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The Role of Classroom Design in Facilitating Student Engagement in Recreation and Leisure Education

Samantha L. Powers\textsuperscript{a}, Robert J. Barcelona\textsuperscript{b}, Nate E. Trauntvein\textsuperscript{c}, and Sean McLaughlin\textsuperscript{b}

\textsuperscript{a}The Pennsylvania State University; \textsuperscript{b}University of New Hampshire; \textsuperscript{c}Utah State University

**ABSTRACT**
Success in the field of recreation management requires a variety of 21st-century skills including the abilities to solve complex problems, think creatively, and collaborate with peers. Research suggests that instructor contribution through active learning pedagogy, incorporation of technology, and maximization of classroom design can foster effective student collaboration. Technology Enabled Active Learning (TEAL) classrooms represent the intersection of these three factors and should be ideal for eliciting student engagement, especially with regard to collaborative work. This quasi-experimental design study (\( n = 86 \)) examined three factors of student engagement (Instructor Contribution, Personal Effort, and Value of Group Work) among students enrolled in two sections of a recreation programming course— one occurring in a TEAL classroom and the other in a traditional classroom. When controlling for GPA, student perceptions of the Value of Group Work were significantly higher among TEAL students. Moreover, when examining factors that explain TEAL student perceptions of the Value of Group Work, Personal Effort, Instructor Contribution, and physical position of the instructor in the modular room explained 70% of the variance in Value of Group Work. Our findings suggest that when used for their intended purpose of active learning, TEAL classrooms are viewed favorably by students and are a valuable tool for recreation education, especially for group collaboration and project-based learning.

**KEYWORDS**
Classroom design; group collaboration; recreation education; student engagement; technology enabled active learning

**Introduction**

The field of recreation management requires professionals to work collaboratively, think creatively, and take engaging and interactive approaches to solve problems (Fulthorp & D’Eloia, 2015; Hurd, Barcelona, & Meldrum, 2008; VanSickle & Schaumleffel, 2016). Similar to other fields of study, a significant portion of student learning in park and recreation programs occurs in the classroom setting. Despite being in the classroom setting, educators can emphasize real-world problem solving and 21st-century skills through the use of student-centered learning, or active learning pedagogies (Mowatt, 2010; Smith, Sheppard, Johnson, & Johnson, 2005). Active learning, especially that which utilizes collaborative, group, or team-based learning, encourages students to apply the content they are learning in more authentic, real-world settings which can help prepare them for future positions in the field (Mowatt, 2010).

Moreover, active learning pedagogy encourages higher-level cognitive processes, such as those described in Bloom’s Taxonomy. That is, students must first remember and understand the material, then be able to apply the material, and finally, be able to analyze, evaluate, and create using the new material they have learned (Krathwohl, 2002). Various active learning pedagogies,
including the flipped classroom and group collaboration, can encourage the use of higher-level cognitive processes (i.e., analysis, evaluation, and creation). Through practicing these processes, students can develop skills critical to their success as professionals.

To support learning in the classroom, it is important to maintain an environment in which students are engaged in the material and can apply the concepts in realistic settings. Studies have shown that classroom engagement is best elicited through the creation of an active learning environment (Smith et al., 2005). Research has independently suggested the importance of the instructors’ pedagogical delivery of the content (e.g., active learning), the physical environment of the classroom, and the integration of technology in the learning process. Technology Enabled Active Learning (TEAL) classrooms have a unique advantage with regard to active learning. TEAL classrooms benefit from a modular, flexible classroom layout with integrated technology. Several student group tables are typically positioned in a circle around the instructor and each table has a TV screen for students or the instructor to project content. With these features, groups of students can collaborate in real-time with everyone being able to see the same screen, including the instructor. TEAL classrooms provide realistic group collaboration experiences which may help students to develop problem-solving skills and prepare them for collaboration in the workplace. In-class group work may take the form of assignments and papers, but the skills students use to work collaboratively with technology are directly transferrable to professional environments (Barcelona, 2009). Thus, TEAL classrooms should be an ideal environment for an active learning course that utilizes collaborative learning. The purpose of this study was to investigate the efficacy of a TEAL classroom for recreation management students. Specifically, this study examined the effectiveness of a TEAL classroom for group collaboration through an examination of students’ perceptions of the value they place on collaborative work as well as their personal effort and perceived contribution of the instructor throughout their semester.

