WIP Statics Abroad: Lessons in Pedagogy from a Short-Term Study Abroad Mechanics Course

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Abstract

In the Summer of 2019, instructors from a large midwestern university led the inaugural instance of a short-term study abroad trip to Western Europe. This four-week program included 12 intensive, 4-hour class meetings designed to teach students a full semester of Statics content knowledge. The course was originally designed to include active, blended, and collaborative learning elements in both its instruction and learning resources, bringing demonstrations, videos, and group activities into the students' learning environment. The process of adapting this research-based Statics curriculum, built around a typical 16-week semester, to fit its new international setting was impacted by the timeline, the student population, their social context, and the resources available abroad. For example, the weekly instructor office hours held during a typical semester became daily office hours while abroad, combining a week's worth of course content and instructional resources into a single day.

Engineering researchers and administrators have frequently highlighted the benefits of experiential learning, including the international educational experiences afforded by study abroad programs. These study abroad experiences provide engineering students with unique opportunities to develop their professional skills and global competencies, while simultaneously promoting student success and fulfilling key standards for program accreditation. This work-in-progress paper describes our initial observations and their implications from the study abroad course in question by combining reflections from the lead instructor with semi-structured interviews from student participants. The paper specifically outlines the decisions that were made when transitioning the existing statics class and environment to its abbreviated format, examines the implications of those decisions using qualitative analysis of interviews and comparison to published study abroad and accelerated learning research, and conveys general insights and lessons learned from the study abroad program. Our emergent findings highlight the importance of student collaboration and community, emphasize the need for culturally embedded learning activities, and note how active, blended, and collaborative learning methods can easily translate to an accelerated classroom environment. As a work-in-progress, the paper concludes by laying the groundwork for subsequent qualitative and quantitative inquiry as well as future instruction in the course.

Introduction

In the 2018-2019 academic year, the Department of Mechanical Engineering at Purdue University – West Lafayette (PUWL) rolled out a series of new study abroad course offerings. Each of these new courses covered subjects that are core to the PUWL Mechanical Engineering (ME) curriculum, and each were offered during the institution's "Maymester", the month-long period between the end of the Spring semester and the start of Summer semester coursework. These courses were designed to provide students with increased curricular options, creating opportunities for international engagement and scheduling flexibility.

One of the courses offered as a part of this initiative was Statics. Statics (called ME270: Basic Mechanics I at PUWL) is a core requirement of the ME program and is a prerequisite for a number of later course offerings related to engineering mechanics. It is often taken during the first semester of students' Sophomore year, making it one of the first formal ME courses taken after completing the integrated First Year Engineering (FYE) curriculum offered to all PUWL Freshmen engineering students. In order to offer Statics as a study abroad option during May of 2019, the instructional team for the course needed to quickly redesign the existing Statics curriculum to fit an accelerated schedule within an international context. More specifically, the course schedule was limited to 12 total, 4-hour days of in-class instruction, scattered over the course of 3.5 weeks. As a result, this transition process and the resulting course provides a unique opportunity for both personal reflection and for future research.

This work-in-progress paper combines literature on study abroad programs and accelerated learning with instructor and student feedback regarding this instance of accelerated Statics offered abroad through PUWL. More specifically, it examines the successes and shortcomings of the course in light of the logistical and pedagogical decisions made by the instructors, the students' own experiences abroad, and the literature-based best practices reviewed after the course's completion. By observing stand-out successes and opportunities for improvement, we highlight targets for future research. The paper concludes by laying a groundwork for future inquiry in the context of this Statics study abroad program.

Why Statics?

Statics acts as a critical, core course for a number of engineering disciplines both within PUWL curricula and more broadly among engineering institutions [1]. Some describe Statics as a 'gatekeeper' course, a bottleneck in student's curricular pathways that can make-or-break their graduation timeline, potentially deterring students from continuing their engineering studies in the process [2]. Statics acts as a curricular lynchpin, and access to Statics courses can drastically influence students' enrollment decisions during their early years of engineering study. PUWL, for example, offers Statics courses during all academic periods: Fall, Spring, and Summer semesters. Although Fall courses have traditionally shown the highest enrollment, there are students interested in taking Statics during all seasons of the academic year.

