The Canadian Journal for the Scholarship of Teaching and Learning

Volume 15 | Issue 2 Article 12

Summer 08-31-2024

Teaching in Active Learning Classrooms at a Canadian University

Hedieh Najafi
University of Michigan, hediehna@umich.edu
N. Carol Rolheiser
University of Toronto, carol.rolheiser@utoronto.ca
Kelly Gordon
University of Toronto, kelly.gordon@utoronto.ca

https://doi.org/10.5206/cjsotlrcacea.2024.2.14408

Teaching in Active Learning Classrooms at a Canadian University

Abstract
This article describes an evaluation of a campus wide Active Learning initiative to examine instructors' experiences teaching in Active Learning Classrooms (ALCs) at a Canadian University. ALCs at this university differ in size, layout, and audio-visual equipment. The participants were 21 instructors from different disciplines who had taught courses in various ALCs who were interviewed to explore their pedagogical decision-making, teaching experiences, and their access to ALC-specific, pedagogical and technological support. Instructors explained their classroom management strategies specific to ALCs, discussed how physical and technological features of different ALCs impacted the extent of necessary revisions to their courses, and highlighted logistical issues in being assigned to ALCs that may fit the requirements of their courses. Based on the findings, we pose a series of recommendations to offices responsible for classroom assignment, academic departments, and centres for faculty support and development. Overall, instructors would benefit from advance notice of ALC room assignment, just-in-time and self-directed opportunities regarding integrating Active Learning strategies in instruction, and access to orientation sessions and multimedia documentation developed for different types of ALCs.

Cet article décrit l'évaluation d'une initiative d'apprentissage actif à l'échelle du campus afin d'examiner les expériences des enseignants et des enseignantes dans les salles de classe d'apprentissage actif d'une université canadienne. Les classes d'apprentissage actif de cette université diffèrent par leur taille, leur agencement et leur équipement audiovisuel. Les participants et les participantes étaient 21 enseignants et enseignantes de différentes disciplines qui avaient donné des cours dans diverses classes d'apprentissage actif. Ils ont été interrogés pour explorer leurs décisions pédagogiques, leurs expériences d'enseignement et leur accès à un soutien pédagogique et technologique spécifique aux classes d'apprentissage actif. Les instructeurs et les instructrices ont expliqué leurs stratégies de gestion de classe spécifiques aux classes d'apprentissage actif, discuté de la manière dont les caractéristiques physiques et technologiques des différentes classes d'apprentissage actif ont eu un impact sur l'étendue des révisions nécessaires à leurs cours, et ont souligné les problèmes logistiques liés à l'affectation à des classes d'apprentissage actif susceptibles de correspondre aux exigences de leurs cours. Sur la base des résultats, nous formulons une série de recommandations à l'intention des bureaux responsables de l'affectation des salles de cours, des départements universitaires et des centres de soutien et de développement du corps enseignant. Dans l'ensemble, les enseignants et les enseignantes bénéficieraient d'une notification préalable de l'affectation des salles dans les classes d'apprentissage actif, d'opportunités ponctuelles et auto-dirigées concernant l'intégration des stratégies d'apprentissage actif dans l'enseignement, et d'un accès aux séances d'orientation et à la documentation multimédia élaborée pour les différents types de classes d'apprentissage actif.

Keywords
active learning, active learning classrooms, faculty development; apprentissage actif, salles de classe d'apprentissage actif, développement professionnel des professeurs et des professeures

This evaluation paper/Rapport d'évaluation is available in The Canadian Journal for the Scholarship of Teaching and Learning: https://doi.org/10.5206/cjsotlrcacea.2024.2.14408

This evaluation took place in a large public, research-intensive university, with over 97,000 students and over 16,000 faculty (2022–2023). Since 2014, this Canadian university (the University) has built new classrooms or refurbished existing classrooms to provide spaces that facilitate Active Learning. Active Learning Classrooms (ALCs) offer more square footage per student, are outfitted with furniture suitable for small group work, and are equipped with a variety of audio-visual (AV) technology. To understand how instructors at the University teach in different types of ALCs, we conducted an evaluation of this campus-wide initiative between March 2019 to February 2020. Our goals were to explore:

- Instructors' pedagogical decision-making in relation to design features and technological affordances of the ALCs;
- Instructors' experiences while teaching in these ALCs; and
- Existing and desired pedagogical support to maximize opportunities for Active Learning in the ALCs.

While this evaluation project has direct implications for the immediate University community, it can also inform decision making regarding the provision of support, and instructional practices related to ALC-type classrooms in similar higher education organizations.

Review of Related Literature

Rooted in constructivist views of learning, Active Learning happens when learners become cognitively engaged with materials presented to them (Bonwell & Eison, 1991). The level and depth of this cognitive engagement may vary from reorganizing the material, providing explanations for a given concept, constructing arguments, to solving problems with peers (Chi & Wylie, 2014). In the context of higher education, instructors are mainly responsible for designing and implementing learning activities that require learners to become cognitively engaged with material that they receive through readings or lectures. While existing research provides evidence for the effectiveness of Active Learning approaches in a variety of disciplines (Hao, Barnes & Jing, 2021) in both low-tech (Carlson & Winquist, 2014) and high-tech (Gordy et al., 2018) classrooms, instructors' experiences as they prepare to and then teach in ALCs are still understudied (Talbert and Mor-Avi, 2019).