**Literature review**

**Bloom’s taxonomy**

Bloom’s Taxonomy is an educational framework commonly used to design curricular objectives based on intended learning outcomes (Bloom, 1956). Bloom’s Taxonomy suggests a hierarchy of various cognitive outcomes (Anderson & Krathwohl, 2001; Bloom, 1956). These include the following, in hierarchical order: knowledge, comprehension, application, analysis, synthesis, and evaluation. Authors have suggested further revisions to the original taxonomy, specifically regarding the knowledge domain of the framework (Anderson & Krathwohl, 2001; Krathwohl, 2002). For example, as Krathwohl (2002) suggested in his revision, the taxonomy may include two different cognitive domains: knowledge dimensions and cognitive processes. He suggests that the knowledge dimension of the taxonomy includes factual knowledge, conceptual knowledge, procedural knowledge, and metacognitive knowledge. On the other hand, the cognitive process dimension suggests that one must remember, understand, apply, analyze, evaluate, and create (Krathwohl, 2002). For the purposes of this study, we will use the framework of the cognitive process dimension of the revised Bloom’s Taxonomy. In the field of recreation management, the ability to transfer concepts learned in the classroom to real-world scenarios is critical. Creative thinking and problem-solving are important skills for recreation professionals, and designing courses and projects through the framework of Bloom’s Taxonomy is one way for students to practice applying their knowledge in realistic settings.

**Student engagement**

The main intent of the cognitive process dimension of Bloom’s Taxonomy is that students must initially remember and understand the material, then be able to apply the material, and finally, be
able to analyze, evaluate, and create using the new material they have learned (Krathwohl, 2002). In courses designed through Bloom’s Taxonomy, it is expected that in order for students to achieve the higher levels of learning (i.e., apply, analyze, evaluate, and create), they must be engaged in the classroom with the material. For example, as Mitchell and Riley (2003) suggested with regard to the success of collaborative learning, “the students must become active and responsible for their own learning” (p. 121). According to The Cambridge Handbook of the Learning Sciences, students’ cognitive engagement in learning is determined by four main factors: value, competence, relatedness, and autonomy (Sawyer, 2005). These four factors broadly translate to a student’s ability and willingness to concentrate, exert personal effort, and show investment in a task (Wiggins et al., 2017). When relating to a collaborative active learning exercise, research has identified three main aspects of student engagement which contribute to higher learning. These include the contribution of the instructor, the personal effort of the student, and the value of collaborative work (Wiggins et al., 2017). Research has identified several pedagogical approaches to increasing student engagement, such as an emphasis on active learning, incorporation of technology, and maximizing use of the physical classroom design (Barcelona, 2010; Barcelona & Rockey, 2010; Laird & Kuh, 2005; Scott-Webbet, Stickland, & Kapitula, 2014; Smith et al., 2005; Vassar, Havice, Havice, & Brookover, 2015).

Active learning pedagogy and student engagement

Active learning is an intentional pedagogy used by course instructors which engages students in meaningful, student-centered learning experiences. In an active learning classroom, students are the focus of attention, not the instructor (Smith et al., 2005). Moreover, the instructor acts more as a facilitator of learning than as a traditional lecturer (Smith et al., 2005).

Research has suggested both flipped classrooms and group collaboration as effective active learning strategies for student engagement (Barcelona & Rockey, 2010; Barfield, 2003; Kim, Kim, Khera, & Getman, 2014; Vassar et al., 2015). For example, in the flipped classroom setting, students often watch a lecture at home prior to coming to class and are able to process the material at their own pace. Then, once in the classroom, students can focus on tasks and projects in an environment which supports collaboration with peers as well as communication with and assistance from the instructor and/or teaching assistants (Baker & Settle, 2013; Vassar et al., 2015). Research has suggested that flipped classrooms are a successful strategy for meeting student needs while maximizing learning outcomes (Kim et al., 2014; Vassar et al., 2015). Group collaboration is also an effective active learning pedagogy and the use of a flipped classroom could help instructors dedicate additional time in the classroom to peer collaboration (Roehl, Reddy, & Shannon, 2013). Research has suggested that group collaboration can increase critical thinking, promote interpersonal skills, and prepare students for real-world work (Barcelona & Rockey, 2010). Moreover, effective group collaboration in the classroom can help students achieve higher-order learning outcomes and increase their overall engagement (Barfield, 2003; Sawyer, 2005).

Technology and student engagement

The idea that technology plays an integral role in teaching is not a new concept. For the past three decades, educators have sought to maximize the use of technology to improve the educational experience (Barcelona, 2009; Barcelona & Rockey, 2010; Chickering & Ehrmann, 1996; Laird & Kuh, 2005). Over twenty years ago, Chickering and Ehrmann (1996) suggested that technology could be used to advance active learning outcomes and better meet Chickering and Gamson’s (1987) Seven Good Principles for Good Practice in Undergraduate Education. These principles included encouraging contact between students and faculty, collaboration among students, active learning, timely feedback, time efficiency, high expectations, and using a variety of
learning styles. Furthermore, as technology advanced following the initial development of the seven principles, Chickering and Ehrmann (1996) suggested that technology could be used to both achieve and advance each of them. For example, some studies have found that online communication methods can increase collaboration among students as well as contact between students and faculty (Barcelona, 2009; Barcelona, & Rockey, 2010; Laird & Kuh, 2005). Research also suggests that students enjoy using technology, and that the use of technology can increase opportunities for peer collaboration (Barcelona & Rockey, 2010; Diemer, Fernandez, & Streepey, 2013).

