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From Distraction to Contribution: A Preliminary Study on How Peers Outside the Group Can Contribute to Students' Learning

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Abstract
Active Learning Classrooms are new learning spaces that allow collaborative learning activities to take place easily over the traditional classroom. However, some features of these rooms could be viewed as "distracting" to students' learning such as the multiple interactive screens. The purpose of this paper is to begin the conversation on how subtle roles in the learning environment could impact learning. Using a case study approach, an activity from one course was chosen that exemplified how peers outside students' immediate group can influence their learning. Based on the preliminary findings, it is suggested that being aware of these subtle roles peers outside the group can have on students and making them explicit in the pedagogical design of the course can lead to maximizing the usage of the space to potentially foster greater learning.

Les salles de classe où l'on pratique l'apprentissage actif sont de nouveaux espaces d'apprentissage qui permettent d'organiser des activités d'apprentissage collaboratif plutôt que de pratiquer l'enseignement traditionnel. Toutefois, certains aspects de ces salles de classe peuvent être considérés comme « gênants » pour l'apprentissage des étudiants, par exemple les multiples écrans interactifs. L'objectif de cette communication est d'ouvrir le débat sur la manière dont les rôles subtils de l'environnement d'apprentissage peuvent avoir des effets sur l'apprentissage. En utilisant l'approche qui consiste à faire une étude de cas, une activité d'un cours donné a été choisie pour exemplifier comment les pairs qui se trouvent à l'extérieur du groupe immédiat des étudiants peuvent influencer leur apprentissage. Selon les résultats préliminaires, il semblerait que le fait d'être conscient de ces rôles subtils que les pairs qui se trouvent à l'extérieur du groupe peuvent avoir sur les étudiants et le fait de les rendre explicites dans la conception pédagogique du cours peuvent mener à maximiser l'usage de l'espace en vue de favoriser un meilleur apprentissage.

Keywords
active learning classrooms, higher education, collaborative learning, peer learning

Cover Page Footnote
Thank you to the Queen's Active Learning Spaces Research Team for helping me collect data for this study, Dr. Andy Leger, Vicki Woodside-Duggins, and Annie Riel. If you have any inquires about the Active Learning Spaces at Queen's University, please contact Dr. Andy Leger

When you walk into a learning space, what role do you think fellow classmates will have on your learning? Some roles are obvious while others are more subtle depending on the configuration of the space. In a standard lecture hall, your classmates will obviously play a role in your learning if you turn to talk to them, otherwise with seats facing the podium, you would expect your classmates would have no impact on your learning. However, the subtle actions of classmates sitting around you in the audience can play a role that greatly impacts your attention and learning simply due to the configuration of the room. The purpose of this paper is to begin the conversation on how subtle roles in the learning environment could impact learning.

With rows of tiered seating stacked behind one another, most students are likely to be seated behind at least two students and will have direct view of what these students are doing. This sightline originally intended to eliminate distractions from other audience members now fosters an environment with a sea of potential distractions. Many students are using electronic devices during class and are often engaging in web browsing and social media that are unrelated to the course (Barak, Lipson, & Lerman, 2006; Bugeja, 2007). Sana, Weston, and Cepeda (2013) found that these silent actions can still affect other students around them. Simply sitting behind students with distracting screens lowered students' scores on their comprehension tests about the lecture compared to students who were not in view of the distracting screens (See Figure 2 in Sana et al.'s (2013) paper depicting students' view of multitasking peers). In their study, "multitasking" referred to students using laptops to browse social media sites and other websites.

Rather than interpreting this as a negative consequence of technology, the findings demonstrate how the configuration of the room can create subtle indirect relationships between students in the classroom that can have a direct impact on students' learning. Keeping in mind these obvious and subtle roles created by the space, consider how this role could change in a new type of learning space depicted in Figure 2.

Figure 1 illustrates an Active Learning Classroom (ALC) similar to the design in many higher education institutes across North America (e.g., Queen's University Centre for Teaching and Learning, 2014; University of Minnesota ALC Case Evaluation Team, 2008; University of Tennessee Teaching and Learning Center, 2012) and "SCALE-UP sites" around the world currently in the UK, France, Spain, Japan, and South Korea, and continuing to expand (SCALE-UP Site, 2011). Instead of rows of seating, this design utilizes several round tables seating up to six students with each student facing the other students in the group. The seats have wheels, allowing for easy movement when students need to face another direction to see the instructor or the rest of the class. A large interactive touch screen is located on the wall next to each table. The screens can be displayed in "collaborative mode" allowing for each table to control and interact with their respective screen, or "presentation mode" allowing for all the screens to display the same screen.

