research Council of Canada (NSERC) grant worked with a capstone instructor to develop the questions, with the authors of this paper reviewing them and providing input. The researcher was the sole conductor of feedback sessions in order to provide a safe

environment for students. The authors analyzed the responses to identify the themes discussed below.

The researcher emailed requests for feedback from students just finishing the capstone course at the end of August 2021 and April 2022 (a total of 109 students). In response, 27% of students participated in two one-hour video meetings. Participants could convey their answers both orally and through pollev.com.

The researcher also contacted 16 alumni who finished the program within the previous 18 months and conducted one-on-one interviews through video meetings. Capstone instructors suggested alumni who they hoped would provide a holistic understanding of different experiences with team dynamics, progress toward the course goals, and personal growth. Though instructor bias could not be eliminated from the selection, the intention was to increase the probability of participation and consider the alumni's track record of engagement in the capstone course and their willingness to improve the program. Hence, this was a case of purposive sampling (Saunders and Lewis 2012). In total, five out of the 16 alumni volunteered for the interviews. In addition to the group and individual sessions, four out of a total of 26 capstone teams in April 2022 that performed the highest academically were also interviewed.

The data collection and publication of this study's results is part of an ongoing quality assurance and improvement initiative and, therefore, did not require a formal ethics application according to Article 2.5 of the Tri-Council Policy Statement by the Interagency Advisory Panel on Research Ethics in Canada (TCPS 2 2022).

RESULTS

While analyzing the data, the researchers focused on student experience regarding soft outcomes previously noted in this capstone course. Researchers looked for stories and events relating to meaningful communication, teamwork, management of conflict, adaptability and resilience, decision making, creativity and problem solving, and the application of research. Keeping these themes in mind and focusing on the soft outcomes, we presented the findings from the analysis that relate to the following themes in this paper:

a) learning opportunity from having real-world sponsors providing real problems to solve,
b) growth of student-instructor relationship throughout the course, and
c) role of team dynamics in making or breaking a team.

For brevity, we excluded from our analysis other themes including student leadership, the value of the BTech degree, and the role of diversity in team dynamics. In our next sections, we discuss the primary themes of interest for this study.

Real-world sponsors: Independence, inner growth, and contributing to community

Unlike some capstone courses, such as the capstone course at Massachusetts Institute of Technology ("Capstone project" n.d.b, "Capstone project" n.d.b., Sirotiak and Sharma 2019), ours has external projects sponsored by individuals and/or organizations. Though there is value to courses that use hypothetical case studies, sponsors can foster student progress toward soft outcomes. We structure the course so that students are the primary liaisons with the sponsors, which enables them to develop relationships with their sponsors and report back to their instructors, improving organizational and communication skills (Zepke and Leach 2010b). For instance, one student commented that it was a "really valuable experience" to learn "how to communicate between different parties, my teammates and sponsors and my advisors." Another praised their sponsor's "openness and trust in our ability" and declared, "Although I am an introvert, I . . . hope to keep in

touch with the sponsor." This student was able to overcome social barriers, at least momentarily, to form a bond, signifying both personal and interpersonal growth. Another interviewee commented that they had received "good feedback" from the sponsor and had been "invited to work with them in the future." This relationship could also prove valuable, since COVID-19 and economic depressions have made it difficult for many people to secure employment (Sharone 2021). By positioning students as the liaisons, we also foster independence and confidence, which feeds into engagement and success; students who feel confident in their own abilities are often motivated to progress even in the face of minor failures (Zepke and Leach 2010a; Zepke and Leach 2010b). The sponsor does not tell them what to do, and students must carry out research, analysis, testing, and prototyping to determine the issue and the best ways of addressing it. Faculty provide guidance, but we also emphasize that they are responsible for this work. As one student said, they are "learning by being thrown into the project," which this individual found "very valuable." Another interviewee identified the kinds of challenges we set as productive: "Our capstone advisors were very available and provided a lot of wonderful insight . . . but at the same time, they're very just hands off . . . and that whole communication structure works really, really well." The respondents experienced the kinds of engagement and proactiveness we want to see when we entrust students to work independently.

Other students noted undergoing internal growth beyond developing confidence or independence. One team analyzed which communities would benefit most from trees being planted in their area. A student from this team confessed that they initially thought, "how are we ever going to make an impact in the community with a couple trees . . . we're not going to accomplish anything." The student's words reflect common emotions experienced by people wanting to "solve" social issues, many of whom feel overwhelmed by the scale of the problems (Cunsolo et al. 2020). When the team began collaborating with schools, the student realized "these small organizations *can* make a difference and we can actually be involved," which helped move them from "a raging pessimist . . . to a bit more . . . enlightened." This interviewee's strengthened belief in local organizations and their journey to becoming a "bit more enlightened" will likely inform any work they do on these issues in the future. Other students similarly connected their individual growth to the knowledge that they had contributed meaningfully to the real world. For example, one declared, "The best part is about building self-esteem. . . we've done something amazing . . . we actually built something to help our community . . . Capstone gave me the opportunity to discover my potential." This student took pride in crafting the technology their sponsor had requested.

