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Does It Matter Where You Teach? Insights from a Quasi-Experimental Study of Student Engagement in an Active Learning Classroom

ABSTRACT

Active learning has experienced a recent resurgence with the advent of specialized active learning classrooms. While the fundamental theory behind active learning is anything but new, a relatively recent finding is that active learning pedagogies thrive in suitable active learning classrooms. To date, studies of active learning have focused on outcomes such as student performance. The quasi-experimental study described in this article investigated self-ratings of student engagement as an outcome of active learning in active learning classrooms using a novel instrument that accounts for known factors of engagement in addition to the contribution of the learning environment—the classroom. We delineated the relative contributions of instructor, classmates, and classroom to self-rated student engagement through student surveys in both a traditional classroom and an active learning classroom in two highly similar courses with the same instructor. Our findings were that the configuration of the classroom had a direct influence on self-ratings of student engagement above and beyond instructor contributions. In this article, we describe these findings and how, with careful consideration of course design and a classroom that fits the instructor's pedagogy, optimal levels of perceived student engagement can be achieved. This knowledge is important to future educational policy on construction and scheduling, as the resurgence of active learning in higher education increasingly reveals deficiencies in physical learning environments.

KEYWORDS

active learning classroom, student engagement, learning environment, active learning, postsecondary education

INTRODUCTION

At a time when budgets in postsecondary education are tight, enrollments are high, and student retention is critical in Alberta as evidenced as key points in many academic plans (e.g. Lethbridge College 2017; Mount Royal University 2017; University of Lethbridge 2017), several institutions continue to teach in outdated facilities that in some cases have not been changed drastically since their inception. Thus, there seems to be a dissonance between the eagerness to foster "21st-century skills" and the physical learning environments in which these skills are meant to be acquired (e.g., expecting dynamic group work in a static lecture theatre) (Wesch 2007). In fact, until the past 15–20 years, it was very rare that physical learning environments were considered instrumental in curricular programming,

let alone considered as warranting study of their impact on tangible student outcomes (Bailey, Minderhout, and Loertscher 2012; Beichner et al. 2000; Lasry et al. 2013). The findings from our quasi-experimental study investigating the impact of a modern active learning classroom on self-rated student engagement support the importance of matching the learning environment to teaching style. In what follows, we present data corroborating the case for functional classrooms under consideration of pedagogical theory: active learning classrooms should be matched with pedagogies that use active learning. Our article describes the way student engagement can be fostered by classroom design, an item of significance for institutional planning at a time when our institution is programming classrooms in a new and costly building. In line with the broader paradigm of the National Survey on Student Engagement (NSSE), it is evident that increased engagement has shown beneficial not only within the classroom, but also for institutions overall (Kuh 2009; Ouimet and Smallwood 2005). Given the mismatches between classroom environment and pedagogical theory, the costs associated with classroom design, and the continuous quest for student engagement, we offer evidence of the impact of classroom environment on student engagement.

Not new, but newly popular

The term *active learning* has experienced new popularity with the advent of specialized active learning classrooms described in the literature (Bailey, Minderhout, and Loertscher 2012; Felix and Brown 2011; Lasry et al. 2013; Leger et al. 2014; Kregenow, Rogers, and Price 2011; Monteiro 2012; Muthyala and Wei 2013; Schaffhauser 2014; Wilson and Randall 2012) and postsecondary institutions (McGill University Teaching and Learning Services 2011; McMaster University 2020; University of Minnesota 2020; University of North Carolina, Charlotte n.d.; Yale University 2020). However, the fundamental theory behind active learning is anything but new. Active learning is inextricably intertwined with the constructivist theory of knowledge (Bodner 1986). According to George Bodner, constructivism is the idea that knowledges can be created or constructed in the mind of the learner, rather than existing as unified, constrained, and intact entities that are flawlessly transferred from the teacher's mind to that of the learner (1986, 873). That is, students acquire understanding on their own, rather than being receptacles of information, as was traditionally assumed. Bodner speaks of this paradigm shift in learning and teaching by highlighting that the instructor's perspective should be one of facilitating learning, not one of imposing knowledge (1986, 876).

Active learning is a way to engage students in the social construction of knowledge. John Dewey ([1938]1997, 38) stated "all human experience is ultimately social: that it involves contact and communication." Experience is the basis for knowledge construction. As such, the creation of opportunities for students to have educational experiences that are based on social contact and communication is the foundation for active learning and active learning classrooms. Dewey also argued that the "primary responsibility of educators is that they not only be aware of the general principle of shaping of actual experience by environing conditions, but that they also recognize in the concrete what surroundings are conducive to having experiences that lead to growth" ([1938]1997, 40). Active learning classrooms can provide the conditions conducive to constructivist educational experiences as a space that fosters social contact and communication.

Some educators believe that there is no such thing as inactive or passive learning in formal educational settings based on what we know about attention and memory (Sadr 2018, 10), and all

learning happens actively. We operationally define *active learning* in line with the more conventional notion as student-centred learning, as opposed to a teacher-centred approach (Michael 2006, 160). While the latter traditionally includes predominantly direct instruction, student-centred learning emphasizes the autonomy of the learner, interdependence between teacher and learner, as well as the learner's responsibility for and reflection of what is learned (Felder and Brent 1996; Lea, Stephenson, and Troy 2003; McCabe and O'Connor 2014). Some active learning strategies can include, according to Joel Michael (2006, 160), problem-based or case-based learning, cooperative or collaborative learning or group work, think-pair-share or peer instruction, conceptual change strategies, inquiry-based learning, discovery learning, and forms of technology-enhanced learning. The instructor engages in the facilitation of understanding rather than in the dissemination of knowledge and acts as a *guide on the side* rather than a *sage on the stage* (King 1993). In the constructivist model, student-centred learning positions students as the central agents responsible for the attainment and creation of knowledge.

The venue for active learning: The SCALE-UP example

A more recent and still growing trend in the active learning literature has focused on learning environments (Beichner et al. 2000; Brown and Lippincott 2003; Hill and Epps 2010; Jamieson et al. 2000; Lasry et al. 2013; Whiteside, Brooks, and Walker 2010). Researching learning environments in general is a fairly new endeavour, and the idea of matching pedagogical styles to room styles is still an emerging notion (Lasry et al. 2013; Temple 2008). Below, we consider the SCALE-UP example in order to demonstrate the successes achieved when designating a learning environment for a specific pedagogy, rather than simply resorting to a one-size-fits-all classroom or teaching style. This discussion contextualizes the impetus for building a SCALE-UP-like classroom at our institution and clarify the research setting.

