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Groupwork in Active Learning Classrooms: Recommendations for Users

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This is a report of the third phase of a research study on students' groupwork. The two earlier phases of the research focused on the assessment and outcome of students' groupwork in general, but at this phase the focus is on Active Learning Classrooms (ALCs). At this phase the author surveyed faculty and students about the effectiveness of various features of ALCs in facilitating students' learning. Nine hundred and sixteen students and 53 faculty who were teaching and learning in these rooms responded to the two surveys. The surveys assessed how active learning classrooms may facilitate students' collaboration, what features of these classrooms are more helpful, and whether there is a difference between faculty and students in terms of effectiveness of these classrooms' features. The results showed that both students and faculty strongly believe in the usefulness of these environments, while there are some differences in terms of student and faculty perspectives towards these rooms. Considering the results of all three phases of this research, a list of recommendations to improve the effectiveness of groupwork and ALCs is offered at the end.

Introduction

Earlier studies have investigated several factors known to influence students' success, including socioeconomic background, internal motivation, and the influence of different teaching styles. Often overlooked or underemphasized is the role of classroom design (Scott-Webber et al., 2014). Recently, educators have noticed that classroom spaces convey an image of educational philosophy about teaching and learning (Park & Choi, 2014; Mui et al., 2019). They have observed the existence of a 'golden zone' and a 'shadow zone' in the traditional classroom, which discriminate students' learning experiences depending on seating positions. Therefore, universities have started re-designing their traditional classrooms to better accommodate group work and group discussion.

Unlike the rigid structure of traditional classroom, ALCs are flexible, spacious, student-centered, and contain large, round, or rectangular tables that seat about six to nine students. Tables' surfaces are writable like whiteboards and each table is equipped with a computer and a large screen TV monitor and all table computers and monitors are connected to a network operated by the instructor. Students or the instructor can share their screen with the whole class through a projector and an extra-large screen visible to all students (Brooks, 2012). The instructor's station in these rooms is usually at the center of the class giving all students equal distance to the instructor.

Building an ALC is extremely costly and the major question for many universities across the nation is whether these rooms are indeed beneficial for faculty and students and if the value added justifies the cost of these classrooms. Regarding the fact that ALCs are quite new in the field of educational technology, not many research studies have been done on their effectiveness. There is little research examining which elements of Active Learning Classrooms (ALCs) are important for maximizing their utility. More research needs to be conducted for different subject matters, class sizes, and level of instructor experience (Nicol et al., 2017). Most of the studies in the past have been limited in their scope and studied only one room or one teacher and one subject matter. In the present study, however, a variety of ALCs used by different disciplinary instructors were investigated. The goal of this study is to investigate how ALCs may facilitate students' collaboration, what features of these classrooms are more helpful, and whether there is a difference between faculty and students' perception in terms of effectiveness of these classrooms. It is proposed that teaching in an environment that enhances and facilitates group discussion, such as ALCs, is helpful in improving the quality and the amount of collaboration among students.

Literature Review

For centuries, the most common teaching strategy used in classrooms has been lectures. However, lectures are usually a one-way communication and lack many of the components

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of active learning, such as critical thinking, self-pacing, and the encouragement of dialogue and group discussion (Rezaei, 2017). On the other hand, designing and teaching large introductory courses is a challenging task. Particularly, faculty struggle with teaching courses where students are expected to actively and intellectually engage in learning, develop attitudes toward the topic, improve their writing and research skills, and become lifelong learners (Langley and Guzey, 2014). There are many research studies supporting the idea that collaborative methods are helpful in this regard no matter what course is taught (Bennett, 2015; Rezaei and Katz, 2003; Rezaei, 2017).

Numerous research studies have demonstrated that small-group learning creates situations in which schoolwork is perceived not as a task or chore but as an opportunity to interact on issues of personal importance (Ahern & Durrington, 1995). The importance of collaborative learning is rooted in its potential for meaningful learning and social interaction. Various theorists from Vygotsky (1986) and the situated learning theorists such as Lave and Wenger (1991) to the current social constructivist theorists (Jong et al., 2014), have stressed the importance of social interaction in learning. These theorists propose that learning occurs in a social or inter-psychological context prior to it becoming internalized or individualized within an intra-psychological category (Vygotsky, 1986). Students working in groups experience increased social support, report higher satisfaction with their learning, and learn better than students working as individuals (Johnson et al., 2007).

Considering the value of teamwork in modern societies, recently, higher education institutions are paying more attention to the development of students' communicative abilities and critical thinking. Collaborative learning is now considered a key teaching strategy to use to develop teamwork skills. Group work is beneficial for both students and instructors. For students, group work motivates them, provides a peer instruction opportunity, gives them a chance to look at the problem from multiple perspectives, and helps them to become more creative. For teachers, group work is an opportunity to give students more complex and more authentic assignments. Collaborative learning procedures have also been shown to enhance student satisfaction with the learning and classroom experience (Rezaei, 2017).

The traditional lecture halls that accommodates hundreds of students might not work well for collaboration and group work. The "stationary seating in rows with limited desk space and no access to a whiteboard restricts the possibilities for how students interact with each other and with the content of the course" (Baepler et al., 2016, p. 9). It is possible to have student-student and student-instructor interactions in these classrooms, but the physical constraints of the seating present challenges in doing so (Petersen & Gorman, 2014).