It is also particularly important that, when Statics is taught, it is taught effectively. As an early ME prerequisite, the students' learning in Statics can have a large impact on their performance in subsequent courses. Academic performance in Dynamics, for example, is strongly predicted by students' prior Statics performance [3], [4], with research showing that students' mastery of Dynamics content is severely affected by incorrect understandings or lack of retention of fundamental Statics concepts [5]. Other research has shown that, while graduate students may display more computational competency, the understanding of fundamental mechanics concepts demonstrated by engineering graduate students is largely the same as that displayed by engineering sophomores [6]. Statics therefore plays a key role in laying the early groundwork for students' ongoing understanding of engineering mechanics.

Statics is already taught in a mildly accelerated format by many Mechanical Engineering departments. At PUWL, Statics during the Summer semester comprises 35 total, 1-hour class sessions spread over a period of 8 weeks, rather than 42 class sessions over 16 weeks as offered in the Fall and Spring semesters. Although we have not studied students' comparative performance in Statics at PUWL, many studies in engineering mechanics [7] and in a variety of other disciplines [8], [9] have shown that students in accelerated and intensive Summer courses demonstrate academic outcomes that are proportional, or are even an improvement, when compared to similar students enrolled in traditional semester schedules. Researchers have tied these improvements to both the compressed timeline and the intensity of instruction in such courses [8], [10]. Thus, there is a precedent for the successful acceleration of instruction in Statics and offering such courses may afford students with opportunities for not only flexible scheduling, but for improved academic performance as well.

Statics at Purdue University

As mentioned before, Statics in the PUWL Department of Mechanical Engineering is a core course, typically taken by ME students during the first semester of their second year. Students receive 3 credits for taking Statics, meeting 3 days a week for a full 16-week semester. Statics is an essential prerequisite in the ME curriculum, but is also a required course for students in other engineering majors such as Civil Engineering and Nuclear Engineering. Current instruction in Statics includes a variety of digital resources and research-based teaching practices and is heavily influenced by engineering education research conducted through the collaboration of PUWL's Engineering Education and ME programs.

The learning environment (called *Freeform*) employed in Statics was developed within the context of Dynamics courses offered at PWUL to combine best practices from active learning, blended learning, and collaborative learning research [11], [12]. The environment itself revolves around a "lecturebook" that serves as both a textbook and a notebook for the students. The curriculum proceeds through the sequential chapters of the lecturebook with students writing their personal notes directly on the pages of the lecturebook itself. Instructors use example problems from the lecturebook during class, and their students can look up videos showing the solutions to these examples (including those not covered during in-class instruction) by going online to the course website. Through the course website, students also have access to their homework, solution videos to previous homework problems, general course information, and a discussion forum for online collaboration. Active and collaborative learning are facilitated during class through the use of group quizzes and problem-solving sessions, and are encouraged outside of class through group work, Teaching Assistant (TA) tutorial hours, and instructor interaction. Blended learning is promoted through the use and integration of educational technology, including online collaboration and the vast library of videos provided via the course website.

Studying abroad as context

The Statics study abroad program in question took place in Barcelona, Spain, a city known worldwide for its rich history, vibrant culture, and distinctive architecture. While the program leaders were very deliberate in their consideration of the course, its rapidity, and its content, they often failed to take important cultural considerations into account. In the weeks leading up to departure the instructors paid little attention to the physical and cultural context of the trip due to their preoccupation with its academic demands. This mindset led to both positive and negative results for the program, as we observe after the later literature review and discussion of student interviews.

The primary difference between the Statics courses traditionally offered at PUWL and the course offered abroad lay in their scheduling constraints. Upon examination, having 12, 4-hour class sessions actually afforded the course *more* in-class instructional time than the 42, hour long class sessions offered during a traditional semester. However, limiting the course to 12 days meant that, in a single day, the instructor would have to cover more than 1 week's worth of traditional Statics content.