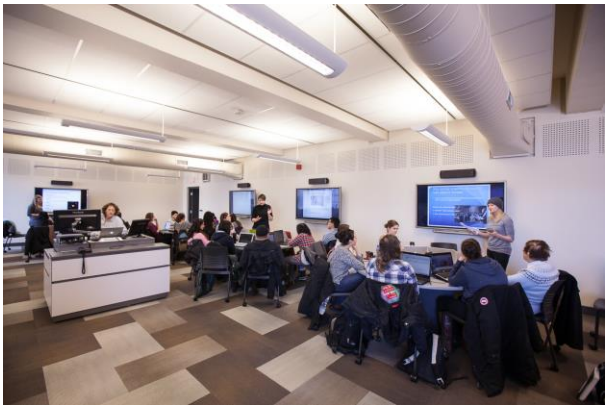

Figure 1. Side view of an Active Learning Classroom. Photograph by Queen's University. Retrieved on July 29th, 2015 from http://queensu.ca/activelearningspaces/classrooms/ellis-333-interactive

Obvious Role: Collaborative Learning in Groups

At a glance, an obvious role students have in the class is to engage in group work. The design of small tables connected to a large screen has been used in spaces dedicated for group work such as reinvented library spaces (e.g., Brown & Long, 2006; Sinclair, 2007), and therefore is a natural fit for classrooms intended for group work activities. One type of group work gaining popularity across disciplines is collaborative learning (Boud, Cohen, & Sampson, 2014). Collaborative learning is when students work in groups and engage in exploration on a topic (Bruffee, 1999). Benefits of engaging in collaborative learning include increasing cognitive processing (Kirschner, Paas, & Kirschner, 2009), improving student engagement in learning material (Shimazoe & Aldrich, 2010), fostering open-minded thinking (Chen, 2014), and subsequently encouraging critical thinking (Springer, Stanne, & Donovan, 1999). The literature on students' roles in collaborative learning has been well-documented, and its success can be attributed to two broad reasons: peers motivating and supporting each other, and peers learning from each other.

Peer motivation and support. In collaborative learning, students are at the centre of learning. They are responsible for helping each other instead of relying on the instructor for all of the answers, and each student is held accountable for contributing to the group (Lowyck & Pöysä, 2001). One of the prominent stigmas and sources of resistance toward collaborative learning stems from the potential occurrence of social loafing (Shimazoe & Aldrich, 2010), with students and instructors fearing some students will not pull their weight in the group because they could rely on others to do all the work. But instead of viewing collaborative learning as a potential environment for promoting social loafing, the physical and social interactions among students may instead foster the opposite, peer motivation to engage in the work.

By being present in a physical group, students may feel more accountable, and pressured to not fail their peers, thereby becoming externally motivated by their peers to put effort into their work (Lowyck & Pöysä, 2001). Peer motivation could also be internally motivating as students have the opportunity to share their thoughts in a small non-threatening environment, and consequently want to build upon other students' arguments and statements with their own

opinions (Hew & Cheung, 2012; Volet, Summers, & Thurman, 2009). Over time in these small groups, students become less afraid to ask for clarification and assistance from their peers (Wheelan, 2004), and students become more willing to provide help to their peers (Slavin, 1996).

Peer learning. Not only are students motivated to participate in smaller group settings, but by working in groups students have more opportunities to co-construct knowledge together which has been shown to be a more effective learning method than listening a lecture (Van Note Chism, 2006). This is essentially a constructivist approach to learning (Bruffee, 1999) as students engage in conversation to hopefully reach a deeper understanding of the content (Topping, 2005). Peer learning provides a platform for students to vocalize their views in a more intimate and less threatening setting with a small group of students compared to sharing ideas in front of the entire class (Boud, Cohen, & Sampson, 2014). Without the authoritative figure of the instructor leading the discussion, students become more comfortable asking questions to their peers (Arvaja, Salovaara, Häkkinen, & Järvelä, 2007) and are more likely to engage in critical reflection and reassessment of views on concepts than from an instructor led discussion (Smith & Hatton, 1993). An additional benefit to peer learning is the gradual development of communication skills, a skill employers have stated graduates have lacked over the past decade (Hart Research Association, 2013; Vedder, Denhart, & Robe, 2013; White, 2013). Having gone through a brief overview on the obvious role of students engaging in group work in ALC, now consider how the literature would explain more subtle roles students can have in the ALC.