In reviewing the literature related to pedagogical practices in ALCs specifically, a variety of findings surfaced (Brooks & Solheim, 2014; Lee et al., 2018; Mozelius & Sundgren, 2018; Remington et al., 2015; Talbert & Mor-Avi, 2019).The importance of pedagogical practices in relation to the technological affordances of high-tech ALCs is highlighted in Brooks and Solheim's (2014) study where one instructor redesigned her course to maximize the technological affordances of an ALC in line with a student-centered pedagogical approach. The instructor had taught the lecture-based version of the same course in the same ALC in the previous academic year. Brooks and Solheim compared final course grades in both years to detect any potential impact of curriculum redesign on students' learning and found that the students in the redesigned course achieved significantly higher grades.

To examine the experience of instructors who taught in two high-tech ALCs in a Swedish university, Mozelius and Sundgren (2018) conducted interviews with nine instructors and held a focus group with tech support and maintenance personnel. The study instructors faced minimal technical difficulties and found flexible small-group seating conducive to collaborative work. The

researchers noted that the instructors in the study were still exploring ways to effectively use the technological capacity of the classrooms and integrate Active Learning approaches into their teaching.

Another study examined faculty members' and students' teaching and learning experiences in a high-tech ALC as an interaction among pedagogy, space, and technology (Lee et al., 2018). Four faculty members participated in interviews and 19 others responded to online surveys. Lecture followed by group work and whole class discussion was the dominant instructional approach, yet the instructors expressed some frustration with lecturing and facilitating whole class discussions in the ALC as it lacked a visual focal point and a central view for students (Lee et al., 2018). The design of the ALC, Lee et al. (2018) asserted, supported group work. The instructors also indicated that teaching assistants could further facilitate small group activities.

Regardless of the level of technology used in classrooms, implementing Active Learning approaches in higher education can also entail administrative, pedagogical, and logistical challenges. One example is a large-scale initiative to integrate team-based learning in a college of pharmacy (Remington et al., 2015) where room layout, faculty concerns about the impact of such a shift on students' learning, and competing research and professional practice priorities were identified as some of the barriers to the sustainability of the initiative.

Often, the number of high-tech ALCs are limited (Mozelius & Sundgren, 2018) which may lead to concerns about access to these rooms. Another challenge for the instructors is becoming familiar with the integrated technology and layout of the ALCs before they can maximize the pedagogical potentials of these rooms. Faculty members in Lee et al.'s (2018) study suggested more training and consultation resources to overcome these challenges.

According to Talbert and Mor-Avi (2019), one implication for studying ALCs of various technological affordances, is to consider how the technological affordance of space, and other elements of active learning environments (Hao, Barnes & Jing, 2021), interact with pedagogical approaches. Conducting this evaluation project was timely given the increasing number of ALCs on the central campus of the University. Our goal was to better understand instructors' experiences teaching in the ALCs and examine support structures needed to facilitate Active Learning in the ALCs.

To contextualize this methodology and the findings of this study, we first describe different types of ALCs as of June 2020 at the University.

ALCs at the University

Within the University, ALCs are classrooms with layouts and furniture that lend themselves to Active Learning strategies and facilitate students' participation in small group and whole class discussions. Note that in this paper we use the terms small group work and teamwork synonymously.

As a preliminary step for this evaluation, we created a classification of the ALCs (Table 1) considering room layout, table size, number of wall mounted writing surfaces, and the flexibility of presentation options. In our classification ALC3 represents one 468-seat auditorium. As of 2020, this room was the only lecture hall of its kind in North America, featuring small-group seating and interactive learning.

Table 1

Four Categories of ALCs at the University

Descriptors	ALC Category			
	Standard ALC	ALC1	ALC2	ALC3
Room Layout	Reconfigurable. Movable chairs and tables.			Auditorium style tiered hall. Fixed chairs and tables on each tier, designed for small group work
Table Size	1-8 students		4-8 students	4-6 students
Writing Surface	One or more whiteboards	Multiple Whiteboards		Whiteboards and document camera
Presentation Options	Single data projector connected to the teaching station.	Data projector connected to teaching station. Students can connect their laptops to the projector through wireless connection.	Data projector connected to teaching station. Students in each group can connect their laptops to the projector through HMDI port at each table or through wireless connection.	Jumbotron with split capability, controlled through touch monitors on teaching station. Students can project iPad or laptop screen using HMDI ports at each table. Instructional team controls projection requests through touch monitors. Each table has a microphone for students to enter a queue and speak to the whole class. Wireless presentation is available.
Photos[a]				

[a]Photos were downloaded on Nov 30 2023 from the website of the office that manages The University's learning space. Used with written permission from that office director.

Characterizing Active Learning in this Evaluation Project

The evaluation team found a lack of common language across the University regarding what characterizes Active Learning. The team consulted relevant literature to develop a set of characteristics and iteratively refined the list based on input from the instructors who participated in this evaluation project. We have published the resulting list elsewhere (Centre for Teaching Support & Innovation, 2020). In summary, at the University, learning activities that require information gathering and synthesis and applying critical thinking to solving problems enable Active Learning. Those activities, whether simple or complex, aim to increase learners' agency and ownership in the learning process. Finally, educational technology may enhance Active Learning.

Methodology

This project was approved as Quality Assurance/Quality Improvement by the Research Ethics Board Manager, Social Sciences and Humanities, Office of Research Ethics of the University. The Project started in March 2019 and concluded in March 2020.

Participants

We identified all instructors who had recently taught in ALCs in the previous academic year and the academic year when this evaluation was conducted. Next, we selected a subset of all instructors who represented a variety of disciplines, teaching experience, and course level to participate in an hour-long interview. We scheduled in-person or online interviews with the instructors who accepted to participate. Table 2 provides information regarding disciplinary affiliation of the 21 participants and the type of ALC where they had taught.