When a student or a teacher enters an ALC for the first time, he or she gets a clear message that this class will not be "business as usual" and realize that they are supposed to be involved in group discussions or group works (Cotner et al., 2013; Birdwell & Uttamchandani, 2019). ALCs provide different affordances for behavior and communication than do traditional classrooms, and they are much more effective when used for their designed purpose than when used otherwise (Scoville, 2018). Such an environment induces behavior on an unconscious level. How persons behave in built spaces depends on their interactions with the affordances and limitations of the space in which they operate (Lefebvre, 1991).

In summary, the positive effects of group work is well documented in the literature. However, it is not clear why group work does not work all the time and what features of ALCs may facilitate or hinder student group work, and what teachers and students can do to make these rooms more effective. This study attempts to answer these questions.

Methodology

This research was conducted in California State University, Long Beach. This is the largest California State University with a population of more than 39,000 enrolled students. It is also known as one of the most diversified higher education institutions in the country. There are 10 ALCs on this campus ranging from the capacity of 35 to 70 students. Each room contains 5-8 writable surface tables with 6-8 seats that include a PC computer, flat-panel large display and personal device cable connections at each table, as well as a centralized teaching station with a master control panel, a PC desktop, a document camera, a DVD/Blu-ray player, and projector with surround sound speaker system. About 100 faculty are assigned to teach in these rooms every semester and about 4000 students are taught by those faculty.

Instruments

Two surveys were designed for this study: one for faculty and the other one for students. The questions were designed based on the results of the earlier study on this campus in which students and faculty expressed their opinions about effective strategies in group work. The faculty survey included 25 Likert type questions plus 9 open-ended questions and some demographic questions. A similar survey was designed for students. The student survey included 31 Likert type questions plus 3 open-ended questions and some demographic questions. The surveys were posted online, and the links were sent to 100 faculty. Faculty were asked to complete their own survey and then

send their students the link to the students' survey. Therefore, the instructors had the option not to send the link to their students.

In the faculty survey, faculty were asked about the percentage of their assignments that require group work and the main group activities which they give their students. They were also asked several questions about the situations or conditions where group works are more effective and the features of the rooms that work or do not work for them. Finally, they were asked about the benefits and the limitations of group work assignments.

Students were asked how much they participate in group work and how useful they find those group work experiences. They were also asked which technologies, or which features of the ALCs are more useful for them, the size of the groups, the selection and diversity of group members as well as the issues and challenges they encountered. Finally, there were questions about the number of lectures they receive and how effectively their teachers use the room and its features.

Participants

While 916 students (73% female, 27% male) responded to the survey, only 771 students completed the survey to the end. Most students were from the College of Education (37%) and College of Liberal Arts (25%), and the average age of participants was 24 with a wide range of 17 to 65. Most students (79%) were taking undergraduate courses, and 21% were taking graduate courses in disciplines such as: anthropology, Asian studies, biology, chemistry, educational psychology, curriculum and instruction, educational technology, forensic pathology, history, journalism, nursing, sociology, Spanish, and physics. For the faculty survey, 53 faculty responded to the survey (69% female, 31% male), but only 47 faculty completed the survey to the end. The average number of years of teaching for this sample was 14.4 years.

Results

Faculty Survey

The most important finding of the faculty survey is that 95% of faculty thought that ALCs foster student-to-faculty interactions that are beneficial to learning outcomes. Similarly, 98% agreed that the ALC fosters positive student-to-student interactions.

More than 91% reported that they have made a lot of changes in their teaching strategies after they switched to ALC rooms, and those changes have happened gradually. Indeed, most faculty (80%) believed that students are more visible in this environment. Moreover, 89% agreed that the ALCs facilitate critical thinking among students through group discussions.

In comparison with traditional classrooms, faculty lectured less (58%) and integrated technology more and, particularly, they used more of the flipped classroom strategy and assigned group projects more often. Most faculty (79%) reported that, in comparison with other classrooms, they believed ALCs give them a better chance to receive feedback from students. Most instructors (81%) preferred to bring their own laptops rather than using the available instructor PC because they needed software or apps not available on the provided PCs. Many faculty (85%) were satisfied with the arrangement of tables and seats in their room.

One of the complaints about ALCs reflected in the literature is the amount of noise and distraction due to students' noise during discussions and disputes. However, the survey results indicate that 87% of faculty did not consider the noise as too much of a distraction although sometimes they have to remind students to lower their voices.

In response to an open-ended question about how faculty assess the effectiveness of students' group discussion, most faculty reported that they use qualitative/observational approaches by walking around the room or sitting briefly in small groups to check if students are on the right track. An interesting finding of the faculty survey was that almost half of the participant faculty (53%) have not asked their students if they like to be in ALCs. It is important to know that over half of faculty (56%) reported that the same amount of collaboration and group discussions conducted in an ALC cannot be achieved with reasonably equivalent effectiveness in a traditional classroom set-up.

In response to a question about the most useful features of ALCs, faculty ranked the writable table surface as their number one choice followed by the large monitors at each table, being able to share a table's work with the entire class, and being able to connect a personal device and share it with the class. The location of the teacher station was the least favorite feature. However, 96% of instructors would like to continue teaching in an ALC.