Even students who were less successful in their deliverables may still have met soft outcomes. Another interviewee worried that her sponsor may not adopt the prototype and was "so mad" about getting a lower grade. When we assign grades to assignments, we consider the extent to which the students addressed sponsors' needs. Like other hard outcomes, grades verify that learners successfully achieved specific goals (Zepke and Leach 2018). For students, lower than expected grades can dampen motivation, heighten competitiveness, and engender fear of the shame associated with low grades, which has led many instructors to implement "ungrading" strategies (Blum 2017; Inoue 2017; Kohn 2011; Schinske and Tanner 2014; Sorens 2020; Stommel 2020). This interviewee was likely undergoing some of the uncomfortable emotions that go along with receiving a low grade, yet also affirmed, "we might not have got it done in time, [it] might not have met their needs . . . but . . . this doesn't change what we learned." She also expressed hope that other students might similarly value "the process." Despite frustrations over the grade, this student demonstrated maturity in focusing on the distance traveled, something learners and educators should value more.

The fact that we solicit real projects enables students to work toward soft outcomes and to make meaningful contributions to their communities. There are also higher stakes with real projects,

since there is an external individual and/or organization relying on them, which is partly why capstone instructors replace lectures with guidance to help the team align their actions with the project goals. This guidance also brings another crucial aspect of learning under the microscope: the student-instructor relationship.

Student-instructor relationships: Community, trust, and collaborative learning

SoTL suggests that students want their instructors to challenge them, but they also want caring environments, which can come in many forms such as clear communication and active listening, and instructors who create opportunities for positive interactions (Quinlan 2016). Both can foster a more productive student-instructor relationship, which can promote learning, engagement, and motivation, and help with student retention (Hagenauer and Volet 2014; Quinlan 2016; Tormey 2021).

In our capstone course, we set high standards for students as they complete complex tasks independently and in consultation with the sponsor. Some students find the transition to this self-directed style difficult. One student stated, "it was hard, we struggled because of the lack of structure." Most classrooms still rely primarily on lecturing, and some of our students may feel discomfort in moving away from passively absorbing information (Barkley 2020; Bok 2009). It is also worth mentioning that many of the teams who initially found this transition difficult eventually rose to the occasion, as we discuss below. Finally, as with any major final project, students are likely to feel some anxiety or exhaustion; one mentioned needing to take additional time off during winter break, and another recalled "stress eating and losing sleep." It is fair to say that we push our students to move outside of their comfort zones and to do difficult work.

At the same time, the instructors put a lot of care into the course. Our bi-weekly meetings generally consist of two faculty advisors and a team of three to four students, which makes room for more meaningful mentorship and deeper student-instructor relationships (Alexander 2012). With this small number of students, it is more possible for us to practice the traits that students often associate with approachable instructors, such as knowing something about their background or being sensitive to their needs (Denzine and Pulos 2000). We can become "friendly . . . but not a friend" (Sibii 2010, 531). Students are more likely to express their personal opinions with friendly instructors, which is important in meetings that determine the shape of their project (Zepke and Leach 2010a).

The fact that we co-teach the capstone course enables us to further develop this friendly dynamic; as Lock et al. (2018) note, co-teaching can have meaningful impacts for both learners and educators. Co-teaching requires us "to work with each other . . . and to be responsive to each other and to the learning environment" (Lock et al. 2018, 29). Working together to create things like the syllabus can help develop trust and respect, which is essential when more complex issues arise. Finally, instructors for our capstone course come from diverse backgrounds in terms of ethnicity, nationality, gender, and/or expertise, allowing us to provide varied perspectives on the projects and to model working with diverse teammates (Laughlin, Nelson, and Donaldson 2011, 11–12).

We can also leverage those interpersonal dynamics through humor and vulnerability. In biweekly meetings we co-teachers often tease each other about our idiosyncrasies or tell stories from our own lives, such as about our own difficulties doing research. We are going against the pedagogical culture that says that educators should not share any personal experiences, but Quinlan (2016) calls for questioning those norms and considering when "might personal disclosure help to build trust with a class" (109). In the capstone course, we have seen returns on this strategy. One student affirmed that we were "open and easy to talk to," and another described their faculty advisors as "friendly and warm-hearted." On a more anecdotal level, capstone students often become comfortable enough to

joke with us or call us by our first names, which can help with anxiety about speaking to authority figures. Opening up to students can also foster a sense of belonging, something many students search for at post-secondaries and that can contribute to engagement and success (Zepke and Leach 2010b). During and after COVID-19 isolation and loneliness increased, and that sense of belonging can be all the more valuable (Hagenauer and Volet 2014; Knupsky and Caballero 2020; Patterson et al. 2021; Quinlan 2016).