SCALE-UP: Pedagogy meets classroom

While the acronym has undergone some changes since its inception, SCALE-UP now stands for student-centered active learning environment with upside-down pedagogies (Beichner et al. 2000; Beichner 2008). Derived from a larger curriculum reform project at North Carolina State University, the SCALE-UP approach brought interactive, collaborative instruction that is often seen both in higher-level small courses to large-enrollment introductory physics courses (Beichner et al. 2000). SCALE-UP was possibly the first example indicating that classroom environment, pedagogy, and student outcomes go hand in hand. The SCALE-UP classroom layout is designed for collaboration: students sit in three teams of three around large, round tables. The instructor is in the centre of the room. Class time is spent working actively and collaboratively on carefully designed activities. Robert Beichner has repeatedly shown the successes of the SCALE-UP approach for his own physics curriculum: students perform better than their peers in traditional classrooms 88 percent of the time (2000, 2008). According to these authors (2000), failure rates for traditionally marginalized groups who performed more poorly in physics, in particular, were significantly reduced through the SCALE-UP approach (Beichner and Saul 2003; Beichner et al. 2000). These authors (2000) reported that science students also solved problems better and showed an improvement in attitudes toward learning in this type of environment. The SCALE-UP room itself eliminates the back-of-the-room phenomenon, according to which high-achieving students sit in the front, and lower-performing students sit in the back of the class (Kregenow,

Rogers, and Price 2011). Without the option of sitting in the back of the room, students can be seen (and engaged) equally, potentially leading to closing the gap in achievement. It has been demonstrated that the classroom space itself matters, too—SCALE-UP is successful only when classroom environment and pedagogy are matched (Lasry et al. 2013).

WHAT DOES STUDENT ENGAGEMENT LOOK LIKE?

Student engagement has been theorized in the education literature for several decades. Fostering student engagement is understood as among the good practices in undergraduate education (Chickering and Gamson 1987). Yet, the meaning of this construct has not been consistent over time, undergoing a substantial evolution (Astin 1984; Kuh 2009; Pace 1980; Pascarella and Terenzini 2005). As reviewed by George Kuh (2009), student engagement has been identified and described variously as time on task, quality of effort, student involvement (Astin 1984), and social and academic integration (Tinto 2012). Now, student engagement is understood as an umbrella term that can include these concepts. One of the challenges with such an umbrella term is that the literature on student engagement contains considerable variations in definition and measurement (Fredricks, Blumenfeld, and Paris 2004, 60). Further, the duplication of concepts is often found in the literature, little differentiation or distinction is made across various types of engagement, and many conceptualizations include some, but not all, of its subtypes (Fredricks, Blumenfeld, and Paris 2004, 60). Additionally, qualitative differences within each concept suggest that engagement can be short-term and situation-specific, or long-term and stable (Fredricks, Blumenfeld, and Paris 2004, 61). More recently, in an attempt to conceptualize a framework for student engagement, it has been viewed as a combination of its various components (Kahu 2013, 761).

In the endeavour to operationalize and measure engagement, it often has been divided into behavioural, emotional (psychosocial), and cognitive components as summarized aptly by Jennifer Fredricks, Phyllis Blumenfeld, and Alison Paris (2004). Behavioral engagement is measured in observable behaviour such as time spent on a task (Fredricks, Blumenfeld, and Paris 2004, 62). Some authors have highlighted three further elements into which it can be subdivided: "rule following, including attendance; involvement in learning, including time on task and asking questions" (Kahu 2013, 761). Behavioral engagement maps onto active learning directly, as observable behaviors are addressed, including being active and participating by asking questions and collaboratively working with other students (Bryson and Hand 2007). Emotional engagement is also termed psychosocial engagement. It includes interests, values, and emotions, as well as a feeling of belonging or attachment (Fredricks, Blumenfeld, and Paris 2004, 63). One important component, indicating why the term *psychosocial* is probably a more adequate descriptor than is *emotional*, is the large relational component encompassed in this type of engagement. Specifically, the emphasis is on student-faculty interaction and peer-to-peer interaction (Vuori 2014; Wong 2015). As Fredricks, Blumenfeld, and Paris (2004, 63) point out, research on emotional engagement is further related to that on student attitudes (such as outlined by Epstein and McPartland 1976; Yamamoto, Thomas, and Karns 1969) and student interest and values (such as described in Eccles et al. 1993). Cognitive engagement is often defined by motivation, effort, and strategy use (Fredricks, Blumenfeld, and Paris 2004, 63). It can include students' flexibility in problem solving, preference for challenging work, and positive coping in the face of failure (Connell and Wellborn 1991). Cognitive engagement implies more than just behavioural engagement

and is measured by looking at deep learning of concepts and skills (Fredricks, Blumenfeld, and Paris 2004, 64). Here, students are more invested in learning for understanding's sake rather than performance goals. Some research indicates that students with increased self-efficacy are more engaged. Believing they have sufficient resources leads students to have increased self-efficacy (Llorens et al. 2007). Importantly, the study of cognitive engagement is often related to that on motivational goals and self-regulated learning (Boekaerts, Pintrich, and Zeidner 2000; Zimmerman 1990).

After reviewing these conceptualizations of student engagement, it became clear that any single approach is insufficient for the purposes to this study. All three of these aspects of engagement are well-suited to the kind of learning environment an active learning classroom aims to foster: the student-centred, student-driven classroom. Here, the three aspects apply as follows:

1. behavioural engagement can be best observed when students actively engage in a variety of activities, such as asking questions, collaborating, or spending time on different types of tasks as afforded by an active learning classroom;
2. emotional or psychosocial engagement is predicated on social interaction, as proposed by the constructivist theory of learning, which is central to the active learning classroom; and
3. cognitive engagement becomes observable in an environment where problem-solving is encouraged over passively receiving information through direct instruction, which is another component of student-centred learning in an active learning classroom.

Therefore, we designed an instrument that measures engagement in observable behaviours, psychosocial interactions, and cognitive aspects, in addition to overall self-ratings of engagement toward a more complete framework of student engagement (see appendix A).

Filling the gap

While it has been demonstrated that student outcomes such as grades and attitudes are improved when classroom and pedagogy are matched (Beichner et al. 2007), these outcomes pertain solely to academic markers and learning attitudes. Whether the effects of matching the physical classroom design with pedagogy are similarly evident in student engagement in particular is unknown. Studying the possible contribution of the physical learning environment to engagement is crucial, as engagement is pivotal for institutions regarding both recruitment and retention at the macro-level (Tinto 2012, Vuori 2014) and in achieving rapport with and participation from students in class at the micro-level (as we outline above).

The contribution of the classroom to self-rated student engagement—in particular as an influence above and beyond that of other engagement factors like the instructor and classmates—had not, to our knowledge, been assessed at the time of this study. Our study addressed the overall contribution of pedagogy and physical learning environments both together and, regarding classroom design, separately. We had a unique opportunity to measure the influence of each and compare them using a quasi-experimental design. Our findings can aid institutional decision makers in planning and directing future resources toward appropriate ends, such as allocating funds for classroom design and professional development in teaching.