While 98% of faculty at the study's campus are trained before they use ALCs, a majority (71%) reported that they did not get a chance to observe another ALC instructor in action. On the positive side, most faculty (61%) reported that they had read research findings on the effective strategies in using ALCs before they started using it. Finally, most faculty (59%) reported that they explained and reviewed with their students how the ALC environment might benefit them, and 47% explained to their students how their teaching philosophy and strategies fit this type of environment.

Student Survey

The most important finding was that 86% of students believed that they learn better in an ALC environment in comparison with their traditional classrooms. Similarly, 93% reported that frequent discussions among students help their learning, and 98% believed that ALCs encourage teamwork and cooperation among students. Not surprisingly, 90% of students felt that they have more social presence in ALCs, and 74% felt that teachers play a less authoritative role and more of a learning facilitator role in these rooms. In comparison with other classrooms, most students (80%) believe ALCs gave them more opportunities to ask questions and that they spent less time on listening to lectures and more time on group discussion. Furthermore, 69% found the ALC environment to be more inspirational.

Despite a common belief among educators indicating the need for being tech-savvy in these rooms, the results showed that a majority of students (72%) believed that they do not need to be tech-savvy in order to use these rooms. Most students (85%) believed the size of tables were appropriate, and 68% believed that 5-6 students per table is the optimum number for better group work. However, students in smaller ALCs were generally more satisfied than students in larger rooms who felt they are more often distracted, and they did not like the central location of the teacher.

An interesting feature of ALCs is that students can connect their own laptop or device to the class network to share their screen with their small group using a large screen TV at each table or using the class projector. However, students reported that they do not use this feature very often. In response to a question about how students use the room more often, most students reported that they use the room to work in small groups on an in-class learning activity.

According to participating students, the most useful feature of ALC rooms is the feature with which instructors can project their material on the large screen (number one choice) followed by the feature with which students can form small groups around a table, the large TV monitors to display teachers' presentation on each table's screen, the teacher location in the center of class rather than in front of class, and the ability to share their laptop's screen with the whole group. Surprisingly, the writable tables' surface was the least favorite feature among students while this feature is faculty's favorite feature.

One of the worries about ALCs, as reflected in the literature of group learning, was that students gradually become dependent on other group members (Rezaei, 2018). The results of this survey showed that the majority of students (65%) do not think these rooms make them more dependable on other students. Another concern was that there are always a few students who do not do their part in the teamwork. Again, most students (58%) believe the ALC setting prohibited those types of students from becoming free riders and unengaged during teamwork because they have to work face-to-face. More surprisingly, while 81% of students felt that they needed a personal laptop to use in these rooms, 74% of students report that they are not required to bring their laptop to the room. This percentage is even higher (80%) in larger rooms.

Finally, the results showed that some students (43%) believed that the instructors did not explain to their students why they chose an ALC for their instruction, and 47% students believed that their instructor did not prepare students for learning in this type of environment.

Discussion

Overall, the results of this study are in harmony with the literature on group work and are aligned with the expectations of the university administrators who spent considerable amounts of money on building these rooms. Some of the aforementioned numbers and percentages regarding the benefits of ALC environments, however, are much higher than what was expected and are quite promising.

The importance of this research is that the benefits of ALCs have never been well documented using a comprehensive survey in such a large scale and quantifiable manner. Most of earlier studies have been anecdotal or qualitative evaluation of the ALCs or, at most, used a small survey with a few answers from a single teacher or a small sample of students. Furthermore, in this study we used open-ended questions, in addition to the Likert type questions, in order to collect participants' reflection as well as their recommendations for effective use of ALCs.

An interesting finding was the comparison between faculty and students' perspectives about the most and least useful features of ALCs. For example, while the majority of students liked the teacher's location in the center of the room rather than in front, many faculty did not like their location in the center. Also, while faculty assumed the writeable table surfaces were useful, students did not find them useful. This might be due to the fact that most students in this study have majors in colleges of education and liberal arts rather than in mathematics, science, or engineering. Another contrast between students and faculty was about preparation of students to use ALC environments. Most faculty (59%) reported that they explained or reviewed with their students how the ALC environment might benefit them. However, as shown in the results section, a considerable percentage of students (43%), believed that the instructors did not explain to their students why they chose ALC room for their instruction, and 47% of students believed that their instructor did not prepare students for learning in this type of environment. While, in this study students are not

mapped to their faculty, it looks that some faculty might have simply assumed that students were ready and knew how to use ALCs effectively. Overall, the variance among faculty regarding the benefits of ALC environments was higher in comparison with the variance among students. This means faculty had a wider range of expectations in comparison with students.

The above findings, along with faculty's comments and reflections, revealed that the ALC environment has changed the dynamics of teaching and learning. An earlier study had shown that it is not the size or space of the classroom that makes the difference in students' learning (Maquivar & Sundararajan, 2017). In this study, no significant difference was found between large ALCs and smaller ones, therefore, it is the room configuration and the way the room is used that makes the difference.

This study shows that students find the ALCs to be more inspirational especially in regard to active class participation. This research and associated earlier research (Rezaei, 2017), as well as other similar research studies (Park & Choi, 2014) show that, unlike traditional classrooms in which usually only high achievers or high GPA students participated in group discussions, in ALC environments almost all students participated and reported that they enjoyed participating in class discussions and small group work. By creating a classroom environment where there are no back rows or front rows, it would seem that students become more interested, motivated, and involved in the learning experience.