While technological tools can help facilitate collaboration among students, simply making these available does not ensure effective collaborative learning. Rather, the instructor must continue to serve as a guide and encourage a culture of collaboration among students (Barcelona, 2010). As additional authors have noted, collaborative learning requires effective facilitation of the instructor as well as the personal effort of the student (Sawyer, 2005; Williams, 1995). For many higher education students today, the use of technology is already engrained into their lifestyle and educational experience. Not only are they familiar with technological tools, but many are interested in using them for educational purposes (Diemer et al., 2013). By encouraging the use of technologies that students are interested in, educators may be able to provide an additional source of motivation for their students. When implemented correctly by the instructor (e.g., showing students how to use them, providing support/troubleshooting, etc.), technological tools may be able to advance active learning pedagogies through group collaboration.

Physical classroom design and student engagement

Despite the importance of active learning, not all classrooms are conducive to active learning such as that of a flipped classroom or collaborative group work. Ideally, the physical classroom space should match the intended pedagogy whether it be an active learning lab or a traditional lecture. Research suggests the value of intentionally designed educational spaces, especially with regard to their ability to mirror the intended pedagogy of the class (Neill & Etheridge, 2008; Scott-Webbet et al., 2014). As Neill and Etheridge (2008) stated, “pedagogical innovation demands a space that enables exploration by both teacher and student” (p. 47). Various studies and reports have identified the need for more flexible education spaces, particularly those which are conducive to group collaboration. Elements of a flexible classroom often include movable furniture, areas for small group collaboration, and mobile and wireless technology which supports group co-creation and digital information sharing (Bemer, Moeller, & Ball, 2009; Lee, Boatman, Jowett, & Guenther, 2014; Neill & Etheridge, 2008; Scott-Webbet et al., 2014).

Technology enabled active learning classrooms (TEAL)

While instructors have been using various forms of technology both within and beyond the classroom for decades, TEAL classrooms represent a key design development for higher education. TEAL classrooms typically have modular layouts with tables positioned in a circle around a central hub for the instructor. The central hub has large screens where the instructor can project content; each student table also has a screen where the instructor and students can project content. TV screens at each group table allow students to hook up their laptops with provided cables. This provides easy visibility to a large group so that everyone can not only participate but see the product in real-time. Classrooms that are intentionally designed to incorporate technology have a unique advantage when it comes to active learning, and likewise, may be able to better meet Chickering and Ehrman’s Seven Principles. Moreover, TEAL classrooms demonstrate the intersection of technology integration with physical classroom design for the use of active learning pedagogy. Research has suggested that the modular design of educational spaces can promote collaboration (Bemer et al., 2009; Lee et al., 2014; Neill & Etheridge, 2008; Scott-Webbet et al., 2014).
and that collaborative learning technologies can facilitate effective group work (Barcelona, 2009; Barcelona, & Rockey, 2010; Laird & Kuh, 2005). Therefore, the TEAL classroom should be an ideal environment for group collaboration.

TEAL classrooms are specifically designed for courses that rely heavily on active learning, such as that of the flipped classroom or group collaboration methods. In addition to their physical design as a modular learning space, TEAL classrooms also include an interesting array of integrated technological tools. From laptop hookups and TV screens at each group table to the position of the instructor’s space in the middle of the room, the TEAL classroom has a unique layout which includes elements of flexible classroom design (Figure 1). Theoretically, these classrooms are intentionally designed to maximize student use of technology in a modular layout in order to facilitate active learning (Lee et al., 2014; MIT iCampus, 2014; University of New Hampshire, 2018; Yale University, 2016).

Many universities have made significant investments (i.e., financial and spatial) in creating similar modular type active learning environments, whether it be classrooms or other study spaces on campus. For example, Massachusetts Institute of Technology implemented TEAL classrooms as part of a collaborative initiative with Microsoft in the early 2000s and has since been using the classrooms for many introductory courses within the university (MIT iCampus, 2018). Furthermore, Yale University suggests the effectiveness of TEAL classrooms for courses that emphasize creative problem-solving (Yale University, 2016). Despite the widespread use of these classrooms, there appears to be a lack of empirical evaluation of the outcomes of using these classrooms with recreation management students, and moreover, there is a need to evaluate their effectiveness with regard to peer collaboration.