Subtle Roles

Peers outside of the group. An aerial view of the ALC design emphasizes the circular arrangement of the tables around the perimeter of the room, along with large interactive screens adjacent to each table (see Figure 2). The ten screens can be overwhelming at first, with many first time instructors exclaiming to our research team that the technology is over the top and will be too distracting for students when they are working. This comment on "distracting screens" is reminiscent of problem of sitting near students with laptops as described earlier in this paper (i.e., Sana, Weston, & Cepeda, 2013). But as previously mentioned, being able to see the additional source of information could be turned into a positive teaching and learning tool. Similar to the discussion on peer motivation and learning within a group, seeing the work peers outside the group are doing could provide motivation for students to work harder or stimulate the formation of new ideas. Furthermore, in Sana, Weston, and Cepeda's (2013) study, students were not aware of the impact other students had on them, but in the ALC where the screens are very prominent perhaps students will be more aware of the roles others play in facilitating their own learning.

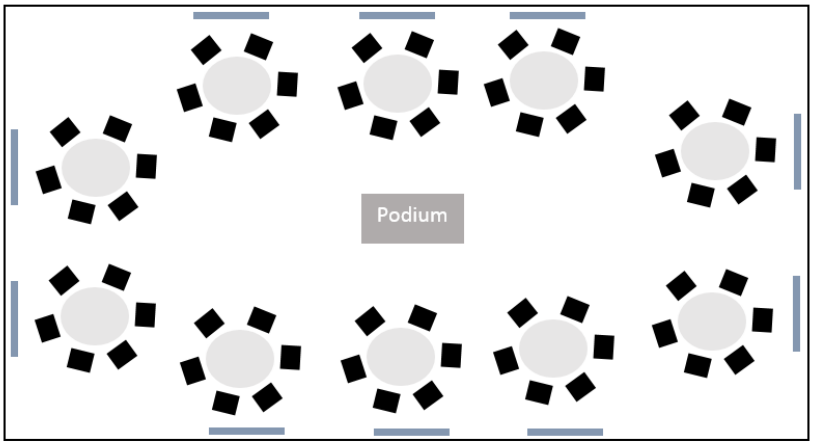

Figure 2. Aerial view of an Active Learning Classroom.

Purpose of the Present Study

The purpose of this preliminary study was to begin exploring how these subtle roles might appear in an ALC. Using a single-case study approach (Yin, 2009), this study aimed to: (a) investigate and describe the subtle roles that peers outside the group may play in influencing students' learning, and (b) determine whether students perceive these roles and are able to articulate them. This study was part of a larger study on all courses that took place over the first semester of implementing the ALC at a medium sized university in Ontario.

Method

Participant and Case Selection

The researchers for the project met with each instructor who would be teaching in the ALC one month prior to the start of the semester in order to introduce to them the new design, layout, and features of the room using the images from Figure 2 and 3. Once construction of the room was completed, the instructors were brought into the ALC and the technical support staff demonstrated the basic features of the interactive screens such as the collaborative and presentation mode. Instructors were not given training on course design or teaching strategies.

After all the discussions with instructors, a 4th year psychology class (N = 40 enrolled, N = 28 participated in study) was chosen for the case study because the instructor expressed interest in redesigning her course in order to take advantage of the new facility and maximize collaborative learning opportunities. This was the instructor's first time creating and implementing collaborative learning activities into her course and was a significant departure from her normally lecture driven format in teaching. Several activities with components of collaborative learning were included in the course (e.g., class debates, developing a Wikipedia entry as a group, preparing exam questions as a group, and a collaborative learning activity). For most of the students in this class, this was the first course they were taking that had a strong emphasis on group work approach to learning in their program. In most 1st to 3rd year psychology courses, class sizes were much larger and little group work was typically involved. After going

through the syllabus with the instructor and attending the first three classes, it was decided by the author and the instructor that the collaborative learning activity would be the most fruitful activity to conduct a case study because it encompassed all features of the classroom and would be largely driven by the students.