The other important finding of this study focuses on the physical seating area. While entering an ALC with multiple projectors and large screen TV monitors at each table might look a little overwhelming at the first glance, the results indicate that students and faculty see a value in sitting close to their own screen rather than all looking at a single projector. Furthermore, the ability to present each group's ideas at the same time using multiple screens aids in comparing different ideas during class discussions. Providing students with wheeled chairs also facilitated group work and discussion. Some students who had used regular chairs at their tables in non-ALCs reported that it makes a big difference to be able to turn around or move the table using wheeled chairs.

A major limitation of this study was the lack of linkage between student survey and faculty survey. Following our IRB recommendation, we could not link students to their instructors because if we did the faculty would be identifiable. As a result, in some cases what students report about their professors and how they use ALCs did not quietly match with what their instructor said. Also, this limitation did not allow the author to measure the impact of specific teaching strategies on students' satisfaction.

Implications

Considering the results of this study, and regarding the findings of similar studies in the literature, the following recommendations might be useful for faculty and students who plan to use ALCs in the future.

Class-Wide Discussions

Most faculty and students in this study reported that they often have been involved in small group discussions. One downside, however, as reported by some students in this study, is that these students miss being able to hear from the instructor or interact with the entire class. Therefore, as Lee, Morrone, and Siering (2018) suggested, a class-wide discussion before or after small group discussion is key to the success of active learning in large classrooms. For example, after a short lecture by the instructor or after a presentation of group work for the entire class, students comment or ask questions about whatever is presented. However, as recommended by experienced faculty in this study, instructors need to set and communicate the rules before class starts or early in the semester. They need to articulate their role as a teacher and students' roles as well as their policies for unacceptable behavior. It also helps to teach students how to ask proper questions.

Centralized Teacher Station

All ALCs reviewed in this study have the teacher station at the center of the room rather than in front of the room. This configuration is believed to better democratize the classroom space and facilitate student engagement. Some faculty mentioned that they feel more comfortable with not being the authority figure in the classroom. Therefore, the centralized teacher station is useful in allowing the instructor to capture every student's attention and provide control and access to classroom displays, including the document camera.

However, among all features of ALCs the central location of the teacher's station was the least favorite feature for faculty participating in this study. Sometimes the instructors needed to talk to the whole class, demonstrate something to all students, or participate in a class-wide discussion. Furthermore, for some faculty, it was difficult to switch from being the center of attention in front of a classroom to a location where one is among the students.

Unfortunately, the teacher's station in all ALCs in this study and in most ALCs around the world are not movable. Some faculty reported that this puts them in an awkward situation, particularly, where some students are sitting at the tables behind the instructor. Lee et al. (2018) suggested using a movable desk. Another solution is to use a remote-controlled mouse or what is known as laser Clickers. This

allows instructors to move around as they are talking, demonstrating, or participating in a class-wide discussion.

Teaching Assistants or Group Facilitators

In the first two phases of this study, the researcher had a chance to use a teaching assistant (recently known as learning assistants) in one of the classes. He found that student groups in that course performed significantly higher than students in his other courses. In the present study, many teachers suggested using teaching assistants, particularly in large classes. As Komulainen et al. (2015) suggested, assistants have an important role in making sure that all groups are able to proceed with their tasks and that the groups do not get stuck and lose valuable time. Assistants can also answer student questions and facilitate group discussions. Where no teaching assistant is available, teachers may assign one of the students as the group facilitator.

Instructor and Student Preparation

ALCs present challenges for instructors who are used to teaching in more traditional classroom set-ups and for students who are used to learning in those environments (Petersen & Gorman, 2014). Instructors complained that most trainings in ALCs are limited to technology features and troubleshooting rather than on interactive and/or student-centered teaching strategies.

More than 70% of the faculty had never observed another instructor using an ALC. Therefore, it is critical to increase the training time and, if possible, provide an opportunity to observe these rooms in practice as part of their preparation. Sitting in an ALC during a real class session provides the instructor with a concrete experience for deciding how to interact with students and how to use the room. If this is not possible, at least one can watch some best practice videos. However, as Peterson and Gorman (2014) recommended, faculty need to redesign their courses incrementally. Because of many changes in instructor roles, which can be substantial for most instructors who previously only lectured, they suggested that instructors modify their courses in stages.

Students also need to be prepared. According to students in this study, about 50% of faculty did not prepare students for ALCs. Students need to know how to use available features. For example, they need to know what kind of marker they can use, which surfaces or walls they can write on, how to connect their PC to the TV monitor at their table, and how to use the wireless speakers when they want to talk. They also need to know what the instructor's expectations and policies regarding group participation are, what are the best ways to start and to conclude a discussion, how their contribution to group discussion will be evaluated, what are the time limits and how they can setup time for outside class or follow-up meetings, and, more importantly, why they are being taught in an ALC.

Dealing with Distraction

While in this study most faculty did not complain about distraction due to the noise, some students, particularly in the larger rooms, complained about it. Also, many students and some faculty complained about other types of distraction. Both instructors and students who participated in this study complained about students who do not engage in group work enough and were instead occupied with private things on their personal laptops or talking about things not related to their task. Others complained about distraction due to multiple screens in the room.