In addition to this, students would not have access to a wide variety of resources that would be readily available when taking courses on-campus. For example, in addition to instructor office hours, there is a TA help-room available to on-campus students. Students can visit this help-room to seek out tutoring from their course TAs. However, receiving assistance from the help-room requires being physically present on campus, making it inaccessible to students traveling abroad. In addition to expert help from instructors and TAs, many students at PUWL report receiving help from peers who have taken the course in previous years, or who may be enrolled in other sections [13]. Some of this interaction is even facilitated online, due in part to the large student enrollment each semester. Unfortunately, such peer resources are simply not available when traveling abroad with a small group of students.

In total, 22 students participated in the study abroad course, making its enrollment even smaller than the Summer semester Statics courses typically offered at PUWL. In addition, there were very few barriers to student enrollment: the program accepted students of any year or Engineering major who were required to take Statics and who were not on academic probation. In contrast, other technical courses offered abroad through PUWL (such as introductory Thermodynamics) required students to have a minimum 3.0 institutional GPA. In addition, the program had no foreign language requirements. Although the primary instructor of the course had previous experience in teaching study abroad programs, students in the courses they previously taught were required to have a high grade-point average and at least 4 semesters of a foreign language. Thus, this 'Maymester' study abroad represented a significant departure from other PUWL engineering study abroad programming.

The study abroad context also included some affordances for both the students and the instructor. For example, PUWL chose to partner with a company called CEA (originally Cultural

Experiences Abroad) that specializes in organizing and facilitating study abroad experiences, easing much of the logistical burden placed on the instructor. The primary professor and TA were provided with printing and scanning services, classrooms, study-areas, office-space, and a variety of logistical solutions to help facilitate cultural engagement and learning activities. The students were also provided with logistical help, study spaces, and student housing. All of the student accommodations were located near one another, which encouraged both community development and collaborative work outside of class. Many ME students on the PUWL campus have reported that their housemates and dormmates can be a valuable resource while studying [14], and these students arrived abroad to find their classmates near at hand.

Adapting to Statics abroad

Before traveling, the instructional team had to make a few key choices regarding how to run the course abroad. They also had a limited window of time to make these choices: only a month lay between finalizing their schedule and their anticipated departure date. While they did not refer to literature on accelerated learning or studying abroad during this initial planning process, they did leverage a variety of other research and teaching experience from their work at PUWL.

During reflection, the primary instructor reported that he expected the initial process of transitioning Statics to its new, accelerated context to be relatively easy. Because of the learning environment being used, many of the learning resources were already available online. The course lecturebook could be readily printed for students, and its role in notetaking meant that students would not be required to bring an extra notebook when traveling. Although instruction would be rapid, the topics covered each day were the same as those taught during a typical semester at PUWL. Transitioning most of the course resources for use abroad was a seemingly straightforward endeavor.

The instructional team expected that planning day-to-day instruction would be slightly more difficult in comparison. Four hours had been earmarked on 12 days, each from 9:00AM to 1:00PM, for in-class instruction. This does not include an extra day which was used for the Final Exam in the course. After working closely and conferring with peers, the primary professor and TA decided to divide each class period in the following manner:

Table 1. Breakdown of the study abroad class schedule

Class Time	Class Content
10-20 Minutes	Review of content from the previous classes, answering questions about the homework
60-75 Minutes	In-class lecturing, demonstrations, and worked examples addressing the Statics topics to be covered that day
10-20 Minutes	First break
60-75 Minutes	In-class group work and ungraded group assessments on the course content for that day
20-30 Minutes	Second break
30 Minutes	Quiz (taken individually) addressing topics from the previous day’s class

30 Minutes	Introduction to the topics for the next class, any additional activities, and answering students' ongoing questions

As the learning environment used in Statics was predisposed to active and collaborative learning, group work and instructional activities were likewise prioritized when transitioning to the new course format. In addition to the class schedule, the instructional team also decided to plan for 2 hours of combined TA and instructor office hours each day after class from 3:00PM to 5:00PM. As each class needed to cover 1 week's worth of typical Statics content, these office hours were intended to provide students with about 1 week's worth of instructor office hours and TA tutorial help.

Cultural experiences and excursions during the study abroad were planned out by CEA and did not impact the 12-days of in-class instructional time mentioned previously. These included two excursions and one guest lecture by a local professor, each of which were planned independently from the Statics course schedule and its content. This decoupling of the cultural experience and course content seemed to be taken for granted during the PUWL course development process, and the course instructors were thankful for the help CEA provided them. As a result, although the process to adjust the existing Statics curriculum for instruction abroad was examined thoroughly, little of the course's actual content was amended in light of its new, international context prior to departure.