Table 2

Summary of Information about the Project Participants

ALC Category	Number of Participants per Disciplinary Affiliation			
	Social Sciences	Humanities	Engineering/ Computer Science/Math	Life Sciences
Standard ALC	2			1
ALC1		2		1
ALC2	3	1	2	1
ALC3		1	7	

Data Collection and Analysis

The main data sources for this project were semi-structured interviews with participating instructors and course syllabi. We conducted semi-structured interviews with 21 instructors who had taught in the ALCs. In one case, we used a modified protocol for an email interview. In the interviews, we asked the instructors to explain their interpretation of Active Learning, to outline their preparation for teaching in ALCs, and to describe their teaching experiences in the ALC. We also asked the instructors to think about how they would use their experience when they teach in an ALC in the future. We asked the instructors to provide a copy of their course syllabi for the

course that they taught in an ALC, and the same course taught in a non-ALC classroom, if applicable. In the course syllabi, we looked for direct or indirect references to Active Learning strategies, course assignment, or participation expectations. We asked the instructors probing questions during the interview as needed. Interviewers' field notes and post-interview debrief, where applicable, complemented the data set.

We used open coding (Glaser, 2016), a data-driven iterative process, to code the interview data. One of the authors read an interview transcript several times and assigned initial codes to excerpts of interviews that conveyed a cohesive meaning related to teaching and learning in the ALCs. A list of preliminary codes was applied to a second interview transcript which allowed the coder to identify new codes and eliminate redundant ones. This process was repeated for four more interview transcripts. At each coding session, the descriptive codes were revised based on cumulative insights gained from reviewing more interview data. By the end of this phase, the authors developed a code table and proceeded to categorize related codes under code categories. Two coders applied the revised coding table to all interviews in tandem and discussed disagreements with a third coder. Course syllabi and field notes were coded in a similar manner. We eliminated all identifying information in the last phase of data analysis.

Findings

We present the findings of this evaluation project in the following sections: Preparing to teach in the ALCs, teaching in the ALCs, technological affordances of the ALCs and issues experienced, teaching assistants' (TAs) role in the ALCs, orientation opportunities and support sources for the ALCs, and thoughts for teaching in ALCs in the future.

Preparing to Teach in the ALCs

Room Assignment and Resource Allocation

Preparation to teach in the ALCs started with classroom assignment. However, instructors described different experiences and paths with their ALC classroom assignments. At the University, some departments ask for the instructors' preferred classroom type. While instructors' preferences are not always accommodated, our interview data showed instances where the instructors were assigned to ALCs based on direct or indirect requests.

Four science/engineering instructors had requested to teach in the ALC3 as they were redesigning their high-enrollment courses to maximize Active Learning opportunities for their students. Technological affordances of ALC3 could facilitate their vision. Three other instructors did not request to teach in ALC3 but anticipated that they were assigned to this room either due to similar courses in their department being assigned to ALC3 or to the size of their course. For large courses, ALC3 allowed the instructors to scale up their teaching while providing Active Learning experiences for their students. In a number of cases, the high enrolment for the course resulted in the instructor's course being assigned to the ALC3, while in another example an assignment to the ALC3 coincided with the instructor's intention of increasing the level of AL in the course with planned increasing enrollment.

Other instructors expressed their preference to their department to teach in specific types of classrooms that supported their pedagogical goals. For one of the instructors, moveable furniture in an ALC2 classroom, compared with theatre-style seating arrangements in other

classrooms, facilitated small group activities. When the department administrator announced the availability of ALC2s, this instructor requested to be assigned to one of those rooms. Similarly, another instructor had expressed interest in classrooms that simultaneously accommodated whole class and small group discussions.

The rest of the instructors who participated in this evaluation project were assigned to ALCs through campus-wide classroom assignment processes and were notified about their assigned classroom close to the beginning of the semester. This left them with little time to leverage the affordances of the ALCs in their course design. Another room assignment issue that affected preparation was lack of information about design specifications of each room. The instructors suggested that it would be helpful if they visited the classrooms earlier or if they had access to detailed online classroom information.

Logistical Preparations to Teach in the ALCs

Instructors who taught in the ALC3 were most likely to need extensive planning before starting their course. In addition to the usual preparatory time for teaching a course, ALC3 instructors had organized all the required cables and digital devices (e.g., iPads, laptops, digital pencils) that they were using in the room. In ALC3, the instructors could display information in different ways and from different sources. Keeping track of content stored across multiple devices was important and prevented delays in instruction. A Sciences/Engineering instructor, described their preparation process:

> I had to manage how many times I asked a question… So, I needed three dongles, two power cords, my Apple Pencil and I had to make sure my laptop, iPad and pencil were charged, turn off notifications, … I needed a paper and a pencil and [to] make sure my laptop and iPad wouldn't go to sleep. Had a lot to carry, and the worksheets, 470 worksheets. (Sciences/Engineering instructor, ALC3)

While one of the instructors had spent up to six hours preparing for one class session, most of the ALC3 instructors expected their extensive initial planning would be reduced for subsequent semesters if they had the same type of classroom.

Advance notice about room assignment could greatly facilitate changes to course design as the instructors stated that redesigning courses to utilize the affordances of ALCs may require a few months. At the time of conducting the interviews, some of the instructors had little preparation time between room assignment and the start of their classes.

For ALC2s, ALC1s, or Standard ALCs, the instructors needed to carry a variety of AV cables and other connectors for their laptop and the teaching station to be ready for any kind of technology configuration in the classroom. Rearranging moveable chairs and tables after the previous class ended was another logistical preparation they raised.

Teaching in the ALCs

Scaffolding Students' Whole Class and Small Group Participation

When the affordances of the ALCs matched the instructors' instructional requirements, they positively viewed their teaching experience in these classrooms. Teaching in the ALCs

enabled some instructors to push the boundaries of course design. As one instructor who taught in an ALC1 commented, ALCs allowed them to enhance their teaching through increased student engagement. Reviewing their experience teaching in ALC3, an instructor stated that their existing teaching approaches would not be as efficient in this classroom and they needed to think about how to increase students' engagement in this new, more expansive space.