Description of the Case

The collaborative learning activity was explained to students as an opportunity to explore a topic and co-construct knowledge as a group and then as a class (Bruffee, 1999; Van Note Chism, 2006). Students were given a statement concerning a topic in modern psychology one week before class discussion. They were asked to prepare for the discussion by finding evidence from the course textbook and other scholarly sources to support and/or refute the statement. The discussions took place in groups of three to five and occurred during class for 40 minutes. In this time, students used the interactive screens to type notes and to find additional sources of information. Students often looked at other groups' screens as they engaged in their group discussions. Following the discussion, the instructor had the class engage in a whole class discussion, with students taking turns projecting their work onto all the screens in the class. Each group summarized their discussion and had the opportunity to comment on other groups' summaries. The entire activity was completed in one hour.

The discussions took place five times throughout the course, and the present case study examines the final discussion session of the course because students were very familiar with the activity by this point in the term. The question posed during this particular session was, "What will psychology be like in 2030? Identify trends and issues that you think will be important and justify your choices." Since it was the last session, the question was meant to bring together ideas over the entire course.

Measures

Data was collected for this case study using an ethnographic approach (Creswell, 2013) for observations and conversations with students, and a survey to gain insights on students' perceptions of their peers' role on their learning. Both video recorders and field notes were used to document the activity, while the survey attempted to capture students' awareness of the subtle roles in the classroom during the collaborative learning activity.

Observations and conversations. Of the seven participating groups (total of eight groups, one did not participate), three were randomly selected to be filmed during the collaborative learning activity, with cameras positioned to capture the conversations and body movements of students in the group. I took the role of a nonparticipant observer during the activity (Creswell, 2013) by sitting at an empty table to take field notes to document the chronology of events, general patterns that emerged such as body language of students and usage of interactive screens, and quotes from students about other groups. During the break, I engaged in conversations with students in the participating groups gaining their consent to use the conversations as data for the study. In most conversations, general impressions and experiences about the activity were noted as memos in field notes which helped in categorizing themes in the observational data. In some instances, conversations were recorded using the video cameras that were left on during the break allowing for exact quotes to be recorded.

The data was analyzed using a categorical aggregation approach (Stake, 1995) by finding patterns in the collection of instances from the data and interpreting the meaning of the patterns. First, dialogue from the videotapes were transcribed. Next, all instances of interactions that were documented between students and peers outside the group, were highlighted and coded in the transcripts and observation notes (including memos and conversations). Non-verbal footage involving direct or indirect interactions with students and peers outside the group (e.g., looking at another group's screen) were then flagged and labelled. The collection of instances were then aggregated with other instances that were similar. Instances that did not fit in with other instances were removed. These aggregated categories were then compared to characteristics listed under Step 2 in Table 1's coding map in order to make sense of the categories. The characteristics were chosen from the literature based on whether they could be overtly expressed and captured by observations alone. Some instances were re-categorized if they were more appropriate under another characteristic. This process was repeated a number of times among members of the research team until there was complete agreement with the categories. The final categories were given a theme name, shown under Step 3, which reflected previous literature and addressed the research questions.

Table 1
Code Mapping of Data

Research question to be answered: What do the subtle roles of the peers outside of the group look like in ALC?	
Step 1: Highlight types of interactions All interactions between one group of students and student(s) from another group—direct and indirect	
Step 2: Match emerging categories to characteristics in the literature	
Students (more indirect interactions): • are externally motivated by other groups to continue building on ideas (Lowyck & Poysa, 2001) by looking at other students' screens • build on what other students are doing (Hew & Cheng, 2012) • feel environment is non-threatening and are open to sharing thoughts (Hew & Cheng, 2012; Volet, Summers, & Thurman, 2009)	Students (more direct interaction through conversation): • ask questions to build understanding (Arvaja, et al., 2007; Topping, 2005) • co-construct knowledge (Van Note Chism, 2006)
Step 3: Assign theme name peer motivation or peer learning	

Survey on students' perspectives (N = 28)**.** Students' perspectives of the role peers outside their group had on their understanding of the discussed topic was examined using a brief survey (see Table 2). This was given to students at the end of the collaborative learning activity, after the whole class discussion, because most instances of group-to-group interaction occurred

during the whole class discussion. Students were asked to write down new evidence that led them to a better understanding of the topic and select the respective source that provided this evidence. Listing the evidence was meant to prompt students to the think about the source and was not expected to provide direct insight into their perspectives of peers' roles. The main evidence came from the checklist portion. It should be noted that the aim of the study was not to examine perceptions of "within group" influences, however participants in pilot testing of the survey were confused by the category of "peers outside your group" because it is not frequently asked and consequently thought it was a typing error. Therefore the within group category was included to make a clear distinction from the category of peers outside the group. This research project has received ethics approval through the university's Human Research Ethics Board.