We further build those student-instructor bonds through collaboration. As previously stated, much of the course time is dedicated to meetings where teams update us on their progress and solicit feedback, enabling students to co-create class content. This kind of collaboration is an active learning technique, which is connected to engagement, motivation and retention levels (Barkley 2020; Bok 2009). Additionally, we are pushing toward soft outcomes like better organizational and social skills in these meetings (Dewson et al. 2000). One interviewee recalled that initially during these meetings the team was "super nervous and . . . intimidated. We didn't know how to present ourselves." As the course developed, the student began to take on a leadership role and worked on factors like "good [team] chemistry, good communication." Leading a capstone course where we co-create the course material can also help with student and instructor engagement. Research has found that courses are more exciting when students and instructors are both making new discoveries about a topic, which often happens in this capstone course since teams become experts on their topic and educate us (Quinlan 2016). Students move from consuming to producing knowledge, and they may perceive us as more approachable since we become learners like them (Zepke and Leach 2018).

These pedagogical strategies help build what one student labeled a "community." This student was interviewed about her experience after graduating and described the relationship between the instructors and team as "open . . . You get a sense of support . . . [and] a community . . . you can just have mistakes and not be afraid of [it]." This was particularly important "when you're coming to Canada as a new student," the interviewee stated. International students like this one can face culture shock, isolation, and difficulties using English as an additional language if they are not native speakers (Mori 2000). This student directly linked her capstone experience to her maturation: "it helped me a lot. [It helped me] gai[n] confidence to join the industry immediately after I graduated from the program." This description shows a student who is engaged, motivated, and ready to move into her career, a transition that can be hard for international students (Nunes and Arthur 2013). This example demonstrates how instructors challenging and caring for students can pay off.

Student-instructor relationships also shape another vital part of the capstone project: teamwork, which can make or break a group. However, teamwork's challenges can also foster productive growth.

Team dynamics: The value of the "difficult" team member

Previous research has demonstrated the value of group work, which can promote a sense of belonging similar to that of the student-instructor relationship (Zepke and Leach 2010a). One interviewee described their team as "really supportive and understanding," including when they had scheduling conflicts. Another commented that they "met some great people . . . so I'm sure looking back years from now I will reminisce about those times." This feedback suggests that students developed true bonds, and such feelings of community and trust often enable student engagement (Zepke and Leach 2010b).

Yet we also had the most mixed responses from interviewees about their teams. Though we had students who expressed nothing but appreciation for their "cooperative" and "organized" teammates, we had others who had good and bad things to say about theirs, such as a student who

said their "group dynamic was okay, but [a couple of] team members were not self-starters." Still, other respondents primarily expressed frustration or disappointment. One student said, "I had to drag our team through some of the activities," while others complained about "procrastination," "lack of participation," or missed deadlines. This negative feedback on teammates can be worrying, but it is important to remember that students often bring outside struggles into the classroom. Many of the stressors in students' lives come from factors like finances, caring for dependents, and the demands of their work (Zepke and Leach 2010a). While systemic improvements can be made, such as implementing food banks or daycares (Cox and Strange 2010; Zepke and Leach 2018), students will continue to experience stressors in their personal lives that they bring into group projects, and the root causes might not be visible to their teammates. As Knupsky and Caballero (2020) argue, people constantly guess at others' thoughts and feelings, but the conclusions we make are often inaccurate (109). An interviewee who complained about "how little my original teammates cared about the project, about school altogether, and about their teammates" might have recognized a real flaw or might have misinterpreted an individual's motivations. One opportunity for improvement could be collaborating with instructors of another course in our program entitled Mindfulness at Work, which teaches active listening, empathy, and emotional regulation, and drawing some of their lessons into the capstone course (NAIT). One interviewee who took Mindfulness at Work declared, "that has made a great impact on my life," which suggests that the acquired "excellent skill[s]" may benefit our other students as well.

While some of our interviewees were upset with teammates that they perceived as difficult, others saw that experience as valuable. One student commented, "that's the way it is at work. Learning how to deal with that is probably a good thing." Another was similarly in favor of students navigating their own team dynamic issues: "In the real world, that's exactly what they do. They go to . . . their director . . . But in the long run, they have to figure it out." Many people will indeed have to collaborate with individuals who they find frustrating or stressful (a real skill). The challenge for instructors is to determine when interpersonal friction is an opportunity for individuals to develop those interpersonal soft outcomes and when it is indicative of deeper problems within a team. We instructors work to create productive teams by getting students to analyze the roles they take on in groups, create a team charter, and regularly submit peer evaluations. When recurring issues do appear, we encourage direct communication between the relevant parties, strategize on ways to improve team dynamics, and, as a last resort, might split the team. These processes enable us to monitor potential problems while also promoting growth.