We asked the instructors to share some of their strategies for facilitating students' participation. A common strategy was to clarify participation expectations either in the course syllabus or early in the semester. In one program, instructors shared a consistent code of conduct in their course syllabi. Relevance of group work to students' professional future was also discussed. In one class, for example, the instructor worked with students to create group charters for the ad hoc groups:

> [I have them] do a team exercise, to do a fun one, the first class when they are put into their teams, just to kind of give them a sense. We do spend some time in that class... talking about teamwork, and you know, just kind of helping them, reminding them about team. And you know, being an effective team member, and they do a team charter as well. So, I kind of feel like I'm setting them up. (Social Sciences instructor, ALC2)

Three instructors assigned students to small groups based on specific criteria such as diversity of ideas. The composition of the small groups changed periodically to maximize students' chances of getting to know their peers and being exposed to a variety of viewpoints. Recognizing students' contributions to small group and whole class discussions and assessing the quality of such contributions was an unresolved issue.

ALC3's affordances supported groupwork and inspired the instructors to increase group work opportunities where students could discuss their approaches to solving a problem or where they could complete and submit the assigned tasks during class time. In one course carried out in the ALC3, students used the document camera to share their work with the whole class, a first in this course. Table arrangement in ALC3 lent itself to small group discussion. A Sciences/Engineering instructor commented in their interview:

> There was an obvious group of students to work with. Whereas previously, I would encourage them to find some people around them to talk to. But then you know, if you're shy, you have to kind of look at these people around you and like try to initiate a conversation and it's awkward, and they don't talk to anyone. But just in those little tables, it's obvious. (Sciences/Engineering instructor, ALC3)

We noted positive remarks about ALC2s, ALC1s, and standard ALCs. Furniture arrangement and the shape of tables in these ALCs were inviting and facilitated small group discussions. This was especially an advantage for courses where the bulk of learning took place in small groups:

> The physical space actually helps them to be intimate… And sometimes on purpose I would give them just one piece of paper… So, they really have to share it. That means the table is very useful. (Humanities instructor, ALC1)

An ALC2 instructor identified the physical space between each group as a positive design feature that decreased intra-group distraction. In some ALC2s, including this specific classroom, tables are secured to the floor. Dedicated whiteboards for each table in an ALC2 was another design advantage. Students could use the board to summarize their discussion and present their work to the class.

While in the majority of the ALCs the classroom design afforded groupwork, an instructor stated that not all students were prepared for or willing to engage in small group or whole class discussions. The role of the instructor in preparing students for small group learning remains paramount. The arrangement of the tables and chairs also allowed the students to sit with their back to the class if they were unwilling to participate in classroom discussions.

Classroom Management in the ALCs

A common thread regarding instructor-student interactions in the ALCs was that the arrangement of furniture enabled the instructors to interact with more students. ALC3 instructors were mostly positive about this feature compared to an amphitheater style classroom where they found it difficult to reach students who sit in the middle of the rows. In the ALC3 they could check with more groups and identify groups that were falling behind or not making progress. From instructors' observations and comments, they noted that teaching assistants (TAs) could easily move about the rows and among the table groups compared with amphitheater style classrooms. However, the size of the ALC3 and the number of enrolled students made it cumbersome to connect to all students and to check on all groups. An ALC3 instructor indicated that TAs could assist in effectively connecting with the students and encouraging more active participation. A standard ALC with castered chairs, however, hindered students-instructor interactions:

> I like to be able to circulate. But it's actually really hard to do it in rooms like that, because it's like, chairs get shoved in the middle, and people throw their bags on the ground anyway, even though there are the things under the chairs. So. it's actually really hard to physically navigate the space. (Social Sciences instructor, standard ALC)

Some instructors noticed that multiple wall-mounted or table-top displays in ALC1 and ALC2s caused the students to look in different directions while viewing the same material. This was very different from other non-ALC classrooms where students faced a single screen.

The decentralized display system was a new feature that the instructors had started to accommodate in their teaching process. For example, when all students needed to pay attention to the instructor or look at a single screen, an instructor suggested to turn off other screens. One instructor shared how they explained to the students that they will experience a different presenter-audience dynamic in an ALC2 before student groups presented their end of term project work with the class. In this instance, after consulting with a colleague, the instructor changed the presentation format where each group used their table display to present their work as digital posters instead of having the groups move to the front of the class to present their work.

Student Engagement in ALC3

Students' distraction and disengagement in the ALC3 was a recurring issue for most of the instructors. The distance between the upper rows of the ALC3 and lower rows led to

disengagement even for highly engaged students. One instructor placed pylons on extra seating in the upper rows of the ALC3 to encourage closer physical proximity in their class.

Some ALC3 instructors expressed a sense of disconnect with students sitting in the upper rows. A Sciences/Engineering instructor stated: “I would go to the very back of the room just to make sure that those people had attention and then work my way down.” Students who sat in the front rows appeared more active during instruction. In their informal communication with these instructors, students also identified distraction as an impediment to their learning in the ALC3.

Gaining students’ attention back from group work to the instructor proved more challenging in the ALC3 compared to other classrooms where the instructors had previously taught. “It's really hard to get their attention back. Every time you release attention, you have to get it back. And in that room, it’s like turning around the QE2 [Queen Elizabeth 2, the ocean liner],” a Sciences/Engineering instructor explained.