Table 2
Sample of Reflection on Collaborative Learning Activity

Question: List evidence that supported/ opposed your position, and select the source	
Evidence/statements	Source (select all that apply)
	• yourself • peers WITHIN your group • instructor • peers OUTSIDE your group
	• yourself • peers WITHIN your group • instructor • peers OUTSIDE your group

Results

Observations Analysis

During this particular session, 32 students were present in the class, 28 of which consented to participate in the study. Participation included permission to be filmed and observed, and to fill out the survey. Using the coding map in Table 1, two themes were derived: (a) peer motivation and (b) peer learning. The evidence for the two themes are closely related and could arguably be interchangeable depending on the interpretation. However, the themes were assigned with the specific context heavily in mind. In the subsequent section, evidence for each theme is provided.

Peer motivation.

Externally motivated by other groups to continue building on ideas. About 15 minutes into the discussion, it appeared half the groups were finished sharing their thoughts as students in each group began looking around the classroom. In one group, one student glanced around the room at the screens of other groups and then returned to his laptop screen for a few minutes while another student was talking. When the other student finished talking, the student then shared a thought, "What about the spectrum of disorders? Do you think the cut-off to get medication will get smaller?" This spawned a discussion on how there is an increase in medication being given for mental illnesses and whether the trend will continue down this route in the future. Due to the time gap between the student looking around the room and speaking, it

is unclear whether the student got the idea from another group, but the act of looking around had sparked some thinking and two groups had information on their screens about mental health issues.

In another group, several students began to lean back in their seats, started moving their chairs away from the table, and turned to look around the room at other groups' screens. A few minutes later, one student began talking, "We haven't talked about technology yet. I guess it will be an important factor in new trends." The rest of the group chimed in and began building on the idea of how technology would be used in psychology. Although "technology" was written on the screens for many groups in the class, the student did not explicitly attribute the idea to another group. The idea however did lead to a longer discussion.

During informal conversations with students, I asked what they thought about the technology in the room, one student stated, "I thought all the screens would be too distracting, but I actually I like it. It makes me more engaged in the class." Another student added,

> The discussions can take a long time and sometimes my group would finish faster than other groups. If I was in a different class I would lose interest, but I think I stay focused longer here because I see other students are on task and so we keep working.

Build on what other students are doing. In one instance, a student showed a video clip from YouTube on the group's screen of a psychologist talking about the future of the Diagnostic and Statistical Manual of Mental Disorders 4th Edition (DSM-IV). The sound from the video caused other groups to look at the group's screen. Most groups continued their discussion when the video's volume was turned down, but one group continued to watch the video. Once the video was finished, the group watching began searching online on their own laptops, looking for clips or websites that were similar. One person stated, "Here is a website from another class I am taking that is also talking about the usage of DSM-IV," and plugged in their laptop to the group's table screen. The rest of the group looked at the screen, and began discussing the website. The direct influence of the other group lead to further discussion in this group as they built on the idea of DSM-IV's usage in the future.

Students feel environment is non-threatening and are open to sharing thoughts. At the beginning of the course, the instructor made it clear to the class that the collaborative learning activity was meant to be an open discussion with no judgements or marks. Students were encouraged to share their thoughts and not feel it was a competition to be better than the other groups. During the group discussions, every group used their screens to record their group's ideas. Based on observations alone, it was difficult to determine whether students were aware they were sharing ideas on their screens to other students and if they were comfortable doing so. In conversations with students, many expressed how comfortable they felt in this space and how it felt less intimidating than tiered lecture rooms. I asked students in if they used the screens for this activity in previous sessions and one student replied, "We use the screens all the time. It's a great way to get work done as a group but also it's nice to see other groups' work as well. It doesn't feel like a competition between groups and I really like that." In a different group, a student stated, "The screens are great for the whole class discussion. I can see what other groups have been working on and we get to share our ideas too."

Peer learning. Unlike peer motivation, peer learning required evidence of more direct interactions and conversations between students in different groups.

Asking questions to build and reach deeper understanding. Some groups posed questions during the whole class discussion with the phrasing, "We wonder what everyone else thought about this," or "What were your thoughts on this?" However, the instructor would answer the question by referring to the textbook or previous sessions and would move on to the next group's summary. Perhaps this was due to time constraints, so students were not able to have conversations between groups. Instead, some groups took the time in their summaries to address the questions with responses tied to the next theme of co-constructing knowledge.