We can see many students developing interpersonal, analytical, and organizational skills through teamwork even as they criticized group members (Dewson et al. 2000). One student affirmed that they "learned how to deal with [a] team and solve conflict," and another one said more expansively that "the team seems to feel too attached to their work [so they] constantly ran into the same critique from the instructor . . . It took a lot of effort to convince them that a change is needed." Individuals who see constructive criticism as an attack are part of a wider discussion about getting students to use feedback (Schinske and Tanner 2014). This interviewee must have adopted problem-solving and interpersonal strategies to persuade her teammates and to foster their growth when they were clearly not motivated by faculty advisors, affirming that peer relationships can be key to student engagement (Hagenauer and Volet 2014; Zepke and Leach 2010a).

Whereas the above student primarily described her teammates' maturation, other interviewees linked their team dynamics to their own internal development. For instance, one student confessed to being timid prior to the capstone course, but becoming a leader within it, and said their "project didn't get going at all" and they had to have a lot of "forbearance" with teammates and start

some "uncomfortable" conversations. The student reflected that this was made more difficult by the fact that everyone came from "different cultures," but these conversations bore fruit; according to the student, "then it clicked" and "[I started to] love these guys. Because we had that almost mystical moment. After that . . . we were all like one unit." Though the student did not expand on this "mystical moment," the story highlights the effectiveness of strategies like patience, taking on new roles, and caring across cultural differences. For some scholars, the latter outcome is a key reason to promote group learning in the hopes that it mitigates bias (Bok 2009; Laughlin et al. 2011; Zepke and Leach 2010b). This student traveled interpersonal distances and "accomplished something on an inner level with the capstone project."

Even with the teams we ultimately split due to internal issues, there can still be important lessons learned. With one team of three students, the faculty advisors and sponsor noted that they were struggling with communication and achieving project goals. The advisor and sponsor went through the steps we usually take to support teams like this, which we discussed above, but two members continued to perform poorly, so they decided to put them in a group on their own. We hoped that this would motivate the group of two to step up and would free up the more productive student. All of them struggled even after the split, but the solo student rose to the challenge and became more invested in the project. Later, the solo student affirmed that she initially had not wanted "do it by [herself]" but that after we split the teams, "I have no choice. I realized that I had the ability. It really boosts my confidence." She went on to say that confidence has been helpful in her work life as well. In the capstone course, her assignments and deliverables remained weaker than other teams', but she proved capable of carrying out a long-term project by herself and ranked her capstone experience as excellent. If we were only eyeing hard outcomes, we could see this as a group who failed to reach their goals. By traditional standards, we might dismiss this group as dysfunctional, especially since the sponsor confessed that she was often frustrated with the team's performance, which is a legitimate concern for us since we often want to retain sponsors for future semesters. Yet those factors do not negate this individual student's personal growth or the distance that she traveled within this course.

CONCLUSION

The intent of this paper was to investigate student growth on a personal and academic level, which challenges a larger context that takes an increasingly neoliberal approach to post-secondary education. We have drawn on SoTL to analyze student feedback on our capstone course gathered over two years. By identifying and examining major emerging themes, we have demonstrated the value of soft outcomes to students and instructors who, we have argued, should recognize and celebrate growth regardless of hard outcomes like grades (Dewson et al. 2000; Zepke 2018; Zepke and Leach 2010b; Zepke and Leach 2018). In our sections on student struggles with the course, their teammates, and their own limitations, we established that negative emotional experiences can be just as productive as their positive ones (Alexander 2012; Barkley 2020; Knupsky and Caballero 2020; Mason 2021; Quinlan 2016). By exploring students' relationship with instructors, teammates, and sponsors, we have aligned with research that concludes that emotions are processed socially and not just individually (Chin 2012; Quinlan 2016; Knupsky and Caballero 2020). Finally, our findings confirmed the legitimacy and necessity of researchers investigating soft outcomes and student experiences, especially in a time that increasingly sees post-secondary education as primarily valuable for its ability to ready students for the workplace (Akinleke 2012; Coker et al. 2019; Ojonugwa et al. 2015; Omar, Jain, and Noordin 2013; Quinlan 2016; Zepke and Leach 2018).