Objectives and research questions

The objectives of our study were twofold: first, we aimed to identify differences in self-ratings of student engagement on behavioural, psychosocial, and cognitive factors. Second, we aimed to (statistically) reveal the contributions of instructor, classmates, and classroom to overall self-ratings of student engagement. The following two questions guided our research:

1. ***What are the relative contributions of classroom, instructor, and classmates to perceived student engagement in an active learning classroom?***
2. ***How does an active learning classroom contribute to self-rated student engagement as compared to a traditional classroom?***

METHOD

In the spring semester of 2016, co-author Richelle Marynowski was teaching two similar third-year education courses in two different rooms—one a traditional classroom and the other an active learning classroom. Their similarity was evident in the pedagogies employed, the students in the course, students' engagement self-ratings, the instructor teaching the course, the time of day the course was taught, the course materials used, and the assessment methods employed. This similarity was determined *a priori* for planning elements (course design, pedagogy, instructor, class time) and *a posteriori* for analysis elements (student demographics, engagement self-ratings). As we detail below, while this scenario did not provide an experimental setup, it provided a basis for a quasi-experiment with data for statistical analysis. The similarity allowed us to investigate the contribution of the physical classroom on self-rated student engagement over and above contributions of instructor and classmates, as the latter two were held mostly constant across the rooms. The instructor did not change her lesson plan or scheduled activities for either course in either of the rooms. All methods outlined here were approved by and in line with the policies and guidelines for ethical research with human participants and approved by the Human Subject Research Committee at the University of Lethbridge.

Participants

Course 1 (assessment course) was a third-year education course on classroom assessment with 39 students in total, 37 of whom participated in the course for credit, one visiting student, and one auditor. The 37 students enrolled for credit (59.5 percent female, 40.5 percent male) were surveyed, with 91.9 percent between 17 and 26 years of age, and 8.1 percent 32 years of age or older. Thirty-four students indicated that the course was a requirement, one that it was not, and one did not answer that question. A majority (61.6 percent) of students were in their fourth year of study, with the remainder indicating "other."

Course 2 (methods course) was also a third-year education course on principles of curriculum and instruction. All 27 students in this course were also in Course 1, but Course 1 had additional students. The students in Course 2 can therefore be considered a subset of the students in Course 1 (i.e., the same students). All 27 students in Course 2 participated. Therefore, age and gender distributions are similar, with 66.7 percent female and 33.3 percent male students, 92.6 percent 17–26 years of age, 7.4 percent age 32 or older, and 77.8 percent in their fourth year of study. Twenty-six students indicated that this course was a requirement for their degree, whereas one indicated it was not.

All of the students in Course 1 had additional courses together, thus the combination of the students was not unique to this one course. Course 2 was the only course where the subset of students had a course without other students. Students in the education program at this university are used to the different types of groupings for courses with one of their courses containing a subset of students from their other courses.

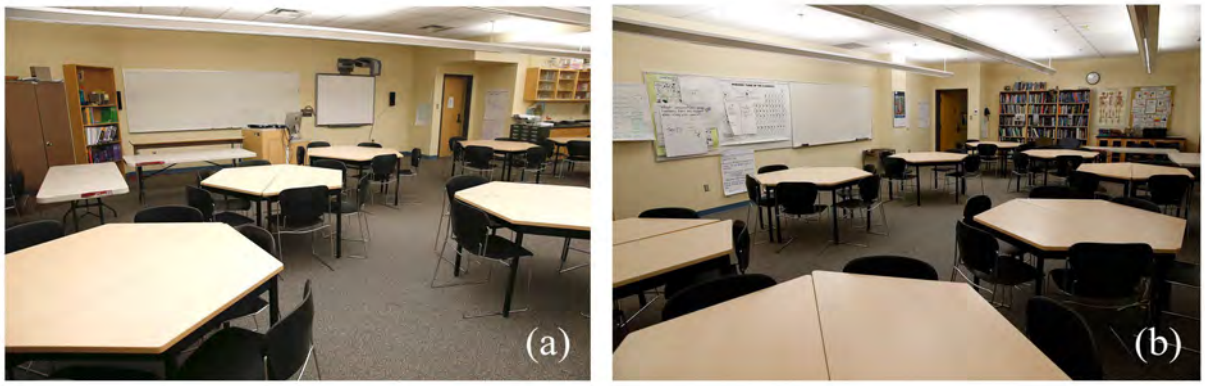
In total, 64 responses were collected in this study, reflected below as n = 64 in the methodological discussion, frequency data results, and discussions about pedagogy that pertain to the instructor.

Classroom

A traditional classroom served as the setting for Course 2, and an active learning classroom was the site for Course 1. The traditional classroom used for Course 2 (figure 1, panels a and b) is an education science teaching lab for the Faculty of Education. This classroom has 16 heavy trapezoidal tables, every two of which are pushed together along the wide side to make eight pods that seat six students. Chairs have a sled base and tables have metal post legs on carpet glides. The instructor station is against one wall of the room adjacent to an interactive whiteboard and a regular whiteboard. As this room is a teaching lab, lab benches, shelving, and cabinets are affixed to a portion of the three south-facing walls. While this classroom was often found set up in rows, the instructor would sometimes move the furniture into pods as pictured here, time permitting. It is traditional in that it had a front of the room teaching wall, was regularly found in rows, did not allow for the same movement opportunities (e.g., chairs on wheels), and allowed for approximately 1.5 square meters per student. Note that it does not provide a collaborative visual workspace for student projects (e.g., working together on Google Drive on large LCD screens), nor does it have any collaborative technology.

The active learning classroom used for Course 1 (figure 1, panels c and d) was conceptually modeled after the North Carolina State University SCALE-UP model (Beichner et al. 2000). This room has six fixed customized D-shaped tables equidistantly situated along the perimeter of the room. Each table has a wall-mounted screen. There is no front-of-room teaching wall. Chairs are on star-base casters (with a taller stool for instructor). All other wall surfaces between and next to screens are occupied by whiteboards. The space allows for approximately three square meters per student.

Figure 1. Classroom photos



Context

The University of Lethbridge is a mid-sized, comprehensive-research institution in Western Canada. One of its mandates is to offer students a liberal arts education that prioritizes, among others, collaboration and civic engagement, values that are linked to retention in the academic plan (University of Lethbridge 2017). The study was conducted after the students had completed one semester of education coursework and a five-week practical field experience prior to this semester. In the semester of the study, students were grouped according to their subject major expertise, took four on-campus courses, and participated in a six-week practical field experience. All students either had a previous bachelor's degree, or were enrolled in a combined degree program where students completed a Bachelor of Education degree concurrently with a bachelor's degree from another faculty.

Students in Course 1 were majors in either mathematics or drama education, while students in Course 2 were mathematics majors. Again, to be clear, the students in Course 2 were demographically the same students in Course 1. Students had 21 contact hours for Course 1 (one three-hour class once a week for seven weeks) and 39 contact hours in Course 2 (one three-hour class twice a week for six weeks, and one additional three-hour class). Students had completed approximately 60 percent of Course 1 and 70 percent of Course 2 when they completed the surveys. Because of these completion rates, we do not believe the timing of survey distribution had an impact on results. Had there been an impact of the timing of the survey, we would expect significantly differing completion rates.

Course design and structure

Both courses were based on the philosophy and beliefs about teaching in the social constructivist paradigm. The instructor designed the courses with the belief that we, as human beings and particularly as students, construct our own understanding of the phenomena we experience or the ideas we are presented with. Our developing understandings are based on our past experiences and knowledge, and our understanding evolves over time with new experiences and understandings (Gadamer 2006, 35-36, 41, 48). As such, the teaching (or learning strategies) employed by the instructor fit within the social constructivist paradigm (Ernest 1998, 131-61) and within the intention of the SCALE-UP classroom space. Within the courses, students are provided with opportunities to engage with the ideas and to have experiences that will help them develop their own understandings. The teaching and learning strategies integrated into the classes contained elements of active learning pedagogies, cooperative learning, and project-based learning. These pedagogical strategies were already

employed by the instructor, but we believe they finally found an appropriate match to a learning environment with the active learning classroom; such a match is also a central tenet of SCALE-UP.