Co-construct knowledge. When students presented a summary of their group's discussion, they often built on what was said from the previous group with phrases such as "We want to add on to the first group's point", "We went in a different direction from the previous group," and "What has not been brought up yet is ..." These statements show students were actively listening during other groups' presentation, and forming connections between the summaries. One example was from the second group that presented,

> Our discussion was similar to the first group. We talked a lot about how there will continue to be an increased cases in mental health but we think therapy and non-medications will be the better solution in the long run. There is already a backlash against overmedicating children for ADHD and we think this will continue for other mental illnesses as well.

Another group projected to all the screens slides created from their discussion with images and websites they found that discussed the future of modern psychology. Students in the other groups subsequently searched for the websites on their own laptops. A few students in one group conversed about the website and made notes on what they would say for their presentation summary. When these students presented their summary, they discussed their opinions of the websites and how it was similar to something they were shown in another class. Although the students were not engaged in conversation between groups, the students were responding to previous groups and as a class co-constructing a wider and deeper understanding of the topic.

Survey on Students' Perceptions of Roles

Although the observational analysis revealed instances of peer motivation and peer learning from other groups, it was unclear if students would be aware of the influence other students had on them. A summary of the survey results is in Figure 3. Twenty-eight students wrote 2-5 pieces of evidence each and selected the respective source(s) per evidence. The mean percentage was derived by taking the percentage of each category per student and averaging it across the students.

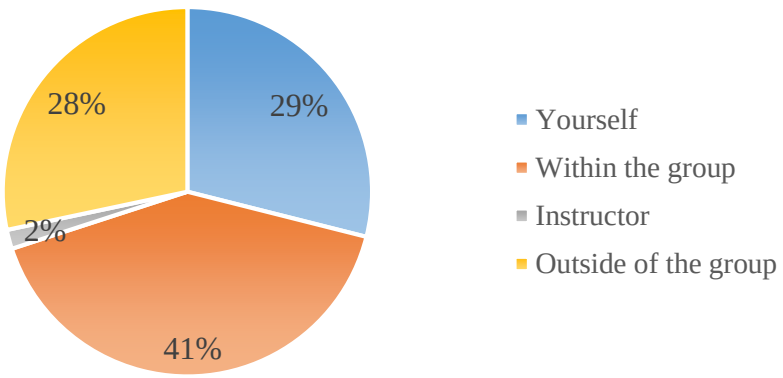

Figure 3. Average percentage of evidence attributed to the respective source.

A Chi-square test was then conducted to assess whether students attributed more information to obvious sources based on the literature in collaborative learning including "yourself" and "within the group" (each hypothesized proportion was .49) or more subtle sources such as "outside the group" and "instructor" (each hypothesized proportion was .1). The results were significant, χ^2 (3, N = 4) = 739.47, p < .01. The proportion of evidence attributed to "yourself" was significantly less than expected, while evidence attributed to "outside the group" was significantly more than expected. Only nine students did not attribute evidence to peers outside of their group. The proportion of evidence attributed to "within the group" was expected since a large portion of the activity required students to have discussions within the group (40 minutes out of one hour). Likewise the evidence attributed to the instructor was also expected since the activity emphasized collaborative learning among students and not gaining information from the instructor. Two students attributed evidence to the instructor, and these were the only students to attribute evidence to all four sources. Overall, the results suggest students were aware of the impact peers outside their group had on their learning and attributed a significant proportion of evidence to them.

Unexpectedly in the evidence section, eight students wrote how the information from the other groups was presented to them, "seeing it on the other group's screen," "seeing other group's work displayed on our screen", and "hearing other groups stating this." This demonstrates at least some students were conscious of using other groups' screens to gain information and were listening to other groups during discussion. In hindsight, the questionnaire should have been framed to ask students the extent to which they perceived roles of peers outside the group had on their learning.

Discussion

Using a case study approach, the preliminary study sought to: (a) document the subtle roles that peers outside the group may play in influencing students' learning during a collaborative learning activity, and (b) whether students perceive these roles and are able to articulate these roles. The results revealed multiple roles peers outside the group had for peer motivation and peer learning. This included externally motivating peers to continue building ideas, building from other groups' ideas, fostering an environment that felt safe to share ideas, asking questions to build understanding, and co-construct knowledge together. The themes are not exclusive of one another, but separating the themes assists in understanding which specific roles peers outside the group are playing on students' learning. Furthermore, the characteristics from collaborative learning literature (which is typically examining small groups in isolation of the rest of the class) made sense of the interactions between groups. This demonstrates the roles are not new, but are expressed in a different form from the peers in immediate groups, to adjacent groups, and all groups in the class.