As this paper demonstrates, studying feedback from students on the capstone course has proven valuable for us as educators and researchers. The outgoing capstone students provided insight on this important course and on one of our key stakeholders: students. Though our institution mandates formal evaluations, capstone students rarely provide responses beyond the numerical ratings, and the standardized questions do not delve into topics like personal growth. Studies such as this allow us to gain a more complex understanding of the student experience and to share our findings with fellow instructors. The themes discussed in our results provide useful directions on areas to maintain and improve. We should keep striving for real-world projects with problems to solve that are aligned with students' skill sets. Through facilitating a safe and engaging environment for student-instructor encounters, student growth and confidence can be nurtured more effectively. The inherent challenges of group work are not going away anytime soon. Hence, we will continue to hone students' interpersonal skills by positioning them in groups. Experiences from the capstone team dynamics may serves as a useful baseline that students can build upon in their next venture.

In addition to continuing things that are proving useful, changes we plan to implement based on our research and findings are:

I) Encouraging capstone students to share with their peers the wisdom gained from their personal, social, and emotional journeys.
II) Implementing reflection exercises for students, which can promote metacognitive thinking and give instructors better insight. Students can hopefully use reflections as a self-assessment tool to gauge their own progress toward soft outcomes.
III) Retaining lists of students whose capstone journey showed significant development toward soft outcomes, so they can mentor future students and share experiences with faculty.
IV) Inviting teams that demonstrated significant progress toward soft outcomes to present at the Capstone Symposium, an event that currently celebrates only the highest-scoring teams. Such changes can assure incoming students that letter grades and a pat on the back from the sponsor are not the only rewards in this course.

The importance of this paper is in making space for non-linear progress, identifying the ways our capstone course has fostered students' maturation and emphasizing the value of emotional struggles and growth in pedagogy. Our hope is to further explore student experience and soft outcomes and to prepare students with tools and attitudes required to succeed as future leaders. To take this to the next level, the authors of this paper are embarking on a new project intended to track and analyze the implementation of the recommendations from this paper. In addition, we intend to investigate in future student feedback several interesting themes that emerged from this work, but that we could not pursue in this paper for brevity.

ACKNOWLEDGEMENTS

The authors of this paper are grateful to NSERC and Alberta Innovates for their support, Ms. Sheremeta for data collection, and Ms. Sheremeta and Dr. Dobson for providing invaluable comments and guidance. Ms. Sheremeta's research was supported by the NSERC College and Community Social Innovation Fund Award held by NAIT. Capstone student teams were supported by an Alberta Innovates ISEE Award. Finally, we wish to acknowledge Dr. Varughese's collegiality and his dedication to the capstone course.

AUTHOR BIOGRAPHIES

Clare Mulcahy (CAN) is an instructor in the bachelor of technology program at the JR Shaw School of Business, Northern Alberta Institute of Technology. She holds PhD and master degrees in English from University of Alberta.

Ashique Khan (CAN) is an instructor in the bachelor of technology program at the JR Shaw School of Business, Northern Alberta Institute of Technology. Dr. Khan received his PhD in mechanical engineering from the University of Alberta.

REFERENCES

Adams, Liz, Mats Daniels, Annegret Goold, Orit Hazzan, Kathy Lynch, and Ian Newman. 2003. "Challenges In Teaching Capstone Courses." *SIGCSE Bulletin* 35 (3): 219–20. https://doi.org/10.1145/961290.961575.

Adkin, Laurie. 2022. "Retelling the Story of the UCP Government's Budget and its Meaning for Post-Secondary Education in Alberta." Accessed November 11, 2022. https://www.parklandinstitute.ca/retelling_the_story_of_the_ucp_governments_budget.

Alberta Advanced Education. 2021. "Alberta 2030: Building Skills for Jobs." Accessed October 2, 2022. https://open.alberta.ca/dataset/24e31942-e84b-4298-a82c-713b0a272604/resource/b5a2072e-8872-45f9-b84d-784d0e98c732/download/ae-alberta-2030-building-skills-for-jobs-10-year-strategy-post-secondary-education-2021-04.pdf.

Alexander, Kaelin B. C. 2012. "Teaching Discomfort? Uncomfortable Attachments, Ambivalent Identifications." *Transformations: The Journal of Inclusive Scholarship and Pedagogy* 22 (2): 57–71.

Akinleke, Olaitan. 2012. "An Investigation of the Relationship Between Test Anxiety, Self-esteem and Academic Performance Among Polytechnic Students in Nigeria." *International Journal of Computer Applications* 51 (1): 47–50. https://doi.org/10.5120/8010-1376.

Amankwah, Emmanuel. 2011. "Relevance of Competency Based Training in Polytechnic Education for National Development." *Journal of Education and Practice* 2 (7): 11–22.