Literature review: Studying abroad and accelerated learning

As part of this work-in-progress paper, we hope to lay out a plan for future improvements to this study abroad course informed by literature and ongoing research efforts. The distinct bodies of literature regarding study abroad programs and accelerated learning schedules address a small number of overlapping themes. Study abroad experiences are often distinguished as being either short-term (lasting less than a semester), or long-term (lasting a semester or more). Some short-term study abroad courses are only intended to cover a small amount of targeted content. Others (like this Statics course) require addressing the curricular requirements of a full semester course within an abbreviated time frame. The design and evaluation of these courses can be informed by research on both study abroad experiences and accelerated learning practices.

Studying abroad

Study abroad programs are attractive to academic institutions for a wide variety of reasons. For engineering departments, study abroad programs can address key requirements of ABET accreditation while encouraging students to develop intercultural awareness and global engineering competency [15], [16]. Engineering students have been consistently underrepresented in U.S. study abroad participation [17] and still make up only 5.3% of U.S. students who choose to study abroad each year [18]. Many suspect that this is due to barriers preventing participation, rather than a lack of interest on the part of engineering students [19]. In addition to the usual concerns related to program costs and foreign-language skills [20], engineering students are also prevented from studying abroad due to the restrictive curricular requirements of most engineering programs [21]. In a profession that highly values intercultural skills and global experience [22], increasing the number of study abroad opportunities available can bring benefits to engineering students and academic institutions alike.

More generally, studying abroad is described as an opportunity for students to have "transformative" learning experiences [23], [24], redefining their worldviews and approaches to learning in fundamental ways. Studies have linked study abroad experiences to beneficial outcomes ranging from improved job placement and academic performance [25], [26], to improvements in creative thinking [27] and collaborative skills [28], in addition to general increases in intercultural awareness and global competency [29]. These benefits have been observed in the context of both short-term and long-term study aboard courses [28], [30], although longer-term study abroad courses tend to increase students' positive learning outcomes [28], [31].

There are a variety of resources available to aid in the development and evaluation of study abroad experiences. These resources cover a broad range of topics comprising the recruitment of students, pre-departure considerations, instructional activities, and the evaluation of learning outcomes. Speaking very generally, this literature offers a few key recommendations to instructors embarking on study abroad programs.

Take students' needs seriously from the beginning. The course should be designed to be both relevant to the students' curricular needs and financially accessible. The extent to which students perceive the course to fit with their individual needs, and the costs which the students must pay to participate, have a significant effect on both their willingness to participate [32], [33] and their personal comfort in the course [34]. Instructors and their institutions also have a responsibility to prepare students for the international experience, building relationships and expectations early to improve group interactions and personal reflections later in the program [34].

Intentionally design instruction for your international context. The learning outcomes for study abroad experiences are naturally a blend of both traditional academic outcomes (such as subject knowledge acquisition and problem-solving skills), and cultural outcomes (such as intercultural understanding, personal awareness, and an appreciation of global issues) [35]. However, the more that these learning outcomes can be integrated and addressed simultaneously, the better. Embedding instruction within the unique contexts provided by studying abroad fosters opportunities for deeper and more transformative learning experiences [36], [37].

Know your target outcomes and evaluate them. The goals that instructors carry into their study abroad courses help to define how they teach. Taking the time to understand those goals and how they translate into learning outcomes is a crucial part of informing course design [37], [38]. Hand-in-hand with this, there need to be valid ways of evaluating those outcomes in order to gauge student learning and inform future improvements to the course [39].

Accelerated learning

Accelerated learning refers to programs that attempt to address a targeted set of learning outcomes over a shorter period of time than would usually be allotted. This generally results in teaching a course for fewer calendar days and for a longer period of time each day. Courses using such a format are also referred to as *intensive* courses [40], [41]. Accelerated learning programs, like study abroad programs, are often attractive to academic institutions. Offering accelerated courses allows universities to expand their academic year [42] and better target adult or other non-traditional learners [8], [43], [44]. These accelerated courses are often adapted from more traditional curricula, with the goal of addressing the same learning outcomes as their parent course within a newly abbreviated time-line.