A couple of solutions are suggested in the literature to reduce distraction. For example, Peterson and Gorman (2014) recommended moving toward those students who are engaged in distracted or distracting behavior, or simply standing near the student engaged in the undesired behavior. Another solution that has worked well in classes is to let students know that their contribution to group work will be assessed by their peer group, their group facilitator, or the instructor. Imposing time limits, assigning teacher assistants or facilitators, and asking random students to report a summary of group discussion are among the strategies that teachers can use to make sure students stay on track.

Adjusting Teaching Methods

The results of this study indicate that ALCs are used mainly for lectures or group discussions. They are rarely used to produce something collaboratively. Magana (2017) recommended three stages of integrating technology in the classroom: translational, transformational, and transcendent. In the translational stage, teachers and students use technology as opposed to analog tools to perform their tasks. In the transformational stage, both the task itself and the students engaged in the task are substantially changed by the use of technology with the goal to make or produce something collaboratively. The results of the data in this study show that few teachers reached this stage. In the third stage, teachers go beyond the normal range of specific outcomes or products. At the transcendent stage, they push hard against the edges of what is currently known or possible. It is suggested that teachers incrementally move to this stage in which students are seen as autonomous creative thinkers or entrepreneurs.

While this open structure classroom might be difficult for undergraduate courses, it may work well for graduate courses. In undergraduate courses, there is more focus on

content but in graduate courses, most focus is on the process and critical thinking. As Rotgans and Henk (2011) suggested, ALCs are an appropriate context for investigating situational interests because in these classrooms, students are often provided with opportunities to formulate their own learning goals and pursue them. Another recommendation is to use the Flipped Classroom strategy in which students are required to read the textbooks or other readings at home prior to class, use the class time to discuss their learnings, ask questions, or do something or make something based on what they have read. ALCs provide the optimum environment, for students to discuss what they had studied before class.

Ask for Early Feedback

As explained earlier, group work success depends on several factors that vary in different situations. Something that works for large classrooms might not work well in small classrooms. Some tasks are divergent, and others are convergent; some students are team players while some are independent learners. Therefore, it is recommended to ask for early feedback to know the course's students and their preferences as soon as possible. This way teachers would know what changes would benefit student learning. It is also suggested that teachers share the results with students and try to accommodate student requests or explain why accommodations are not made (Petersen & Gorman, 2014).

Low Tech Vs High Tech Classrooms

As discussed earlier, it is not the size of ALCs that make a difference in learning (Maquivar & Sundararajan, 2017). There is also research showing that it is not the technology that makes the difference either. According to Nicol et al. (2017), although numerous high-technology classrooms are being established, it has not been determined whether students achieve higher grades in those types of environments than in low-technology classroom environments that employ active learning techniques. On the other hand, England et al. (2017) reported that all of their five ALCs' courses that they investigated had caused student anxiety due to excessive use of technology. In this study, all ALCs had the same level of technology equipment. However, many faculty mentioned that they can engage students at an equal level in a low tech environment as well.

Nicol et al. (2017) found no significant effects for the high-technology ALCs versus low-technology ALCs. In their study, the instructors noted various problems with equipment, student non-participation, difficulty with using the technology, and some problematic group dynamics preventing the emergence of the high-technology classroom's full potential. Similarly, Rogers et al. (2015) found that it took numerous years, a certain level of instructor experience, and changes to the curriculum before benefits were evident.

Therefore, it may be more important to have a pedagogy-driven approach such as the aforementioned Magana's (2017) approach to integrating technology in the classroom rather than a technology-driven approach. Technology itself may play a role in fostering a student's motivation to engage in the material, but it may also hinder engagement, depending upon individual differences. Nicol et al. (2017) asserted that while active learning is important for higher levels of learning, classrooms that provide a lot of visual and intellectual distractions might not be a better means by which to engage students.

Consider All Types of Learners and All Levels of Learning

One complaint reported mostly by students in this study was "too much discussion" or "too much group work." While the main idea of creating ALCs is to facilitate group work and group discussions, as reported by some students in this study, not all course objectives merits group work or group discussion. The researcher's own course evaluations also indicate some students are interested in working or reading independently or prefer to learn first-hand from the instructor rather than listen to other students' opinions. Other students are resistant to approaches that ask them to take more responsibility for their learning (Petersen & Gorman, 2014).

It is also possible that the novelty of an ALC can have short-term impact on student attitudes, which may wane in cases of overuse (Perks et al., 2016). Therefore, differences between students who have been exposed to many courses taught in ALCs versus students who have not been exposed to these rooms should be considered by the instructors. However, it should be noted that at least in one study, the authors found no difference in the first-time or repeated student-users' experience in ALCs (Mui et al., 2019). Another thing to consider is that since students in ALCs are mostly engaged in student-student interaction and students in the class may be facing away from the instructor at any given time, faculty-student interaction might be under-emphasized, therefore, instructors need to address the whole class sometimes to allow students hear from the instructor and perhaps ask their questions.