Distraction and noise level in the ALC3 could be ameliorated. Some of the instructors had devised strategies to orient their students. For example, one of the ALC3 instructors recommended using timers on the screens for students to self-monitor their time. Another strategy to foster more student engagement was to incorporate the outcome and product of small group work into the whole class discussions, thus increasing students’ sense of agency in their own learning.

Technological Affordances and Issues of the ALCs

In all ALC categories, the instructors identified multiple presentation options to be a valuable feature. In most non-ALC classrooms the projection screen obstructs the whiteboard or blackboard making it impossible to project an image while writing on the boards. The ALC1 instructors stated that multiple screens on different walls made it easier for all students to view the projected content no matter where they sat in the classroom. Most ALC2 instructors commented how seamlessly they could switch the screens and share table screens with the class and that students could easily use this feature:

> There were the instances where we were having discussions and critiquing. And the students who were really comfortable with basically switching to projecting via the connected system, were then doing that… there were kind of points where, you know, someone was talking about some things and said “here, I'll show you” and right, and then actually working with that. So, when that happened, that was great. (Humanities instructor, ALC2)

In ALC3, the AV facilities were distinctive as the room afforded multiple input types in addition to high quality large displays. The instructors commented on how easily they could display different content on screens of their choice and switch between input sources. For example, it was possible to write on the document camera while slides or other content were displayed on other screens. As we explained previously, to maximize the AV affordances of the ALC3 the instructors spent time preparing content on different devices. The instructors also mentioned that the ALC3 technology staff facilitated the presentation process, which allowed the instructors to focus on teaching rather than having to pay explicit attention to AV equipment.

The main technology issues in standard ALCs and ALC1s were unreliable wireless and, on two occasions, flickering displays. Moreover, the new displays were incompatible with laser pointers, which one instructor used to emphasize key sections of the displayed resources. To

ensure connectivity while teaching, one instructor carried a USB connector to use the University's ethernet connection.

For a standard ALC, one instructor suggested adding more electrical outlets as many of the students bring their own electronic devices to class. In terms of AV equipment, two instructors explained how the video and audio recording facility installed in the room allows them to record their instruction and have remote students sign in to join the class. Or the instructor could record students' presentations and later provide an opportunity for the students to reflect on their presentation and communication skills.

While doable, ALC2 instructors thought such practice was suboptimal. To ameliorate this problem, one instructor suggested installing lockboxes in the classroom to store the cables. In one course, the instructor noticed that of the two HDMI ports on the tables, only one was connected to the monitor. Lack of clear labeling caused the class to spend some time solving this problem.

In the ALC3, each table has a microphone that students could tap to enter a queue for individual or table responses. Sometimes students accidentally tapped the microphones and the instructors had to manually clear the queue or they asked the student to refrain from touching the microphones altogether. Technology-related issues could prolong activities and create unnecessary workload for the instructional team.

Teaching Assistants' (TAs) Role in the ALCs

Some of the TAs never attended a class in the ALCs as their main responsibility was grading assignments and tests. TAs were more actively involved during class time in at least five courses held in the ALC3. In computer science courses, for example, TAs covered different zones of the ALC3 so that all students could have access to help when needed. They were also encouraged to walk around during class and communicate with the students to facilitate peer interaction and discussion or to address students' questions.

In an Engineering course, TAs contributed to classroom management by monitoring whether the content displayed on the screen aligned with the instruction taking place at that very moment. Alternatively, they would communicate in real-time with the instructor to facilitate instructors' communications with all students no matter where in the ALC3 they were located.

In two courses held in ALC3 a TA was a dedicated technology coordinator and operated the teaching station. This allowed the instructor to focus on teaching and facilitating learning activities. In one such course this eased the instructor's mental load during teaching: "this person is anticipating it. I'm going to use this analogy: it is like being in surgery. And the doctor doesn't need to say I need the scalpel… that person is already anticipating what it is you need" (Sciences/Engineering instructor, ALC3)

Related to the role and responsibilities of TAs in each course, is the training that they receive, especially in a unique classroom such as ALC3.

TA Training for the ALCs

To the instructors' knowledge, their TAs in standard ALCs, ALC1s, or ALC2s did not receive specific ALC training beyond the training that is provided by the University to all TAs, which does include AL pedagogical techniques. The tech-TAs, that we mentioned previously, were self-taught and could consult with ALC3 technical support staff as needed. However, in our interviews one of the instructors described a unique TA training program

for an introductory computer science course: “Most of our training, this term, was focused on getting them [the TAs] to think from the students’ point of view, getting them to empathize with the students, understand their challenges and really be aware of bias and inclusivity” (Sciences/Engineering instructor, ALC3).

Orientation Options and Support Sources for the ALCs

Most instructors who taught in ALC3 had participated in at least one orientation session offered by the central space management office. All instructors who were assigned to ALC3 received an email with multiple dates offered for a training session. They were also encouraged to schedule one-on-one sessions with the ALC3 support staff. A brochure, provided by the central Learning Space Management Office, responsible for developing and maintaining the ALCs, in consultation with divisions and departments, and a manual developed by an instructor at the University, offered further orientation resources for the ALC3.

A small group of instructors had closely followed the construction process of several, building-specific ALC2s and the ALC3 due to their departmental affiliation, their administrative appointment, or their involvement in a fellowship program. Some instructors had requested one-on-one training sessions at the ALC3 with support staff guiding them to use the AV facilities.

One instructor had spent more than seven hours in the ALC3: “For [ALC3], one hour was nowhere near enough. I got a fob to get into [ALC3] and over the winter break, I spent seven and a half hours just playing with all the tech” (Sciences/Engineering instructor, ALC3).