Anchan, Mrinali. 2022. "Alberta Government Urged to Regulate Tuition Increases for International Students." Last modified July 17, 2022. https://www.cbc.ca/news/canada/edmonton/alberta-international-student-tuition-fees-1.6518373#:~:text=At%20the%20University%20of%20Alberta,most%20art%20and%20science%20degrees.

Barkley, Elizabeth F., and Claire H. Major. 2020. *Student Engagement Techniques: A Handbook for College Faculty*. John Wiley & Sons.

Blum, Susan. 2017. "Ungrading." Accessed October 2, 2022. https://www.insidehighered.com/advice/2017/11/14/significant-learning-benefits-getting-rid-grades-essay.

Bok, Derek. 2009. *Our Underachieving Colleges: A Candid Look at How Much Students Learn and Why They Should Be Learning More - New Edition*. Princeton, NJ: Princeton University Press.

Brown, Jan. 2011–2012. "Context Does Matter: The Role of Context in Programme Planning and Delivery." *TE IARERE WAVELENGTH* 5 (Summer).

Bryson, Colin. 2014. "Clarifying the Concept of Student Engagement." In *Understanding and Developing Student Engagement,* 21–42. Abingdon, UK: Routledge.

"Capstone Project." University of Alberta International. Accessed September 16, 2022. https://www.ualberta.ca/international/global-education/certificate-international-learning/capstone-project.html.

"Capstone Project." Schell Center for International Human Rights. Accessed September 16, 2022. https://law.yale.edu/schell/undergraduate-program/scholars-program/capstone-projects.

Chinn, Sarah E. 2012. "Once More with Feeling: Pedagogy, Affect, Transformation." *Transformations: The Journal of Inclusive Scholarship and Pedagogy* 22 (2): 15–20. https://doi.org/10.5325/trajincschped.22.2.0015.

Coker, Ayodele Olurotimi, Hannah Iyabo Okunrinboye, A. O. Adesokan, and Joachim Azegbeobor. 2019. "Depression, Anxiety, Stress and Self-Esteem Among Students in Owo, Southwest, Nigeria." *Nigerian Medical Practitioner* 75 (4–6): 48–53. https://www.ajol.info/index.php/nmp/article/view/187562.

Cox, Donna Hardy, and C. Carney Strange. 2010. *Achieving Student Success: Effective Student Services in Canadian Higher Education*. Montreal, Canadian Electronic Library.

Cunsolo, Ashlee, Sherilee L. Harper, Kelton Minor, Katie Hayes, Kimberly G. Williams, and Courtney Howard. 2020. "Ecological Grief and Anxiety: The Start of a Healthy Response to Climate Change?" *The Lancet Planetary Health* 4 (7): e261–63. https://doi.org/10.1016/S2542-5196(20)30144-3.

Denzine, Gypsy M., and Steven Pulos. 2000. "College Students' Perceptions of Faculty Approachability." *Educational Research Quarterly* 24 (1): 56.

Department of Mechanical Engineering. 2018. "M.Eng. Capstone Project Guidelines." Accessed September 16, 2022. https://www.ualberta.ca/engineering/media-library/dept-mechanical-engineering/graduate/mengcapstonev4.pdf.

Dewson, Sara, Judith Eccles, Nii Djan Tackey, and Annabel Jackson. 2000. "Guide to Measuring Soft Outcomes and Distance Travelled." Brighton, UK: Institute for Employment Studies.https://library.uniteddiversity.coop/Measuring_Progress_and_Eco_Footprinting/Softoutcomesanddistancetravelled.pdf.

Dresch, Aline, Daniel Pacheco Lacerda, and Paulo Augusto Cauchick Miguel. 2015. "A Distinctive Analysis of Case Study, Action Research, and Design Science Research." *Revista Brasileira de Gestão de Negócios* 17: 1116–33.

Effah, Bernard, Ernest Boampong, George Adu, Rogerson Anokye, and Jack Nti Asamoah. 2014. "Issues of the Industrial Training Programme of Polytechnics in Ghana: The Case of Kumasi Polytechnic." *Journal of Education and Practice* 5 (5): 39–46.

Esa, Ahmad, Suhaili Padil, Asri Selamat, and Mohammad Talha Mohamed Idris. 2015. "So STEM Model Development for Application of Soft Skills to Engineering Students at Malaysian Polytechnics." *International Education Studies* 8 (11): 204–10.

Fisher, Donald, Amy Scott Metcalfe, and Cynthia Field. 2016. "The Structural Force Exerted by Marketization on Higher Education Systems, Research Universities and Academic Researchers." In *Routledge Handbook of the Sociology of Higher Education*, 63–73. Routledge.

Government of Canada, Interagency Advisory Panel on Research Ethics. 2023. "TCPS 2 (2022) – Chapter 2: Scope and Approach." Accessed November 9, 2023. https://ethics.gc.ca/eng/tcps2-eptc2_2022_chapter2-chapitre2.html.