Accelerated courses can be very effective, leading to learning outcomes and course evaluations that are comparable to those from students who take traditional courses [43], [45], [46]. Upon examination, there are a few general recommendations we can draw from literature regarding the design of accelerated learning.

Use a variety of active pedagogical methods to foster learning and engagement. Due to the shortened schedule, repetition cannot be used as a teaching tool for accelerated learning in the same way that it might be in a traditional classroom [47]. In addition to this, maintaining students' attention and engagement is key when conducting the long class periods associated with typical accelerated learning courses [41]. Employing research-based pedagogical methods such as active learning [48], self-directed learning [49], and collaborative learning [48], [50] can help to keep students engaged in the course material. By employing multiple instructional methods during each class period, students can be repeatedly exposed to the same topic across a number of different contexts.

Encourage social interaction and the development of classroom community. Many writers highlight the importance of classroom environment in their discussion of accelerated learning programs, especially with regards to the relationships between students and their peers or instructors [40], [48], [51]. This goes beyond talking about collaborative learning interventions: students and instructors alike report that the *social* aspects of their experience are one of the key benefits of accelerated learning [46], [48]. Fostering an environment of peer support appears to be an essential part of promoting student success in accelerated programs.

Expect pacing and organization to introduce new stresses for students and instructors alike. When planning and teaching accelerated curricula, instructors seem most concerned with issues of pacing and course organization. The number of total instructional hours in accelerated classes are generally comparable to the number of hours available in a traditional course. However, instructors often express concern regarding the sheer amount of content that needs to be covered in accelerated programs and are confused about what expectations they should have of their students to ensure that this content is covered effectively [40], [47]. Students also express concern that they will not be able to learn and perform effectively within the accelerated time-frame [52] and are often afraid of the possibility of "falling behind" in such fast-paced course schedules [46].

There are a number of parallels which can be drawn between literature on short-term study abroad programs and accelerated learning. Both introduce the stress of having to navigate new organizational concerns, and both are heavily invested in student engagement. There are also some areas in which the needs and advantages of accelerated learning and short-term study abroad programs can complement one-another. As one example, the development of a class community can start far earlier for a study abroad program than for a typical accelerated learning course. Pre-departure meetings and other early correspondence can allow instructors to foster a collaborative and supportive community long before the course officially starts. In addition to this, accelerated study abroad programs provide a unique opportunity to plan out pedagogy that is both individually engaging and culturally embedded. Pasquarelli, Cole, and Tyson [37] argue that it is not enough to design pedagogy for these courses that is just active or just experiential. Short-term study abroad programs should intentionally design their learning experiences to match the international environment in which they take place. Doing so can promote student engagement while simultaneously addressing intercultural learning outcomes unique to the study abroad context.

Student experience and feedback

Methods and limitations

The student feedback used for this work-in-progress paper was collected using semi-structured interviews. In total, 6 out of the 22 students in the course agreed to be interviewed about their thoughts and experiences regarding the Statics study abroad. We coded and analyzed these interviews in two rounds informed by the methodological recommendations of Braun and Clarke [53]. Through this, we identified a small set of emergent themes that may inform our evaluation of the study abroad course. We would like to mention that, while we believe these themes to be representative of the students' responses, they do not represent the results of a full Thematic Analysis. These emergent findings may change and develop as research continues within the context of this course.

Before discussing any student interviews, it should be noted that the primary author of this paper was the Teaching Assistant for this Statics course (DAE), and the primary instructor of the course is also on our author list (CMK). In addition, all student interviews were conducted by the course TA while abroad, as no other research staff were available. Although it was made clear to students that participation in the interviews would not affect their grade in any way, and the students expressed confidence in their TA's impartiality, there is a possibility that the TA's status as part of the instructional staff could have impacted the content of the resulting student interviews.