Not all instructors had this level of extended access to training for ALC3. For one instructor, the available training did not give them enough confidence to fully leverage different presentation options of the teaching station. In this session, based on the instructor’s comments, ALC3 support staff explained how to switch between display inputs but hands-on practice was not available. While a facilitated orientation opportunity in the ALC3 could introduce the instructors to the array of technological features, the opportunity to practice using the teaching station and other AV affordances could be a more important enabling factor.

Two instructors who had taught in standard ALCs had different orientation experiences. One instructor’s program lead showed them around the standard ALC that was assigned to them. The other instructor did not seek or was not offered a tour, but they were able to operate the teaching station without any problems.

ALC2s that were identified for this project belonged to two different departments. Two of the four instructors who commented on orientation options in one building with ALC2s, had either received a tour of the room or had a support staff member with them in the room during class. As noted by the following comment, the first instructor who received a tour did not feel confident to use all the options available in the room as they found the one-time tour overwhelming:

> We just said, okay, we don't need that. We just want to do the basic things… I learned that you can show different things on different screens? And I think … the students can actually connect their devices and show something. Wow, that's just too much! (Humanities instructor, ALC2)

However, another instructor tried out the AV system and the teaching station of an ALC2 on their own and were comfortable using both in their instruction. For ALC2s in another building,

a department staff member from the instructors' home department, provided an orientation which instructors found useful. To them, technological features of the room were intuitive.

Technology and AV Support in the ALCs

ALC3 had a different tech and AV support structure compared to the other ALCs as two staff support members had been assigned exclusively to this room. The instructors highly rated the quality of technology support whenever a problem occurred although the service was sometimes delayed. An ALC3 tech team member sometimes sat in class to provide direct assistance, if needed.

In other ALCs, the instructors could press a tech support button on the teaching station to ask for assistance. A technician would come to the class to examine the issue. However, sometimes this would take several minutes. The instructors emphasized that they would not delay instruction to wait for the technical issue to be resolved. Instead, they would switch to an alternative plan or activity. The quality of technological support was perceived to be generally high.

Desired Support Sources

Regardless of the type of ALC, instructors proposed compiling a collection of video clips to showcase effective examples of integrating Active Learning strategies in teaching. Such video clips could showcase an instructor teaching in an ALC and using the affordances of the room to enhance opportunities for Active Learning. A Humanities instructor stated:

> If there are faculty who are successful in Active Learning strategies that would allow a class or part of their class to be recorded. So other people could look at people who have had an experience of trying out this strategy ...if there was some sort of central repository... I think that would be a great, great help. (Humanities instructor, ALC1)

The instructors reflected on possible disciplinary differences and variations in integrating Active Learning strategies in teaching practices. Resources, workshops, and hands-on sessions, they suggested, could be both discipline-specific and cross-disciplinary.

There were multiple requests for resources that orient the instructors to the technological and AV affordances of the ALCs. Such resources could be a collection of videos, manuals, suggestions from previous instructors who have used the same room, plus guided hands-on sessions. Short video clips that explain how different teaching stations can be operated could be self-directed and provide on-demand learning resources for the instructors. The layout of different ALCs may require adjustments to teaching strategies or classroom management approaches, as was the case in some ALC2s with no "front" of the room. Instructors interviewed noted that highlighting and sharing how instructors adjust their strategies in various ALCs would be of value.

Thoughts for Teaching in ALCs in the Future

For high demand ALCs, the instructors proposed a priority system based on class size and pedagogical design of a course. One instructor wondered why a course with less than half the student capacity was assigned to a larger ALC. For courses with lecture and tutorial/lab components, assigning the lecture component to an ALC was less justified.

Insufficient transition time between classes was a unique issue to the ALC3. Instructors of high enrolment courses found the 10-minute allotted transition time to be insufficient for large numbers of students and the instructor of the previous class to leave and the students and the instructor of the current class to enter and prepare for the class.

Requests for ALCs or for preferred classroom configuration could not always be met. One instructor had two sections of their course assigned to two different classrooms, an ALC2 and a non-ALC room. The instructor observed significant differences between the two sections. The ALC2 facilitated group work while furniture arrangement in the non-ALC room impeded group work. The available array of technology in an ALC sometimes did not match the technological requirements of a course. For instance, while an ALC2 provided multiple screens it lacked the "one laptop or desktop per student" requirement of a social science course. The instructor found a computer lab to be better equipped for that specific course.

Depending on their perceived chance to be assigned to a certain type of ALC, the instructors had different views on changing their courses to maximize the affordances of ALCs. When a course had more than one section, for instance, there was a chance that not all sections could be assigned to an ALC. Those instructors who were uncertain whether they would be assigned to teach in an ALC again, were less likely to make significant changes to their courses. However, they already had ideas about enhancing students' learning experiences in ALCs. Increasing group work and using AV affordances such as multiple screens to display the work of small groups for the whole class to compare or to discuss, were two common ideas. A conversation with a colleague, one instructor mentioned, inspired a new way of thinking about students' in-class presentations:

> … an idea that she'd seen is to not do presentations, but instead use the monitors for, like digital posters…and have the students walk around to each other's [tables]... So, I thought it was kind of an interesting idea. It's sort of leveraging the room and using it…to an advantage as opposed to trying to get them to present when the room was not suited for it. (Social Sciences instructor, ALC2)

Instructors of high enrollment courses in the ALC3 were planning to facilitate students' contribution to the class without hindering the overall instructional flow. Ideas to improve students' active contribution in future courses included using the HDMI ports on the tables to display students' work on one of the large screens and developing conversational agents that would allow the students to submit their ideas or questions to the class. According to one instructor, one advantage of sharing students' work with the whole class is to discuss common errors or misconceptions in a specific type of learning activity and highlighting important approaches or results from problems or questions.