Hagenauer, Gerda, and Simone E. Volet. 2014. "Teacher–Student Relationship at University: An Important Yet Under-Researched Field." *Oxford Review of Education* 40 (3): 370–88. https://doi.org/10.1080/03054985.2014.921613.

"History." NAIT. Accessed September 15, 2022. https://www.nait.ca/nait/about/our-vision/history.

Hoon, Alice, Emily Oliver, and Philip Newton. 2015. "Use of the 'Stop, Start, Continue' Method is Associated with the Production of Constructive Qualitative Feedback by Students in Higher Education." *Assessment and Evaluation in Higher Education* 40 (5): 755–67. https://doi.org/10.1080/02602938.2014.956282.

Inoue, Asao B. 2017. "A Social Justice Framework for Anti-Racist Writing Assessment: Labor-Based Grading Contracts." Accessed September 15, 2022.

Knupsky, Aimee, and M. Soledad Caballero. 2020. "Do We Know What They Are Thinking? Theory of Mind and Affect in the Classroom." *Teaching & Learning Inquiry* 8 (1): 108–21. https://doi.org/10.20343/teachlearninqu.8.1.8.

Kohn, Alfie. 2011. "The Case Against Grades." Accessed October 2, 2022. https://www.alfiekohn.org/article/case-grades/.

Laughlin, Kevin, Peggy Nelson, and Susan Donaldson. 2011. "Successfully Applying Team Teaching with Adult Learners." *Journal of Adult Education* 40 (1): 11–18. https://eric.ed.gov/?id=EJ961997.

Leach, Linda, Nick Zepke, and Tom Prebble. 2006. "Now You Have Got Them, How Do You Keep Them? Relationships and the Retention Puzzle." *New Zealand Journal of Educational Studies* 41 (1): 113.

Lock, Jennifer, Jacqueline Rainsbury, Tracey Clancy, Patricia Rosenau, and Carla Ferreira. 2018. "Influence of Co-Teaching on Undergraduate Student Learning: A Mixed-Methods Study in Nursing." *Teaching & Learning Inquiry* 6 (1): 38–51. https://doi.org/10.20343/teachlearninqu.6.1.5.

Loquias, Rizza T. 2015. "Employability of the Bachelor of Science in Electronics Engineering Graduates of Camarines Sur Polytechnic Colleges." *Asia Pacific Journal of Multidisciplinary Research* 3 (4): 33–40.

Massachusetts Institute of Technology. "1.013 - Senior Civil and Environmental Engineering Design." Civil and Environmental Engineering. Accessed October 1, 2022. https://cee.mit.edu/capstone/.

Mason, Derritt. 2021. "'I Suck at This Game:' 'Let's Play' Videos, Think-Alouds, and the Pedagogy of Bad Feelings." *Teaching & Learning Inquiry* 9 (1): 200–17. https://doi.org/10.20343/teachlearninqu.9.1.14.

Mori, Sakurako Chako. 2000. "Addressing the Mental Health Concerns of International Students." *Journal of Counseling & Development* 78 (2): 137–44. https://doi.org/10.1002/J.1556-6676.2000.TB02571.X

"Course Outline." NAIT. Accessed July 31, 2024. https://www.nait.ca/programs/btech?term=2024-fall&intake=7c5333f6-0faa-48c8-9dfd-8fc181be2a17&overviewtabs=courses-tab.

Nunes, Sarah, and Nancy Arthur. 2013. "International Students' Experiences of Integrating Into the Workforce." *Journal of Employment Counseling* 50: 34–45. https://doi.org/10.1002/j.2161-1920.2013.00023.x.

Ojonugwa, Oguche Innocent, Ramlah Hamzah, AB Rahim Bakar, and Abdullah Mat Rashid. 2015. "Evaluating Self-Efficacy Expected of Polytechnic Engineering Students as a Measure of Employability." *International Journal of Education and Literacy Studies* 3 (3): 24–30. http://journals.aiac.org.au/index.php/IJELS/article/view/1816.

Omar, Safiah, Jasmine Jain, and Fauziah Noordin. 2013. "Motivation in Learning and Happiness Among the Low Science Achievers of a Polytechnic Institution: An Exploratory Study." *Procedia-Social and Behavioral Sciences* 90: 702–11. https://doi.org/10.1016/j.sbspro.2013.07.143

Patterson, Zachary R., Robert L. Gabrys, Rebecca K. Prowse, Alfonso B. Abizaid, Kim G. C. Hellemans, and Robyn J. McQuaid. 2021. "The Influence of COVID-19 on Stress, Substance Use, and Mental Health Among Postsecondary Students." *Emerging Adulthood* 9 (5): 516–30. https://doi.org/10.1177/21676968211014080.