One of the instructor's goals was to provide students with strategies that they could employ in their own teaching practices through getting students to experience a teaching strategy and then debriefing said strategy. In Course 1, students learned about formal assessment and evaluation practices, as well as tools that they could use to assess their own students' understanding of the curriculum. Students developed both skills in assessment design and a philosophy of assessment. Students also developed an assessment plan for a unit of study in their discipline, which was a major component of the course. The assessment plan included an articulation of a balance between formative and summative assessment tools consistent with the intended learning goals of the unit. Students developed draft plans and then engaged in structured reviews of each other's work. Throughout the course, the instructor modeled formal (exit slips[1]) and informal (observations) formative assessment strategies while meta-commenting on their purpose and what the instructor learned about the students' understandings while engaging in that strategy.

Course 2 highlighted the importance of students doing mathematics by getting students to engage in mathematical activities called "rich tasks" that they could incorporate into their teaching. A rich task has the following features: it has variable entry and exit points, it promotes students doing mathematical thinking, it engages students in high levels of cognitive demand, and it includes relevant contexts (Van de Walle et al. 2015, 30, 31-36). Each class began with students completing a rich mathematical task that they then discussed with respect to the mathematics that was being engaged in, the preparation the teacher would need to implement the task, the formative assessment data that was being collected by the instructor during the task, and the decisions that the instructor made during the task. The metacognitive conversation after the task brought forward for students elements of the teaching that were not visible during the task implementation. An example is specific decisions that the instructor made in the moment to either adapt or go ahead with the task based on the formative assessment information that the instructor was gathering. Throughout the course, students also completed formal and informal formative assessment tasks with focus on other elements rather than those specific to assessment.

The instructor's philosophy and method of teaching and learning were consistent with the intent of active learning activities that fit into the design of the active learning classroom (e.g., problem-solving, switching between activities, collaborating, using technology and group tables, and grouping and regrouping students many times during an individual class session). While in groups, students engaged in smaller teamwork to solidify their understandings or share ideas they had discussed in a previous group. (This was facilitated in the active learning classroom by group tables that had enough space to break off into smaller teams.) The instructor most frequently used jigsaw activities to engage students in collaborative learning. A jigsaw activity is one where students are grouped in a particular configuration (111, 222, 333…) and come to a common understanding (e.g., an interpretation of a reading or set of concepts as assigned by the instructor). The groups are then regrouped so that the new groups contain one member from each of the original groups (123, 123, 123…). Group members share their original information with their new group, thus spreading perspectives and understandings throughout the class. Often, the instructor brought students back to their original group formation at the

end of the activity to share any insights that were gleaned from the task. Students shared insights or asked questions of the instructor to summarize the learning.

The study

Our study was conducted as part of a larger study between the Learning Environment Evaluation Project at the Teaching Centre, University of Lethbridge, and the Educational Enhancement Team at the Centre for Teaching, Learning, and Innovation, Lethbridge College. The study was titled *Impact of Active Learning Classrooms on Student Engagement.* Unique about this aspect of the study was the comparison between active learning classrooms and traditional classrooms. Results from the complete study can be obtained through the University of Lethbridge Teaching Centre (https://www.uleth.ca/teachingcentre/lee-data). As part of this larger study, classroom observations and instructor interviews were also conducted, as was a survey about the physical attributes of the classroom. The results for those measures are not included in this article.

Survey instrument

Measuring student engagement via student perceptions

The survey (see Appendix A) was thematically constructed from the review of the literature on student engagement. Items were grouped into subscales according to the three engagement areas: behavioural (eight items), psychosocial (seven items), and cognitive (six items) indicators of student engagement. All items were based on student perceptions akin to employee engagement surveys (as used by Van Wingerden, Derks, and Bakker 2017, 55-59, 61) and existing student engagement measures (as used by Betts et al. 2010, 86, 87, 90; Burch et al. 2015, 225-228). From these studies, it is evident that student perceptions give an adequate insight into student engagement. Further frequency measures have been assessed elsewhere (see Ouimet and Smallwood 2005).

In general, items were adapted from existing survey instruments for various aspects of perceptions of student engagement, while some were newly constructed. In addition, four items pertaining to participation, collaboration, atmosphere, and belonging were asked in an identical-to-each-other fashion about the instructor, classmates, and the classroom in order to determine the relative contributions of the three factors for a total of 16 items. Lastly, on one item respectively, students were asked to self-rate their overall engagement prior to any other questions with *engagement* in the wording and their overall impression of the classroom. Demographic information was collected on four questions pertaining to age, gender, year of study, and whether the course was required for the student's degree.

Following a section for instructions, the first question (Q2) assessed the behavioural aspects of perceived student engagement. Items 2.1, 2.2, 2.3, 2.4, 2.5, 2.7, and 2.8 were adapted from the Classroom Survey of Student Engagement (CLASSE) (see Ouimet and Smallwood, 2005), and item 2.6 was adapted from the 2015 version of the NSSE. After results from a pilot study, several applicable items were modified and "when I wanted to" was added to determine that it was a student-originated activity. Question 3 was an original question devised by the research team to elicit a gut rating of a student's own perception of engagement before the term had been introduced to them. This approach has previously shown to be successful with a classroom question (see item 9.1).

Questions 4, 5 and 6 used identical question items, but were reordered and asked about the instructor, classmates, and the classroom, respectively. These questions were created by the research

team based on both the necessity and feasibility to ask of all three potential contributors to engagement in the same manner. They were designed to relate to all three aspects of engagement (behavioural, psychosocial, and cognitive):

1. participation was used to reflect the *behavioral* aspect, as participation is an observable behavior;
2. collaboration was used to reflect both *behavioral* and *psychosocial* aspects, as collaboration is both an observable behavior and an interaction with peers (as described by Bryson and Hand 2007; Tucker and Abbasi 2015);
3. atmosphere was used to reflect both *psychosocial* and *cognitive aspects* (e.g., atmosphere for learning, working), as reflective of "being in the zone" and learning with others as per the social constructivist paradigm;
4. and belonging was used to reflect the *psychosocial* aspect, as interaction with peers can lead to a social space that allows for feeling part of the class or a group (as described by Fredricks, Blumenfeld, and Paris 2004; Parsons and Taylor 2011).

Question 7 addressed psychosocial aspects of engagement. Item 7.1 was adapted from the CLASSE (Ouimet and Smallwood 2005), 7.2 was adapted from the Student Engagement Instrument™ (Betts et al. 2010). Items 7.3, 7.6, and 7.7 were structured in parallel to those items. Lastly, items 7.4 and 7.5 were created by the research team.