Horton (2011) categorized students' class activities into three groups: absorb, do, and connect activities. He believes that while absorb activities are not inherently interesting for typical students, they are quite useful, particularly for highly motivated learners. Given that, some research has demonstrated that active learning has an influence on higher level learning (based on Bloom's taxonomy), but possibly

not lower level learning, it is possible that some important learning activities such as reading, physical demonstrations, dramas, or ponder activities might be underemphasized in ALCs, if there are no absorb activities.

Conclusion

To conclude, ALCs are very new in our colleges and campuses. Teachers, students, and administrators are learning as the number of rooms and the number of users grow. This study leaves no doubt that ALCs are quite useful in most aspects of learning outcomes and teamwork skills. The question is how we can improve their effectiveness and reduce the cost of designing them. While the need for training was reflected in this article, the need for further research is also there. For example, in response to our open questions some students and faculty raised important questions and concerns. However, since those questions were not included in the Likert type surveys, we are not sure how prevalent those concerns are. Future studies may focus on some of the suggestions provided in this article to check their validity. For example, the novelty factor is a serious concern that needs to be examined in the future. Comparison of different ALC sizes, levels of technology, teaching styles, tasks, and group configurations would also be helpful in the future.

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Appendix 1

ALC Faculty Survey

Consent form:

Dear faculty,

You are being asked to participate in this research study because you have been identified as a CSULB faculty that previously or currently uses the Active Learning Classrooms (ALC) on campus. The goal of this study is to find out what features of these classrooms are useful and what features are not used by faculty and students and what are missing in these classes. We would also like to learn what type practices work better in this type of environment.

Please read the following consent form and decide if you agree to continue the survey or you want to stop the survey. **Please note this survey is anonymous.**

Potential Benefits to Subjects and/or to Society The results of this research will help us to design more effective learning environments in Active Learning Classrooms (ALCs).

Potential Risks and Discomforts Risk #1: Loss of confidentiality. This risk is minimal because the researcher doesn't have access to the email list. Only ALC staff will have the list and they will send the link to the faculty who use the ALC rooms. Risk #2: Coercion. This risk is also minimal since the survey results will be accessible only by the Principal Investigator and he will not access to your email address. Furthermore, you are not asked to input your names or IDs and your participation is quite voluntary. You may end your participation at any time. You may also refrain from answering any specific question that makes you uncomfortable and still remain in the study.

Payment for Participation

There is no direct payment for this study.

Confidentiality You will not be asked to provide any information that might be used to determine your identity. If the study is published, there will not be any identifying information that can be linked to your email address and e-mail correspondence will not be connected to any of your responses.

Participation and Withdrawal You can choose whether or not to be in this study. If you volunteer to participate, you may withdraw at any time without any consequences of any kind. Participation or non-participation will not affect any personal consideration or the rights you usually expect. You may also refuse to answer any questions you do not want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which in the opinion of the researcher warrant doing so.

Identification of the Investigators This research study conducted by Dr. Ali Rezaei a professor of education at CSULB in cooperation with ATS/Classroom Support Services. Dr. Rezaei has been teaching for more than 25 years and his area of research is educational assessment. You may contact ASEC's office at 562-985-7947 for more information about him.

Rights of Research Subjects You may withdraw your consent at any time and discontinue without penalty. You are not waving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact the Office of Research and Sponsored Programs, CSU Long Beach, 1250 Bellflower, Blvd., Long Beach, CA 90840. Telephone (562) 985-8147 or email to ORSP-Compliance@csulb.edu.

I understand the procedures and conditions of my participation described above. My questions have been answered to my satisfaction, and I agree to participate in this study.

- o Agree (1)
- o Disagree (2)

Your College?

▼ Choose your college----- (29) ... College of Continuing and Professional Education (37)

Your Department?

▼ Select Your Department------- (39) ... Others (21)

Your gender?

- o Male (1)
- o Female (2)

Number of years teaching experience?

	1	7	13	18	24	30
Use slider to choose. ()						

Select the room that you are currently teaching in and doing this survey for it.

- o AS-235 (1)
- o AS-244 (2)
- o CBA-217 (3)
- o CBA-218 (4)
- o EED-040 (5)
- o EED-041 (6)
- o LA2-101 (7)
- o LA2-200 (8)
- o LA3-106 (9)
- o LA3-204 (10)

Course name and number? (e.g., ETEC 444)

1. Did you make considerable amount of change in your teaching strategies when you switched to ALC rooms?

- o Yes, absolutely (4)
- o Yes, to some extent (3)
- o Not really (2)
- o Not at all (1)

If yes, what changes did you make?

2. In comparison with other classrooms, do you believe ALC rooms give you a better chance to receive feedback from students on if they are learning or not?

- o Yes, absolutely (4)
- o Yes, to some extent (3)
- o Not really (2)
- o Not at all (1)

3. In comparison with other classrooms, how longer/shorter are your lectures in ALCs?

- o I don't lecture anymore (1)
- o My lectures' length has decreased significantly (2)
- o My lectures' length has not changed significantly (3)
- o Indeed, my lectures' length has increased (4)

4. Have you ever used your own laptop/iPad (instead of the available desktop) to share your screen with your **students**?

- o Yes (1)
- o Yes (2)

If yes, explain why you needed to use your own laptop.