Another concern was the likelihood of being reassigned to the same or a similar ALC in the future. For the instructors, making changes to their courses only to find out that they were reassigned to a more traditional classroom was not an effective use of time. While the instructors may adapt their teaching approaches to suit different types of classrooms to achieve desired learning outcomes, making too many changes at once was undesirable.

Recommendations

To understand how instructors at the University experience teaching in different types of ALCs we conducted an evaluation project and interviewed a group of instructors who had taught at least one course in those classrooms. The instructors unpacked multiple facets of teaching in the ALCs, including complexities of the classroom assignment process, pedagogical and technological preparation required for each type of ALCs, classroom management issues and opportunities, and their desired support sources to maximize Active Learning integration in their courses.

Based on our findings, we propose recommendations for offices in charge of classroom assignment, offices or centres responsible for faculty development, and departments/divisions that support the progressive transformation of the instructional landscape to promote Active Learning in ALCs. While this project was conducted at the University, we posit that other higher education institutions could draw on the recommendations as may apply to their specific contexts.

Streamlining ALC Assignment Processes

Instructors teaching in standard ALCs, ALC1s, and some of the ALC2s were generally unaware of the underlying design considerations or affordances of these classrooms or they did not know other ALC options were available to them. Also, while requesting a certain type of classroom is possible, classroom assignment is not guaranteed. A recurring issue for the instructors is receiving their classroom assignment close to the beginning of the semester, leaving them with insufficient time to redesign their courses to leverage the affordances of the ALCs.

Offices in charge of classrooms assignment can develop an institution-wide typology around ALCs within their specific context to facilitate communication across all stakeholder groups. We have proposed the first version of ALC typology for the University that describes the affordances and the layout of different groupings of ALC classrooms. That typology evolved as we interviewed participants for this project and gathered their input. Earlier classroom assignment also enables the instructors to consider ALC affordances in their course planning. The early classroom assignment notification can include links to specific resources such as classroom layouts, orientation material, and examples of Active Learning strategies previously implemented in the assigned classroom. For high-demand ALCs, a course prioritization system based on class size, instructional requirements, and special requests can facilitate assigning higher priority courses to the requested ALCs.

At the departmental level, we recommend an ALC taxonomy be shared with registrars and departmental administrators so that they are informed of the technological and physical space options when communicating with instructors around room assignments. Departments may need to review their classroom assignment processes including input from instructors and time needed to make necessary changes to a course based on the assigned or available ALCs.

An enhanced classroom assignment system will also allow the instructors to work with centres for faculty development to design their course informed by the ALC's affordances and to identify and access necessary orientation or ongoing support materials or resources.

Facilitating ALC-Focused Orientation and Course Redesign

For instructors who participated in this project, integrating Active Learning strategies in teaching practices was not limited to ALCs. However, classroom layout and A/V facilities in the

ALCs could promote and support the implementation of Active Learning strategies. Ongoing and just-in-time support is a significant enabler to identify and prioritize opportunities for Active Learning that are also disciplinary responsive.

When communicating with instructors about classroom assignment, the respective office may add information about local and central teaching and learning centres to facilitate instructors' access to existing support systems. Opportunities for staff from offices in charge of classroom assignment to participate in ALC-related faculty development events can increase coordination of efforts to provide access to pedagogical resources and support for ALCs.

Centres for teaching and learning may include ALC-specific components to existing faculty development programming and create opportunities for instructors to share their experiences teaching in different ALCs. To facilitate instructors' access to such resources, moderated online or in-person events and self-directed modules should be available. Tip sheets, case studies of teaching in ALCs, and annotated video recordings of instruction in different ALCs may complement existing faculty development opportunities. Faculty development topics that we found most relevant to teaching in ALCs were classroom management, students' participation and engagement in small groups, and scaffolding transitions between individual, small group work and whole class discussions. Recommendations from this evaluation project are consistent with the design principles of faculty development opportunities in a program dedicated to instructors who teach in active learning classrooms similar to the ALCs described in this project (Birdwell & Uttamchandani, 2019).

Existing faculty orientation sessions for the ALC3 can be enhanced by a follow-up practice session and pedagogical support. The detailed guide for this room that is prepared by an instructor needs to be widely distributed.

For all ALC categories, centres for faculty development can offer in-person workshops to support and encourage innovation and teaching-related research within ALCs and self-directed resources with examples of Active Learning strategies and possible furniture configurations that can facilitate lesson design to incorporate Active Learning strategies. A complementary best practices database can include annotated videos of how an activity, or a lesson, was redesigned to enhance students' Active Learning experiences. For example, the teaching and learning centre at the University has already curated resources to facilitate instructors' decision making regarding active learning strategies integration and launched an online hub in August 2023. A Community of Practice and online course have been developed for instructors to support their ongoing pedagogical development in ALCs (Rolheiser et al., 2020).

At the departmental level, we recommend initiating Active Learning-focused peer networks or communities of practice so instructors can share effective practices for teaching in different types of ALCs.

Providing ALC-focused Training to Teaching Assistants (TAs)

TAs' involvement in instruction depended on the type of ALC and on the departmental affiliation of the courses. They were more actively involved during instruction in ALC3 and less so in courses taught in other ALC categories. Bent et al. (2020) highlighted the role of teaching assistants in similar large active learning classrooms to facilitate students' learning. Thus, TA training beyond the existing mandatory paid training for first contract may optimize support in larger ALCs, specifically ALC3.

Centres or offices that provide TA training should recognize the variety of roles and expectations for the TAs based on the type of ALC, class size, and disciplinary affiliation of courses. A review of general TA training programs will reveal how Active Learning approaches are addressed. This review can be complemented with an environmental scan of expectations and responsibilities of TAs that might maximize their involvement in facilitating Active Learning in all ALCs. Instructors and departments could be involved in revising TA responsibilities in the teaching and learning process where ALCs are concerned.