Emergent themes from the student interviews

The most common thread throughout the students' discussions of the course was their *appreciation of their student community* and how helpful peer collaboration was in their experience. Feedback on the course was, for the most part, very positive, and much of this positive feedback was given in connection to the people involved in the course. Only one student said that they infrequently worked with their peers, and even then, they went out of their way to mention that in-class collaboration was useful. "I wouldn't say that I rely on my peers as much as I would in other courses, but I will say that going through those conceptual questions in groups is really nice… we all like, balance each other out really well, and help each other understand (Student 5)." The other students were almost universally positive when it came to discussion of their peers and the student community. Many talked about how developing close, personal connections with their peers changed the way they interacted during academic collaboration:

> “We’re basically a family now, which really changes not only how you spend time together, but how you spend time studying together… If you don’t know the person, it’s a lot harder to admit [what] you don’t know (Student 6).”

> “I think we can all be friends in the long run and stick together. It also helps like, asking for help… or even like helping someone else. You can talk to them not as like, one as a ‘teacher’ and one as a ‘student’, but more as like a friend to a friend conversation. It’s really, relaxing, I guess (Student 4).”

> “I haven’t been with the same group of people for a month since like, high school… It was more enjoyable to study with them, I guess, and it was more comfortable to ask them questions, because I knew them a lot better (Student 3).”

Others attributed part of their success in the course to the routine that their peers helped to introduce to their lives while abroad. One student talked about how this helped them stay on top of their course-load, “It really helped that everyone went back to CEA to do homework everyday cause I know if I like, didn’t, I would be up late every single night doing homework. Being with other people who were motivated to get it out of the way early definitely helped and was, like, essential (Student 3).” Another described this group homework session as “a time when we know we can all be together (Student 2)”, emphasizing both the utility and the comfort of the communal daily routine. To elaborate on the comfortable day-to-day environment such a community could bring, one student said, “…It turned from *me*, focusing on the board, to *us* focusing on the topic of whatever that day was. It became like, more, routine (Student 6).” Students quickly became comfortable asking for help and collaborating, primarily with their peers, but also with the course instructors. As one student noted, “I don’t feel like anyone was like, concerned about asking questions; either to our professor, or to the TA, or to each other. I feel like we were good about communicating as a group, and that there wasn’t anybody left out of that circle (Student 1).”

Some students felt that their *learning was impeded by the speed of the course* and reported this feeling in a number of different ways. One student mentioned that they preferred to “mull over” concepts after learning them, saying, “I don’t think I can say that I completely, 100%, understood a topic... Everything I know is from the crammed 3.5 weeks. I don’t think I’ve got to that point where I can do [the problems] backwards, you know (Student 6)?” Another student reported that they simply didn’t have the study time they thought they needed, “On Tuesday it kinda threw me for a loop like, ‘Oh shoot, we’re still learning stuff and the final is on Friday’ (Student 3).” Even those students who felt comfortable in the course thought that learning could be improved by a slightly longer schedule. When making recommendations on how to improve the course, one high-performing student wrote, “For me the pace was fine… I think maybe it was, maybe a little too fast? Maybe like a week more (Student 5)?” Student 2 wrapped up their perception of the course’s overall difficulty by doubly emphasizing the accelerated schedule, “the content wouldn’t be as difficult given, like, a longer time frame… [the level of difficulty is] likely what you would expect, in this time frame (Student 2).” This was put in context with the risk of falling behind, “the pace at which the class moves which is like, a chapter a day, makes it difficult too… you learn one concept, and if you don’t pick it up that day, you’re moving on (Student 2).”

Some students mentioned that they would like the *course content to be better tailored to the new study abroad format*. One student wrote, “I don’t know if it was just because our course was so short… when we went back to review, some people were confused because there were examples that were more complicated in the book that we didn’t cover, or topics that were more complicated that we didn’t cover (Student 1).” This student previously said that they liked the course: they didn’t think it was too hard, nor too easy. However, they did feel like they were encountering gaps in their knowledge due to the excess of examples provided by the lecturebook, which was designed to be used over a full 16-week semester. Other students requested course content that was better tailored to the specific, study abroad context they were living in. One student mentioned a phone conversation they had earlier in the week, “I was talking to my cousin about the course, and I was like, ‘Oh yeah! I’m taking Statics [in Spain]!’ And they were like, ‘Cool! Why are you taking it [in Spain]?’ And I was like, ‘Uhhh… Well, to be honest, I don’t know?’(Student 3).” Students felt there was no intentional connection between the course itself, and the setting they were in, which made it difficult to engage with their new knowledge outside of the classroom environment.