Pontillas, Virginia V. 2018. "Tracer Study on Bachelor of Science in Electrical Engineering Graduates of a Polytechnic College in the Philippines from 2007 to 2010." *Asia Pacific Journal of Multidisciplinary Research*.

"Quick Facts." NAIT. Accessed September 16, 2022. https://www.nait.ca/nait/about/our-vision/quick-facts.

Quinlan, Kathleen M. 2016. "How Emotion Matters in Four Key Relationships in Teaching and Learning in Higher Education." *College Teaching* 64 (3): 101–11. https://doi.org/10.1080/87567555.2015.1088818.

Rahmat, Normala, Abdul Rahman Ayub, and Yahya Buntat. 2016. "Employability Skills Constructs as Job Performance Predictors for Malaysian Polytechnic Graduates: A Qualitative Study." *Geografia* 12 (3). http://journalarticle.ukm.my/9908/1/17xx.geografia-si-mac16-normala-edam.pdf.

Saunders, Mark N. K., and Philip G. Lewis. 2012. *Doing Research in Business & Management: An Essential Guide to Planning Your Project*. Harlow, UK: FT Prentice Hall.

Schramm, Cheryl, and Adrian D. C. Chan. 2013. "Capstone Project Evaluation – Towards a Student-Centred Approach." *Proceedings of the Canadian Engineering Education Association (CEEA)*. https://doi.org/10.24908/pceea.v0i0.4840.

Schinske, Jeffrey, and Kimberly Tanner. 2014. "Teaching More by Grading Less (or Differently)." *CBE—Life Sciences Education* 13 (2): 159–66. https://doi.org/10.1187/cbe.cbe-14-03-0054.

Sharone, Ofer. 2021. "Networking While Long-Term Unemployed: Why Long-Term Unemployment Will Likely Persist Long after the COVID-19 Pandemic Recedes." *American Behavioral Scientist*. https://doi.org/10.1177/00027642211066032.

Sibii, Razvan. 2010. "Conceptualizing Teacher Immediacy Through the 'Companion' Metaphor." *Teaching in Higher Education* 15 (5): 531–42. https://doi.org/10.1080/13562517.2010.491908.

Sirotiak, Todd, and Achintyamugdha Sharma. 2019. "Problem-Based Learning for Adaptability and Management Skills." *Journal of Professional Issues in Engineering Education and Practice* 145 (4): 04019008.

Sorens, Clarissa. 2020. "Ungrading: What Is It and Why Should We Use It." Accessed October 3, 2022. https://www.chemedx.org/blog/ungrading-what-it-and-why-should-we-use-it.

Stommel, Jessie. 2020. "Ungrading: An FAQ." Accessed October 3, 2022. https://www.jessestommel.com/ungrading-an-faq/.

Suarta, I. Made, I. Ketut Suwintana, I. G. P. Fajar Pranadi Sudhana, and Ni Kadek Dessy Hariyanti. 2020. "Employability Skills for Sustainable Development and Supporting Industrial Revolution 4.0: A Study for Polytechnic Curriculum Development." In *First International Conference on Applied Science and Technology (iCAST 2018),* 36–9. Atlantis Press.

Tormey, Roland. 2021. "Rethinking Student-Teacher Relationships in Higher Education: A Multidimensional Approach." *Higher Education* 82 (5): 993–1011. https://link.springer.com/article/10.1007/s10734-021-00711-w.

Yorke, Mentz. 1999. *Leaving Early: Undergraduate Non-Completion in the United Kingdom.* Falmer Press.

Zainuddin, Zaharatul Akmar Ahmad, and Ir Ghazali Abd Aziz. 2012. "Smart Tri-Partite Partnership: Polytechnic-Industry-Student." *Procedia-Social and Behavioral Sciences* 31: 517–21. https://doi.org/10.1016/j.sbspro.2011.12.096.

Zepke, Nick. 2018. "Learning with Peers, Active Citizenship, and Student Engagement in Enabling Education." *Student Success* 9 (1). https://doi.org/10.5204/ssj.v9i1.433.

Zepke, Nick, and Linda Leach. 2010a. "Improving Student Engagement in Post-Compulsory Education: A Synthesis of Research Literature." *A report prepared for the Teaching and Learning Research Initiative, Wellington, New Zealand.*

Zepke, Nick, and Linda Leach. 2010b. "Beyond Hard Outcomes: 'Soft' Outcomes and Engagement as Student Success." *Teaching in Higher Education* 15 (6): 661–73. https://doi.org/10.1080/13562517.2010.522084.

Zepke, Nick, and Linda Leach. 2018. "A Critical Reflection on a Research Partnership." *Student Success* 9 (3). https://doi.org/10.5204/ssj.v9i3.452.