Conclusion

In this paper we presented the findings of an evaluation project that examined how instructors from various disciplines experienced teaching classes of different sizes in Active Learning Classrooms (ALCs) at a Canadian University. In their interviews, the instructors reflected on pedagogical and logistical preparation needed to teach in different types of ALC. They also highlighted affordances (e.g., increased learner engagement), and challenges (e.g., classroom management), of teaching in these ALCs. Those affordances and issues related to the features of the type of ALC in which they taught. From the instructor's account of their experiences, we also identified ways that the existing support sources can be enhanced or outlined new support structures and resources that need to be developed. Our recommendations focus on the role of centers for teaching and learning in promoting active learning integration and in the provision of professional development opportunities that are responsive to the existing and upcoming teaching spaces, including the ALCs.

Centres for teaching and learning can help higher education institutions to maximize the benefits reaped from investments in infrastructure such as ALCs. At the University, the central teaching centre has raised awareness about potential challenges and addressed the need for capacity development for instructors as they move towards establishing a culture of Active Learning in their classrooms. For example, Rolheiser et al. (2019) discuss concerns related to classroom management, student engagement, and unique layout of classrooms designed for and offer guidelines to address these issues while planning for Active Learning integration. Moving forward, the central teaching centre will work with the broader community of the University on acting on these recommendations to realize the potential offered by these new ALC classrooms in enhancing students' learning experiences and supporting instructors in realizing their pedagogical goals.

References

Bent, T., Knapp, J., & Robinson, J. (2020). Evaluating the effectiveness of teaching assistants in active learning classrooms. *Journal of Learning Spaces, 9*(2), 103-118. http://libjournal.uncg.edu/jls/article/view/1984

Birdwell, T., & Uttamchandani, S. (2019). Learning to teach in space: Design principles for faculty development in active learning classrooms. *Journal of Learning Spaces*, *8(*1), 19-27. http://libjournal.uncg.edu/jls/article/view/1768

Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom.* Wiley.

Brooks, D. C., & Solheim, C. A. (2014). Pedagogy matters, too: The impact of adapting teaching approaches to formal learning environments on student learning. *New Directions for Teaching & Learning, 2014*(137), 53–61. https://doi.org/10.1002/tl.20085

Carlson, K. A., & Winquist, J. R. (2011). Evaluating an active learning approach to teaching introductory statistics: A classroom workbook approach. *Journal of Statistics Education, 19*(1), 1–23. https://doi.org/10.1080/10691898.2011.11889596

Centre for Teaching Support & Innovation. (2020). *Assessing targeted objectives of the transforming the instructional landscape (TIL) project: Active learning classrooms at the University of Toronto*. Centre for Teaching Support & Innovation, University of Toronto.

Chi, M. T., & Wylie, R. (2014). The ICAP framework: Linking cognitive engagement to active learning outcomes. *Educational Psychologist, 49*(4), 219-243. https://doi.org/10.1080/00461520.2014.965823

Glaser, B. G. (2016). Open coding descriptions. *Grounded Theory Review, 15*(2), 108–110.

Gordy, X. Z., Jones, E. M., & Bailey, J. H. (2018). Technological innovation or educational evolution? A multi-disciplinary qualitative inquiry into active learning classrooms. *Journal of the Scholarship of Teaching and Learning, 18*(2), 1–23. https://doi.org/10.14434/josotl.v18i2.23597

Hao, Q., Barnes, B., & Jing, M. (2021). Quantifying the effects of active learning environments: Separating physical learning classrooms from pedagogical approaches. *Learning Environments Research, 24*, 109–122. https://doi.org/10.1007/s10984-020-09320-3

Kuh, G. D. (2008). High-Impact educational practices. *Peer Review, 10*(4), 30. https://link.gale.com/apps/doc/A203770127/AONE?u=anon~33265405&sid=googleScholar&xid=d60746c9

Lee, D., Morrone, A. S., & Siering, G. (2018). From swimming pool to collaborative learning studio: Pedagogy, space, and technology in a large active learning classroom. *Educational Technology Research and Development, 66*(1), 95–127. https://doi.org/10.1007/s11423-017-9550-1

Mozelius, P. & Sundgren, M. (2018). Furnishing for the future - Teacher experiences of active learning classrooms. In L. Gómez Chova, A. López Martínez, & I. Candel Torres (Eds.), *Proceedings of the 12th International Technology, Education and Development Conference 2018* (pp. 3115-3123). IATED Digital Library. http://doi.org/10.21125/inted.2018

Remington, T. L., Hershock, C., Klein, K. C., Niemer, R. K., & Bleske, B. E. (2015). Lessons from the trenches: Implementing team-based learning across several courses. *Currents in Pharmacy Teaching and Learning, 7*(1), 121–130. https://doi.org/10.1016/j.cptl.2014.09.008

Rolheiser, C., Olmstead, K. & Gordon, K. (2019, October 3). *Goodbye lecture halls, hello active learning spaces: Strategies to transform your classroom into a lively, student-centered learning environment*. Harvard Business Publishing. https://hbsp.harvard.edu/inspiring-minds/goodbye-lecture-halls-hello-active-learning-spaces

Rolheiser, C., Olmstead, K. & Gordon, K. (2020, January 31). *How to shake up active learning assumptions: Strategies to get students excited about class participation*. Harvard Business Publishing. https://hbsp.harvard.edu/inspiring-minds/how-to-shake-up-active-learning-assumptions

Talbert, R., & Mor-Avi, A. (2019). A space for learning: An analysis of research on Active Learning spaces. *Heliyon, 5*(12), E02967. https://doi.org/10.1016/j.heliyon.2019.e02967