For many, Statics represented a departure from their previous learning experiences, often by being their first course taken through the ME department. For example, “This is like, my first really like, physics-based engineering class… [The FYE classes] were more about how to be an engineer like, mentally. But this was more about how to be engineer computationally (Student 3).” Another student was even more direct by saying, “[Statics] is the first Mechanical Engineering class I have ever taken in my entire life (Student 6).” In this way, *Statics was a transformative learning experience for many students*, serving as their first introduction to the expectations, rigor, and culture embedded in the study of engineering at PUWL. However, even this introduction to engineering served to draw the student community together:

> “We all have that similar mindset, we all wanted to study abroad, we all wanted to take this class: you know, either because we wanted to get it out of the way or because we were interested, right? And that similar mindset creates like, a trust, within the group… We can all become friends a lot easier through that mindset, just because… at [PUWL], it’s kinda the same thing, but just here it’s even *more* specific. We all have the exact same interest, and we’re *all* going into engineering (Student 5).”

Observations and conclusions

Generally speaking, this instance of Statics abroad seems to be an example of a successfully accelerated course, but not necessarily of a successful study abroad. Anecdotally, we (the instructors) observed student academic performance that was comparable to what may be seen in other semesters, but we can also see parallels between the students’ interviews and the themes from broader literature. For example, students’ reports of their experience in the course were often dominated by discussions of collaborative learning and their in-class community. It was the social aspects of their learning environment that defined their studies abroad and served to motivate them to pursue academic success as a part of their daily routine.

Students expressed concern regarding the course's accelerated schedule, much as we would expect. However, rather than discussing stress due to falling behind or poor grades, these students often worried that their understanding of key Statics concepts would be impaired. Students were afraid that their conceptual understanding would suffer from having so little time to study, review, and reflect on their new knowledge. Even students who reported being perfectly comfortable with the pace of the course expressed a desire for more time to mull over the Statics content.

The learning environment, with its suite of resources and research-based teaching methods, came with its fair share of affordances and drawbacks when applied in the study abroad context. It's likely that the preexisting emphasis placed on active learning and collaborative learning helped to make this accelerated program successful. The collaborative learning activities that resulted from this environment played a key role in the students' reported experience, and the active learning approach aligns well with literature-based best practices in accelerated and intensive learning. In addition, having a suite of readily available online resources made the course's logistical transition abroad very straightforward. However, students seemed to be slightly overwhelmed by the sheer number of example problems and video resources being provided to them, not knowing where to start or what examples to focus on. Students also expressed a desire for the course materials to have a more overt connection to their study abroad destination, a desire which does not lend itself well to the use of pre-existing resources. The class simply became a unique travel opportunity, rather than an embedded experience of Statics in the Spanish context.

As a result of this work, we believe that future instances of this Statics study abroad will offer many opportunities for ongoing research. We would like to highlight a small number of possible research questions in light of our discussion above:

- What traits or affordances would allow the *Freeform* learning environment and its content to be better adapted to diverse contexts or foreign environments? How can this learning environment better leverage and speak to the unique features and desired learning outcomes of study abroad programs?

- What can we learn about the role of Statics as a transformative course for new Mechanical Engineering students? Can this transformative role be better understood, or even be enhanced, through the experience of studying abroad?

- Could accelerating instruction in Statics to such an extent cause a negative impact on students' understanding of key Statics concepts, despite having no obvious negative impact on their academic performance in the current course?

Given the relative success of the previous program, there were already plans for another 'Maymester' Statics study abroad during the 2019-2020 academic year. These plans have since been suspended in response to novel coronavirus, but we remain hopeful that Purdue University will continue to offer such programs in the future. In the coming years, our team will not only be designing culturally-embedded learning activities for future study abroad courses. We will also be seeking opportunities to address a variety of research questions in the context of Statics abroad. Through this paper and our future work, we hope to inspire and inform study abroad opportunities in Mechanics at PUWL and at our fellow engineering institutions both here, and abroad.

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