5. Are you satisfied with the arrangement of tables and seats in this room?

- o Not at all (1)
- o Not really (2)
- o Yes, to some extent (3)
- o Yes, very much (4)

6. Do you have any comments, concerns or suggestions about the size of the room and table arrangements?

7. Do you feel that sometimes there are too much noise and distractions in the room ?

- o Yes, absolutely (4)
- o Yes, most of the time (3)
- o No, only sometimes, (2)
- o Not at all (1)

If yes, how do you manage noise and distractions when all students are talking and discussing?

8. How do you assess your students' learning due to their discussions? How do you know the discussions are helping? You may simply say "I don't assess the **effectiveness of discussions**".

9. Do you have a **time limit** for group discussions?

- o Yes, always (4)
- o Yes, most of the time (3)
- o Not really (2)
- o Not at all (1)

10. **How do you check** if students are on task during group discussion tasks?

Appendix 2

ALC Student Survey

Consent form:

Please read the following consent form and decide if you agree to continue the survey or you want to stop the survey. **Please note this survey is anonymous.**

You are being asked to participate in this research study because you have been identified as a [faculty/student] at CSULB that previously or currently uses the Active Learning Classrooms (ALC) on campus. The goal of this study is to find out what features of these classrooms are useful and what features are not used by faculty and students and what are missing in these classes.

Potential Benefits to Subjects and/or to Society.

The results of this research will help us to design more effective learning environments in Active Learning Classrooms (ALCs).

Potential Risks and Discomforts.

Risk #1: Loss of confidentiality. This risk is minimal because the principle investigator doesn't have access to the email list. Only ALC staff will have the list and they will send the link to the faculty who use the ALC rooms and faculty will send the link to their students.

Risk #2: Coercion. This risk is also minimal since your instructor will not have access to the surveys and the survey results will be accessible only by the principle Investigator. Furthermore, you are not asked to input their name or ID and will not be forced to answer and participation is voluntary.

Payment for Participation

There is no direct payment for this study.

Confidentiality

You will not be asked to provide any information that might be used to determine your identity. If the study is published, there will not be any identifying information that can be linked to your email address and e-mail correspondence will not be connected to any of your responses.

Participation and Withdrawal

You can choose whether or not to be in this study. If you volunteer to participate, you may withdraw at any time without any consequences of any kind. Participation or non-participation will not affect any personal consideration or the rights you usually expect. You may also refuse to answer any questions you do not want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which in the opinion of the researcher warrant doing so.

Identification of the Investigators

This research study conducted by Dr. Ali Rezaei a professor of education at CSULB in cooperation with ATS/Classroom Support Services. He has been teaching for more than 25 years and his area of research is educational assessment. You may contact ASEC's office at 562-985-7947 for more information about him.

Rights of Research Subjects

You may withdraw your consent at any time and discontinue without penalty. You are not waving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact the Office of Research and Sponsored Programs, CSU Long Beach, 1250 Bellflower, Blvd., Long Beach, CA 90840. Telephone (562) 985-8147 or email to ORSP-Compliance@csulb.edu.

I understand the procedures and conditions of my participation described above. My questions have been answered to my satisfaction, and I agree to participate in this study.

- o Agree (1)
- o Disagree (2)

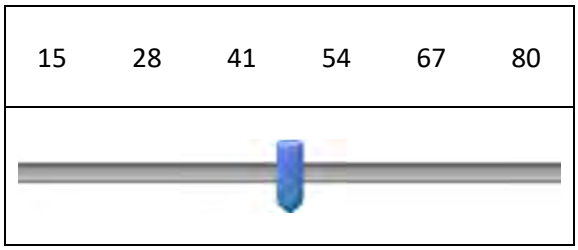
Your College?

▼ Choose your college-----

Your Department?

▼ Select Your Department-------

Your age?



Your gender?

- o Male (1)
- o Female (2)

Select the room(s) you are currently using (choose only one specific class even if you are using multiple rooms this semester).

- o AS-235 (1)
- o AS-244 (2)
- o CBA-217 (3)
- o CBA-218 (4)
- o EED-040 (5)
- o EED-041 (6)
- o LA2-101 (7)
- o LA2-200 (8)
- o LA3-106 (9)

- LA3-204 (10)

Course name and number? (e. g., ETEC 444)

How often did the following activities occur in your course?

	Not often	Very often
The work of **an individual studen**t was displayed or projected so that the whole class could see it. ()		
The work of **a group of students** was displayed or projected to the whole class. ()		
An in-class learning activity required students to **use the internet** to conduct research or located information. ()		
An in-class activity required students in the group to use a **personal laptop** or device. ()		
An in-class learning activity **required students to explain** course ideas or concepts to other students. ()		
Students worked in **small groups** on an in-class learning activity ()		

1. Do you think you **learn better** in an Active Learning Classroom (ALC) environment rather than the traditional classroom?