Question 8 addressed cognitive aspects of engagement. Item 8.1 was used to measure attention and adapted from the engagement survey for students developed by Gerald Burch (Burch et al. 2015). Item 8.2 was adapted from the motivated strategies for learning questionnaire developed by Paul Pintrich and Elizabeth DeGroot (1990) and used as an assessment of student performance. Items 8.3, 8.4, and 8.5, used to measure motivation, were adapted from Burch's instrument (item 8.5) and Pintrich and DeGroot's (items 8.3, 8.4). Item 8.6 was used to gauge self-efficacy and adapted from the Student Engagement Instrument™ (Betts et al. 2010). Lastly, question 9 asked about demographic information and the gut rating of the classroom itself (item 9.1).

Survey administration

Using the ClassClimate software (Scantron®) allowed the research team to administer the survey in paper during class time, while still receiving the data electronically. The instructor left the room before students received instructions regarding their participation in the study and only returned after the survey was completed. The survey took less than 10 minutes for students to complete.

Survey reliability

The survey underwent a pilot study in the fall 2015 semester, and one question was slightly modified in favour of easier answer options (fewer options on the frequency scale of Q2, scale labels instead of anchors). All subscales were subjected to reliability analyses and showed good internal consistency (mean $\alpha = 0.77$), under *a priori* exclusion of item 8.2 (performance estimation) and *a posteriori* exclusion of item 2.3 (preparedness) based on results of these analyses. These items are still reported in frequency data, but were excluded from statistical analyses. Full results of internal consistency analyses are reported in appendix B.

RESULTS

Data analysis

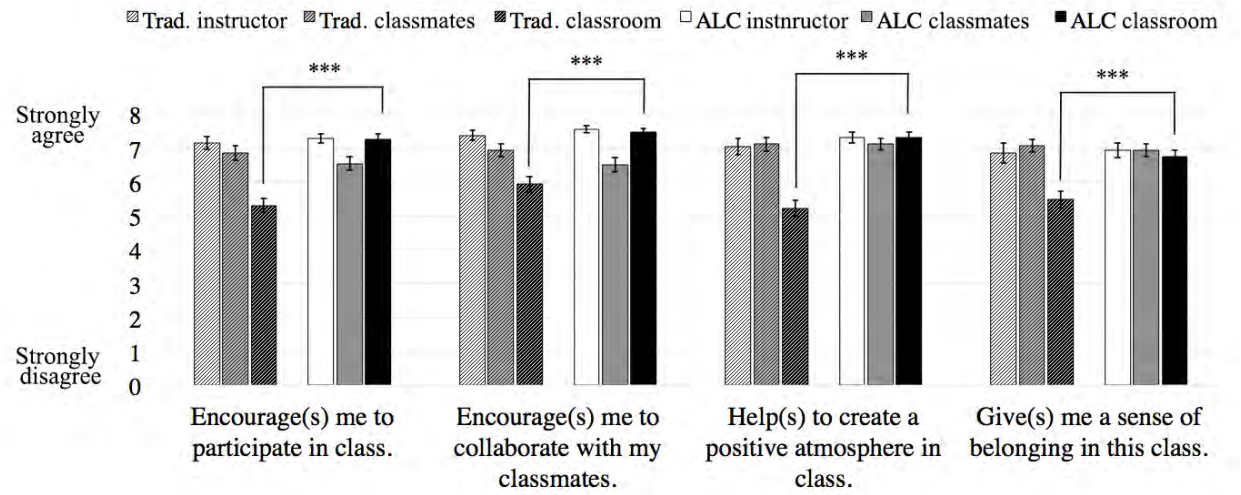
As do many others who conduct educational action research, we used a quasi-experimental action-research setup. We have been asked why this study was not set up as a controlled experiment. Because we are at a small institution and this project was constrained by time, budget, and human resources, we started with the instructor teaching in the active learning classroom and extrapolated back to the experience of the traditional classroom.

Students in the two courses were compared statistically on standardized demographic variables (z scores of age, gender, year of study) and standardized responses to the three engagement scales (z scores of behavioral, psychosocial, and cognitive engagement scores). There were no statistically significant differences between the two student populations (all ps = or > .165), which represents the foundation for future statistical analyses.

The active learning classroom significantly contributes to engagement compared to the traditional classroom

To investigate any differences in the contributions of instructor, classmates, and classroom between the active learning classroom and the traditional classroom, we conducted a univariate analysis of variance (ANOVA) with the four contribution variables (encouragement to participate, encouragement to collaborate, helping to create a positive atmosphere, and giving a sense of belonging) for each contributor (instructor, classmates, and classroom) as within-subjects factor, and with room type as between-subjects factor (active learning classroom, traditional classroom).

Figure 2. Mean ratings of instructor, classmates, and classroom for both traditional room (hatched bars) and active learning classroom (solid bars)



Note: The ANOVA revealed that students rated the active learning classroom significantly higher than the traditional classroom, all ps <.001 as indicated by the asterisks. There were no significant differences between instructor or classmates across the two rooms. Error bars represent standard error of the mean.

The ANOVA revealed statistically significant differences for room across the active learning classroom and traditional classroom on all four variables, but not for the instructor or classmates. This indicates

that the active learning classroom was rated significantly higher in contributing to these four variables of perceived student engagement than the traditional classroom. For significant test parameters, see table 1.

Table 1. ANOVA test parameters and statistics

	F (df)	*p*	M (SEM) ALC	M (SEM) traditional
Classroom encourages me to participate in class.	68.66 (1, 63)	< .001	7.27 (0.14)	5.30 (0.20)
Classroom encourages me to collaborate with my classmates.	39.90 (1. 63)	< .001	7.46 (0.13)	5.93 (0.23)
Classroom helps to create a positive atmosphere in class.	49.38 (1, 63)	< .001	7.30 (0.19)	5.22 (0.24)
Classroom gives me a sense of belonging in this class.	16.92 (1, 62)	< .001	6.75 (0.18)	5.48 (0.26)

Key: SEM = standard error of the mean

The instructor is the contributor rated highest in both room types, and followed by classroom in the active learning classroom

Additionally, four separate, repeated-measures ANOVAs were conducted to compare the relative ratings of instructor, classmates, and classroom for each of the variables for the active learning classroom and the traditional classroom, respectively. For the active learning classroom, participation and collaboration showed a significant omnibus effect, both *p*s < 0.001. Pairwise comparisons revealed that both the instructor and the classroom outranked classmates in both cases, all *p*s < 0.01. For the traditional classroom, all four variables showed a significant omnibus effect, all *p*s < 0.001. Pairwise comparisons revealed that instructor and classmates outranked the classroom on participation, collaboration, atmosphere, and belonging, all *p*s < 0.01. In addition, the instructor also outranked classmates on collaboration, $p = 0.047$. Please refer to figure 2 for visualization (differences not plotted).

The instructor and the classroom contribute to self-ratings of engagement for the active learning classroom, but only the instructor contributes in the traditional classroom

To investigate the relative and separate contributions of the instructor, classmates, and classroom to self-ratings of engagement, first, a compound score was compiled for each of the contributors, respectively. That was done by creating the mean scores of the four items of contributors. For example, to create the mean instructor contribution score, the items *instructor encourages me to participate in class*, *instructor encourages me to collaborate with my classmates*, *instructor creates a positive atmosphere in the class*, and *instructor helps to create a sense of belonging* were averaged.