The survey provided further evidence of these roles, adding more rigor to the findings, and contrasting the findings from Sana, Weston, and Cepeda's (2013) study and literature on collaborative learning. Students were not only aware of the role peers outside their groups had on their learning but based on the results from the Chi-square test attributed a significantly higher proportion of evidence to peers outside their group than expected. The literature on collaborative learning attributes most, if not all, of the learning to students' themselves and peers within the group. Little research has been done on the impact peers outside the group could have on

students' learning therefore this study provides preliminary evidence in showing this wider group of peers can be an influential resource for students that instructors should capitalize on. Several students even provided explanations that help to explain how peers outside the group influenced their learning. This was mainly through seeing other groups' screens and hearing other groups' discussions, which the observations and conversations with students had found as well. The large interactive screens are prominently displayed around the class, and instead of viewing them as distractions to learning, they can be sources of meaningful contribution to learning.

Limitations with Methodology

Although the combination of observations, conversations, and survey assisted in triangulating the data and added validity and rigour to the results, each methodology had limitations that made it difficult to attribute the results to the collaborative learning activity, the features of the ALC, or a combination of the two. Since more direct interactions among groups occurred during the whole class discussion, it would appear the collaborative learning activity had more influence than the room. An appropriate control group in a traditional room could help separate the nature of the activity from the room itself, but the methods also restricted the data collected. Observations allowed the naturalistic setting and complexities of the case to be captured (Creswell, 2013), but could not provide information into what students' were thinking at each stage of the activity (small group and then whole class discussion). The survey gained some insight into how students perceived peers outside the group influence on their learning (through seeing the screens and hearing the presentations) but again this did not sufficiently distinguish between the activities from the room. Moreover, the structure of the survey may have restricted the unique insights students could have potentially offered. The conversations during the break attempted to gain more data that the observations and surveys missed, however were short and unstructured, and data collected was more superficial with focus on the features of the room than on the effect of peers outside the group in collaborative learning. For instance, the comments made on feeling safe to share information could have been more in-depth if more formal interviews were conducted for longer lengths of time allowing students more time to provide longer explanations and detailed examples. Furthermore, other aspects of collaborative learning that may not have been observed may have come up during such interviews. One suggestion for future studies is to conduct either interviews or structured focus groups about the case study with participants. Focus groups might be more advantageous because they tend to produce more in-depth data if a synergy and lively conversation is generated among the participants (Morgan, 1996). Through interviews or focus groups, how peers outside the group influenced students' learning during the small group and whole class discussions could be distinguished.

Limitations with Case Study

Another major limitation in the study was the number of confounding factors: a new classroom, new technology, an instructor new to implementing collaborative learning activities, and students new to collaborative learning. The instructor stated in a post-study interview, that there is a learning curve to teaching in this space, which can also be applied to students learning in the space. Some students were resistant at the start of the course while others immediately embraced the layout and pedagogical structure of the activities. By the end of the course,

students had become accustomed to the room and the activity, therefore this study was conducted on the final activity session with the intention of documenting an exemplary instance of how peers outside the group can impact students' learning while reducing the potential confounds. For future studies, observing more than one session could provide more insight into how students gained awareness of these roles over the term.

Implications

Although this study is very preliminary, the findings suggest peers outside students' immediate group could have an influential role on students' learning and this should be taken into account when designing activities in the classroom. The ALC's structure allows the classroom to become one large group or one unit, and each small group can be viewed as an individual within this unit. The space and technology that might at first appear to be overwhelming and distracting can become a place with new and fruitful interactions that were not as explicit or even considered in the traditional lecture hall. Similar to this case study, instructors can incorporate more collaborative learning activities when using ALCs in order to maximize the potential interactions that can take place between students. Instructors should also encourage students to use students outside their group as resources, which is something that may not be intuitive when students sit at their groups and appear physically separated from the rest of the class. Moving beyond the reaction of technology and spatial configurations as a distraction to learning, instructors and students may discover the valuable contribution of these elements and how peers outside students' groups can have on their learning.

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