- Yes, absolutely (4)
- Yes, most of the time (3)
- No, only sometimes (2)

- o No, I don't think so (1)

2. What is the **main feature** that makes ALC more useful than a regular classroom?

   A. Students can form small groups around a table (1)

   B. We have the large TV monitors for each table (7)

   C. The teacher is in the center of class rather than in front of class (8)

   D. The tables' surface are writable (9)

   E. We can share our laptop's screen with the whole group (10)

   F. The instructor can project his material on the large screen (11)

   G. None of the above, I don't agree that ALC rooms are more useful (12)

3. Do you get more **distracted** in ALC than regular classrooms?

   - o Yes, absolutely (4)
   - o Yes, most of the time (3)
   - o No, only sometimes (2)
   - o No, I don't think so (1)

4. Does frequent discussions among students **help your learning**?

   - o Yes, absolutely (4)
   - o Yes, most of the time (3)
   - o No, only sometimes (2)
   - o No, I don't think so (1)

5. Do you need to be **technology-savvy** as a student in ALC rooms?

   - o Yes, absolutely (4)
   - o Yes, most of the time (3)
   - o No, only sometimes (2)
   - o No, I don't think so (1)

6. What do you think about the **size of tables** in these rooms? The size is

   - o Just fine (1)
   - o A little large (2)
   - o A little small (3)
   - o Too large (4)
   - o Too small (5)

7. How many students **per table** is most desirable?

4	6	7	9	10	12

8. Have you ever used your own laptop to share your screen with the **other students**?

- o Yes, many times (4)
- o Yes, sometimes (3)
- o Only once (2)
- o No, never (1)

9. If yes, explain what did you share and why did you share?

10. Do you ever use the **writable surface** tables in this room?

- o Yes, all the time (4)
- o Yes, most of the time (3)
- o No, I don't think so (2)
- o Absolutely no (1)

11. Do you believe that ALC rooms encourage teamwork and cooperation among students?

- o Yes, absolutely (4)
- o Yes, I think so (3)
- o No, I don't think so (2)
- o Absolutely no (1)

12. Do you feel that you have more **social presence** in ALC rooms?

- o Yes, absolutely (4)
- o Yes, I think so (3)
- o No, I don't think so (2)
- o Absolutely no (1)

13. Does ALC environment compel you to **attend class** more often and miss classes less?

- o Yes, absolutely (4)
- o Yes, I think so (3)
- o No, I don't think so (2)
- o Absolutely no (1)

14. Do you believe that ALC rooms makes you become more a **dependent learner** (dependent to other group members)?

- o Yes, absolutely (4)
- o Yes, I think so (3)
- o No, I don't think so (2)
- o Absolutely no (1)

15. Does the ALC environment make your teacher to play a less authoritative role and more a facilitator role?

- o Yes, absolutely (4)
- o Yes, I think so (3)
- o No, I don't think so (2)
- o Absolutely no (1)

16. Did your instructor **explain why** he/she is using this type of classroom for his/her course?

- o Not at all (4)
- o Not really (3)
- o Yes, to some extent (2)
- o Yes, very much (1)

17. Did your instructor **prepared you** for learning in this type of environment?

- o Not at all (4)
- o Nit really (3)
- o Yes, to some extent (2)
- o Yes, very much (1)

18. If yes, how?

19. Does the instructor move around the room and **sit with** small groups to make sure they are quite engaged?

- o Yes, all the time (4)
- o Yes, most of the times (3)
- o No, only a few times (2)
- o No, never (1)

20. In comparison with other classrooms do you believe ALC rooms give you more opportunities to **ask your questions** from your teachers?

- o Yes, absolutely (4)
- o Yes, I think so (3)
- o No, I don't think so (2)
- o Absolutely no (1)

21. Is **most of your time** in class spent on listening to lecture, discussion and collaboration, or individual tasks?

- o Listening to lecture (1)

- o Discussion and collaboration (4)
- o Individual tasks (5)

22. Do you **stay** with the same group for the whole semester?

- o Yes, always (4)
- o Yes, most of the time (3)
- o No, only sometimes (2)
- o No, we change groups all the time. (1)

23. Do you find the ALC environment to be more **inspirational**?

- o Not at all (1)
- o No, just a little (2)
- o Yes, to some extent (3)
- o Yes, very much (4)

24. Does the center location of the **instructor station** make the instructor more accessible?

- o Yes, absolutely (4)
- o Yes, to some extent (3)
- o No, I don't think so (2)
- o Not at all (1)

25. There is no **back row** or back seats in ALC rooms. Is this a good thing?

- o Yes, absolutely (4)
- o Yes, to some extent (3)
- o No, I don't think so (2)
- o Not at all (1)

26. Usually, there are **a few students** who don't do their part in a teamwork. Do you believe this ALC setting stops those free riders and unengaged students?

- o Yes, absolutely (4)
- o Yes, to some extent (3)
- o No, I don't think so (2)
- o Not at all (1)

27. In your opinion, **what kind of courses** are more appropriate for this ALC environment?

28. In your opinion, does it make sense to design **much larger ALC** rooms that fit many more students?

- o Yes, absolutely (4)
- o Yes, to some extent (3)
- o No, I don't think so (2)
- o Not at all (1)

29. Do you prefer **Huddle Boards** (portable white boards) or you prefer these writable surface tables?

- o Huddle Boards (1)
- o Writable Surface Tables (4)

30. Are you **required** to bring your own laptops to class?

- o Yes, all the time (4)
- o Yes, most of the times (3)
- o No, only a few times (2)
- o No, never (1)

31. **Do you like the idea** that students should bring their own laptops to class?

- o Yes, absolutely (4)
- o Yes, to some extent (3)
- o No, I don't think so (2)
- o Not at all (1)