To answer the question what, if anything, the classroom contributes above and beyond the contributions of the instructor and classmates, a hierarchical linear regression analysis was conducted with instructor contribution in block 1; instructor and classmate contributions in block 2; and instructor,

classmate, and classroom contributions in block 3 as predictors and students' overall self-rating of engagement as a dependent variable. This was done for both the active learning classroom data and the traditional classroom data, respectively. A bootstrap procedure was performed for the regression analysis in order to control for the small sample size (table 2 displays the models tested for each type of room). In the active learning classroom model, the model was significantly improved on all steps. This indicates that instructor, classmates, and classroom significantly explained more than half of the variance in self-ratings of student engagement. In the traditional classroom model, only the instructor rating explained the variance of self-ratings, and steps two (classmates) and three (classroom) did not significantly change the model.

Table 2. Hierarchical regression results for predictors of student engagement self-ratings

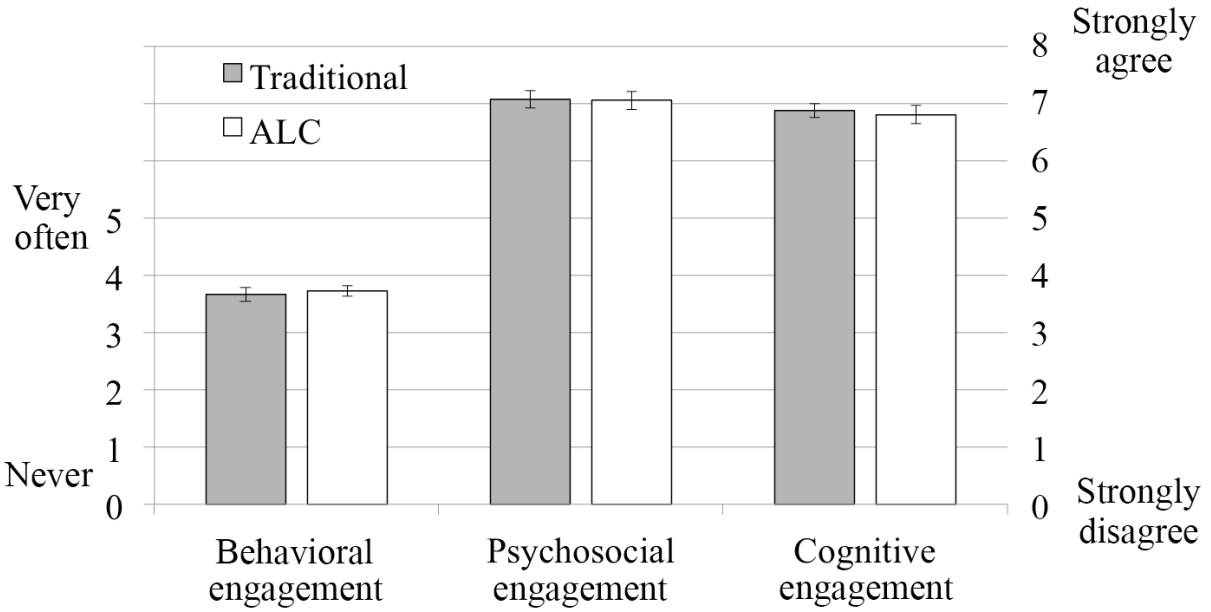
	Adjusted R^2 (Std. Err_{Est})	F-change (df1,df2)	*p* F-Change	Co-Effic. (B)	Bootstrap co-effic. 95% CI for B	*p* Bootstrap
Active learning classroom						
Instructor[a]	.227 (.73)	10.71 (1,32)	**.003***	.127	.064, .235	**.007**
Classmates[b]	.287 (.33)	3.68 (1,31)	.064	.068	-.011, .133	.090
Classroom[c]	.429 (.63)	8.72 (1,30)	**.006**	.114	.051, .191	**.008**
Traditional room						
Instructor[a]	.366 (.89)	16.01 (1,25)	**< .001**	.178	.056, .245	**.002**
Classmates[b]	.461 (.81)	5.4 (1,24)	**.029**	.111	.031, .269	.065
Classroom[c]	.493 (.76)	2.52 (1,23)	.126	.065	.157 .161	.157

Key:
*bolded *p*-values are significant
[a]Predictors: (Constant), mean instructor contribution
[b]Predictors: (Constant), mean instructor contribution, mean classmate contribution
[c]Predictors: (Constant), mean instructor contribution, mean classmate contribution, mean classroom contribution
Bootstrap was conducted for 1,000 samples with a 95 percent confidence interval (CI)

There were no differences in behavioral, psychosocial, or cognitive aspects of engagement between the two rooms

One might infer that the differences explained above could be due to students in one course being more engaged, or differently engaged, than students in the other course. Mean compound scores of each of the subscales for behavioral, psychosocial, and cognitive engagement were compared across the two rooms. Independent *t*-tests revealed no significant differences on either of the subscales, all *p*s > 0.65 (two-tailed; figure 3).

Figure 3. Mean ratings of engagement subscales for traditional (grey bars) and active learning classroom (white bars)



Note: Independent t-tests revealed no significant differences between the groups on any of the subscale mean compound scores. Ratings for the behavioral engagement scale range from 1 = never to 5 = very often (frequency of behaviors), while ratings for the remaining two scales range from 1 = strongly disagree to 5 = strongly agree (agreement with statements). Error bars represent standard error of the mean.

DISCUSSION

Our findings showed that the learning environment matters to achieve improved results for student-perceived engagement as measured through influence of instructor, classmates, and classroom on self-ratings of engagement. We demonstrated a gain in student engagement self-ratings when active learning was met with an active learning classroom, despite ratings being generally high across both room types as elicited by the active learning pedagogy.

Similar results have been identified by Nathaniel Lasry and colleagues (2013), showing that a mismatch of the learning space and type of instruction can lead to unfavorable results. In this study, we found that when active learning strategies are matched with an active learning classroom, self-rated student engagement is positively impacted (see figure 2; table 2). This positive impact was specific to the relationship between the instructor and the classroom, and their relative contributions to perceived student engagement. We further demonstrated that an alignment between learning strategies and classroom can lead to improved student perceptions of engagement. This is evidenced by the fact that only the active learning classroom, but not the traditional classroom, elicited higher classroom contribution to student self-ratings of engagement.

In the traditional classroom, the instructor employed active learning strategies as used in the active learning classroom; however, the implementation of those pedagogies was not as smooth and required more planning by the instructor in order to make those pedagogies flow in the classroom space. For example, in the active learning classroom there were numerous whiteboards where students detailed their ideas and thinking in which other students could engage. In the traditional classroom there were fewer whiteboards; thus, the instructor had to use mini-whiteboards, poster paper, or table tops in order

to conduct a similar type of activity. The challenges were not insurmountable but required the instructor to come up with alternatives to what was already available in the active learning classroom. Additionally, with its low square footage per student, lack of collaborative technology (e.g., screens), and static furniture layout and spacing, the traditional classroom clearly signaled that it was not meant for many of the active learning strategies employed.

Our results also indicate that perceived engagement was high in traditional classrooms, suggesting that despite the physical learning environment, if teaching method (active learning vs. direct instruction), course design, and the instructor's teaching style and philosophy are aligned with active learning pedagogies, classes can be engaging. However, a novel factor in our study was the classroom itself: we learned that the classroom contribution clearly increases this self-rated engagement, as revealed by the significant prediction of the active learning classroom to engagement self-ratings, but nonsignificant prediction of the traditional classroom (table 2). Interestingly, we found that traditional measures of student engagement (behavioral, psychosocial, and cognitive), which are often used as frequency measures but were used here as perception ratings, are unable to yield the exact influence of the classroom as a specific contributor to engagement. However, asking about the classroom specifically identified a difference in perceptions of student engagement. The indication that there were no differences in behavioral, psychosocial, and cognitive measures of engagement strongly suggests that these factors are not determined by the classroom, but were more likely influenced by other factors, including course design, which is dependent on the instructor, and the opportunity for interactivity, which is often scripted into the course design (see Lasry et al. 2013). Therefore, although the behavioral, psychosocial, and cognitive measures do not serve well to measure classroom contribution, they do serve as indicators of perceived student engagement.

Notably, when asked about perceptions of engagement, the physical classroom made a difference that is obscured in traditional measures, which seem to rely on other factors. Therefore, these measures of engagement could be said to serve as control factors. Specifically, both types of rooms received a high instructor contribution to these self-ratings. Yet, in the active learning classroom, the classroom contributed above and beyond the existing instructor contribution to self-rated student engagement. This indicates that when an instructor teaches in an optimal learning environment that is well-suited to the pedagogy implemented, the classroom can enhance the instructor's contribution to perceived student engagement (see table 2). Such a result was not found in the traditional classroom, where the instructor contribution was overall larger, indicating that the engagement contribution, as measured and statistically determined here, is solely carried by the instructor. This finding suggests what most experienced instructors know at some level: we work harder when placed in a suboptimal learning environment. It also suggests that an ideal learning environment allows us to reach full potential as educators.

While the contribution of the physical classroom to student engagement has not been directly investigated as we have, other studies have shown that matching learning environment to pedagogy can have positive impacts. For example, several studies by Beichner and colleagues about matching SCALE-UP pedagogy and room show positive impacts related to reduced failure rates, higher grades, and better attitudes for students (Beichner et al. 2000; Beichner 2007; Beichner and Saul 2003), which was the starting point of our own investigation. Further, Lasry, Charles, Whittaker, Dedic, and Rosenfield (2013) showed that when adapting pedagogy to a technology-rich classroom, improved student gains

(e.g., grades) were reached, yet when the pedagogy was insufficiently adapted, these gains were absent despite the state-of-the-art classroom. In fact, the authors concluded that active learning pedagogies result in higher student gains regardless of classroom. Our results support findings that traditional measures of engagement (behavioral, psychosocial, and cognitive), as they were similar across classrooms, can be assumed to be mostly carried by the pedagogy and instructor.

Like Lasry, Charles, Whittaker, Dedic, and Rosenfield (2013), therefore, we advocate for matching the learning environment to the pedagogy to achieve improved results. It is such that active learning strategies can foster the increased perception of engagement by both students and instructors. While we did not set out to measure student learning per se, it stands to reason that an increased opportunity to engage in active learning through an appropriate venue, the active learning classroom, provides an improved way for students to engage in the social construction of knowledge (Dewey [1938] 1997).

Limitations

Three main caveats should be kept in mind when interpreting the results. First, this study employed a quasi-experimental approach rather than a controlled experiment. Second, the instructor self-selected to teach in the active learning classroom and showed enthusiasm to do so. This enthusiasm may have influenced the students. Importantly, however, the teaching styles between the two rooms did not differ markedly. Third, further investigation is required to identify whether such a result can also be obtained by matching other styles of teaching, such as direct instruction, to their ideal classrooms, such as a good lecture theatre. It could be the case that any well-designed learning environment can produce optimal perceived student engagement, and not simply a well-designed, active learning classroom. Future research should (a) collect additional data to supplement a moderate-sized sample, (b) compare more classes by the same instructor over several terms and years, and (c) investigate traditional classrooms under assessment of traditional pedagogies (e.g., direct instruction).

When this research has been presented, there was feedback on the main traditional classroom used in this study as not being traditional at all. However, it should be noted that there are several important distinctive characteristics of the room: while the instructor would usually set up this classroom in pods according to the images shown, this classroom still had a traditional front-of-the-room teaching wall and station, and thus was also found in rows (i.e., required setup). Further, this room did not have the ability for students to collaborate at their pods using any technology available. Instead of being able to project their ideas on individual screens as in the active learning classroom, students in the traditional classroom had to gather around one student's computer in order to collaborate, which made working on common projects (e.g., Google Drive) cumbersome and difficult. Further, when working together in the traditional room, several students without computers commonly stood behind those with computers, as the laptop screen was not visible from all around the table. With physical barriers hindering the execution of all-inclusive collaboration, it is fathomable that the space signalled liminality and non-belonging (see figure 2, comparison of classroom in "belonging"). In addition, the active learning classroom was measured to include a higher square footage per student as required for active learning and thus used by students to move around often, whereas the traditional classroom had much more constricted space and did not in fact afford students to move around often or unimpededly. This was not only true for the workspace itself, but also for overall mobility in the classroom due to the non-

swivel traditional chairs without casters and heavy tables. We estimate that compared to the 3.5 square meters per student in the active learning classroom, the traditional room offered 1.4 square meters per student despite the instructor's effort to configure it in pods. Though the intent of the instructor was that the students would be moving around a similar amount of time in both spaces, the traditional classroom set-up did not allow for ease of movement. The traditional classroom space was more crowded, and students ended up tripping over each other's belongings making them frustrated about having to move around, thus asking the instructor that they be asked to move around less. Further, the instructor did not use the outdated technology in the traditional classroom (SMARTboard) in conducting her classes; however, because the technology was seamlessly incorporated in the active learning classroom for both the instructor and the students, it was regularly used.

The instructor found that she was more engaged with the class itself in the active learning classroom. The layout of the room, as well as the lack of an apparent front of the classroom, meshed with her teaching style and the structure of the class. While the space itself provided opportunity for students to engage with and use technology in their learning activities, the instructor did not utilize those elements of the classroom at every occasion out of her own initiative, nor mandate students to use them. However, students themselves had the ability to choose when to use technology for their collaborations and did so at their liberty rather than dictated by the instructor. Finally, separate and independent surveys conducted by the first author (VH) over two years have indicated that the layout (including space per student) and furniture (as well as environmental factors such as lighting) are significantly better suited to active learning pedagogies in the active learning classroom.

Conclusion

This study has potential to influence institutional planning on multiple levels. First, scheduling classes into classrooms based on pedagogy is highly recommended, as such a match suggests to produce desirable outcomes for both instructors and students. Even if a well-designed learning environment creates higher rates of perceived student engagement indirectly as mediated by instructor disposition due to teaching in such a space, this study showed that we can no longer assume that the learning environment does not matter. Institutional advocacy should be directed toward appropriate scheduling practices that, under instructor consultation, take into consideration how certain teaching styles will fit into certain classrooms. Second, it has been remarked over the past four to five decades that learning environments are often antiquated and outdated (McLuhan 1962; Wesch 2007). Active learning in postsecondary education is increasingly revealing deficiencies in classroom spaces. While renovation and construction are always tied to already tight budgets, findings such as ours should be a wake-up call to institutions to reallocate resources to obtain and maintain optimal student outcomes. Third, this study can be regarded as a call for instructor professional development toward engaging learning strategies, where so required.

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NOTES

[1] Exit slips are short forms on which students answer a simple, typically open-ended question, such as "What is one remaining question you have from today's class?"

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APPENDIX A: THE SURVEY INSTRUMENT

2. Please rate the frequency with which you have engaged in the following behaviours in this course this term.

		Never	Rarely	Sometimes	Often	Very Often
2.1	When I wanted to, I contributed to a class discussion that occurred during class.	☐	☐	☐	☐	☐
2.2	When I wanted to, I asked questions during class.	☐	☐	☐	☐	☐
2.3	I came to class without having completed readings or assignments.	☐	☐	☐	☐	☐
2.4	I worked with other students on projects during class.	☐	☐	☐	☐	☐
2.5	When I wanted to, I worked with classmates outside of class to prepare assignments/projects.	☐	☐	☐	☐	☐
2.6	I explained concepts or ideas from class to classmates.	☐	☐	☐	☐	☐
2.7	When I wanted to, I discussed ideas from readings or class with the instructor outside of class.	☐	☐	☐	☐	☐
2.8	When I wanted to, I discussed ideas from class with others outside of class (students, family, friends, coworkers, etc.).	☐	☐	☐	☐	☐

3. Overall, how would you describe your engagement in this course this term?

3.1 Not At All Engaged ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very Engaged

4. Please rate your level of agreement with the following items:

The instructor...

		Strongly Disagree							Strongly Agree
4.1	Encourages me to participate in class.	☐	☐	☐	☐	☐	☐	☐	☐
4.2	Encourages me to collaborate with my classmates.	☐	☐	☐	☐	☐	☐	☐	☐
4.3	Helps to create a positive atmosphere in class.	☐	☐	☐	☐	☐	☐	☐	☐
4.4	Gives me a sense of belonging in this class.	☐	☐	☐	☐	☐	☐	☐	☐

5. Please rate your level of agreement with the following items:

My classmates...

		Strongly Disagree							Strongly Agree
5.1	Encourage me to collaborate with them.	☐	☐	☐	☐	☐	☐	☐	☐
5.2	Give me a sense of belonging in this class.	☐	☐	☐	☐	☐	☐	☐	☐
5.3	Encourage me to participate in class.	☐	☐	☐	☐	☐	☐	☐	☐
5.4	Help to create a positive atmosphere in class.	☐	☐	☐	☐	☐	☐	☐	☐

6. Please rate your level of agreement with the following items:

This classroom...

		Strongly Disagree							Strongly Agree
6.1	Helps to create a positive atmosphere in class.	☐	☐	☐	☐	☐	☐	☐	☐
6.2	Encourages me to participate in class.	☐	☐	☐	☐	☐	☐	☐	☐
6.3	Gives me a sense of belonging in this class.	☐	☐	☐	☐	☐	☐	☐	☐
6.4	Encourages me to collaborate with my classmates.	☐	☐	☐	☐	☐	☐	☐	☐

7. Please rate your level of agreement with the following items:

		Strongly Disagree							Strongly Agree	N/A / did not do this
7.1	I am comfortable talking to my classmates.	☐	☐	☐	☐	☐	☐	☐	☐	☐
7.2	My classmates respect what I have to say.	☐	☐	☐	☐	☐	☐	☐	☐	☐
7.3	The instructor respects what I have to say.	☐	☐	☐	☐	☐	☐	☐	☐	☐
7.4	Working with classmates on activities *during class* was a good use of my time.	☐	☐	☐	☐	☐	☐	☐	☐	☐
7.5	Working with classmates on activities *outside of class* was a good use of my time.	☐	☐	☐	☐	☐	☐	☐	☐	☐
7.6	I am comfortable talking to the instructor *during* class.	☐	☐	☐	☐	☐	☐	☐	☐	☐
7.7	I am comfortable talking to the instructor *outside of* class.	☐	☐	☐	☐	☐	☐	☐	☐	☐

8. Please rate your level of agreement with the following items:

		Strongly Disagree							Strongly Agree
8.1	When I am in class, my mind is focussed on class activities.	☐	☐	☐	☐	☐	☐	☐	☐
8.2	I expect to do well in this course.	☐	☐	☐	☐	☐	☐	☐	☐
8.3	Understanding the subject of this course is important to me.	☐	☐	☐	☐	☐	☐	☐	☐
8.4	I prefer courses that challenge me intellectually.	☐	☐	☐	☐	☐	☐	☐	☐
8.5	I put a lot of effort into this course.	☐	☐	☐	☐	☐	☐	☐	☐
8.6	I am responsible for how well I do in this course.	☐	☐	☐	☐	☐	☐	☐	☐

9. Other information

9.1	Generally, how do you feel about this classroom as a learning environment?	I hate it	☐	☐	☐	☐	☐	I love it

APPENDIX B: INTERNAL CONSISTENCY OF SURVEY SUBSCALES

We constructed the survey instrument from several subscales addressing different concepts. The subscales were comprised of modified items from different existing instruments and occasional novel items. Reliability analyses were conducted for the three subscales (behavioral, psychosocial, and cognitive engagement) to assess their internal consistency. This was initially done for the pilot instrument, and then repeated for the final survey. Results for the final instrument are reported here.

The behavioral engagement subscale had somewhat low internal consistency (N = 8, $\alpha = 0.59$), which was largely carried by two items of low item-total correlation, *I came to class with completed assignments or readings*, $r = -0.11$, and *I worked with other students on projects during class*, $r = 0.285$. All other item-total correlations were above 0.3. Only the first item's deletion would bump Cronbach's alpha to 0.66. This indicates that the *preparedness* item was not well correlated to the scale, and thus determined an inadequate item for the behavioral subscale. Since upon deletion the subscale is close to the 0.70 cut-off of conventionally acceptable reliability, this scale can be considered moderately reliable with exception of *preparedness*.

The psychosocial engagement subscale had high internal consistency (N = 7, $\alpha = 0.84$). The range of item-total correlations was $r = .40$ to $r = 0.77$. Lastly, the cognitive engagement subscale had high internal consistency (N = 5, $\alpha = 0.80$). Item-total correlations ranged from $r = .47$ to $r = 0.74$. Note that the item used as a measure of performance was not included in this analysis, as it was not conceptually intended to be part of this scale, and only included in this place due to its thematic fit. Thus, it is recommended that the preparedness (behavioral subscale) and performance items be taken out of subsequent statistical analyses. This does not prevent their use as stand-alone items or their inclusion in frequency depictions.