Figure 1. TEAL classroom blueprint (University of New Hampshire, 2018)
**Value of group work**

TEAL classrooms should be ideal for collaborative group work given their incorporation of technology as well as modular layout. The ability to effectively collaborate and work in groups is an essential competency required of college graduates (Fulthorp & D'Eloia, 2015; Hurd et al., 2008). When developing and offering recreation events and programs, professionals frequently work in groups. Students graduating with degrees in recreation management must be able to effectively collaborate with other professionals, and incorporation of group collaboration into undergraduate courses can help to more effectively prepare them for their careers (Barcelona & Rockey, 2010; Mowatt, 2010; Payne, Monk-Turner, Smith, & Sumter, 2006). According to *The Cambridge Handbook of the Learning Sciences*, peer collaboration can even increase motivation and cognitive engagement (Sawyer, 2005).

Despite much of the research on the benefits of group collaboration in higher education as well as instructors’ common use of this approach, studies suggest students’ ambivalence toward peer collaboration (Barfield, 2003; Payne et al., 2006). Some studies suggest students enjoy the use of technology and that it can facilitate more effective group collaboration (e.g., Barcelona & Rockey, 2010; Diemer et al., 2013) but what about in a technology enabled classroom? Currently, research on student perceptions of group collaboration in TEAL classrooms is limited. However, some research on similar modular classrooms with technological features suggests that students enjoy these spaces and find them valuable for group work (Adedokun, Parker, Henke, & Burgess, 2017).

Based on this review of the literature, we suggest that in order for students to achieve higher levels of learning, they must engage with course material through individual effort, effective facilitation of the instructor, and positive peer collaboration. This is consistent with Bloom’s Taxonomy and active learning pedagogy. Moreover, the design of the TEAL classroom (including both the physical layout and incorporation of technology) should create an ideal environment for group collaboration. The purpose of this study was to evaluate the effectiveness of a TEAL classroom toward improving student perceptions of group collaboration. This research addressed the following questions:

1. When accounting for self-reported GPA, is there a significant difference in student perception of classroom engagement (Value of Group Work, Personal Effort, and Instructor Contribution) between students who are taught in a Technology Enabled Active Learning classroom and those who are taught in a traditional lecture hall classroom?
2. How do students in the TEAL classroom perceive the classroom design?
3. Among the TEAL students, is there a significant relationship between student perception of Value of Group Work and various aspects of the classroom design while accounting for the Contribution of the Instructor and the Personal Effort of the student?

**Methods**

**Sampling**

This quasi-experimental design study (n = 86) was available to students enrolled in two sections (one in a traditional lecture hall and one in a TEAL classroom) of a recreation management program design course at a mid-size, public university in the Northeastern United States. All aspects of this study were approved by the university’s institutional research board. Students were able to choose which section of the course to sign up for during their course enrollment period the previous semester. The sections were not held at the same time, and therefore random assignment was not feasible. Both sections were held on Tuesday and Thursday with the traditional lecture-hall section occurring from 9:40–11:00am and the TEAL section occurring from 2:00–3:30pm.
The TEAL class was a bit larger than the traditional lecture hall, which could be a function of many factors, such as a more desirable time or perhaps an interest in using the TEAL classroom. However, the study took place during the first semester that the TEAL classroom was in use at the university, so students would not have had previous experience in this room. Both sections of the course were taught by the same instructor and had the same teaching assistants.

It is important to acknowledge that two of the researchers from this study were involved in the teaching of this course and invited students to participate in the survey. Students were invited to complete the survey during a class period at the conclusion of the semester in Fall 2017. Students were not required to participate and received no incentive for doing so. The traditional lecture hall section had 44 enrolled students, 34 of which completed the survey for a response rate of 77%. The TEAL section has 56 enrolled students, 52 of which completed the survey for a response rate of 93%.

**Class delivery**

We controlled for several aspects of class delivery including instructor, content, and pedagogy. Both sections of the class had identical content including lecture material, group work, and individual assignments. Both sections of the course remained on the same schedule with identical content and delivery each class meeting. Moreover, instructor pedagogy was consistent across classrooms with every Tuesday class meeting serving as a lecture and every Thursday class meeting being used for collaborative work on a semester-long project. The project included the planning, implementation, and evaluation of a recreation event; it was designed as an opportunity for students to apply their knowledge through the creation of a unique, collaborative project. For the final project, students had to 1) create a fictitious program plan for a recreation agency which was tied to their mission, the population they serve, and the types of services they offer; 2) implement a “program slice,” or an event that was a part of their proposed program where their classmates served as program participants; and 3) evaluate the program from their own perspectives as managers and from the perspectives of participants through analysis of post-program surveys. In addition to serving as a framework for this study, Bloom’s Taxonomy also served as a guiding role in the curriculum design for this recreation management course. That is, students’ content delivery (lecture) was followed by opportunities to apply and analyze content which ultimately led to the collaborative creation of a final product. The collaborative nature of this course was very intentional and was designed to provide a realistic application of the material. One of the intended outcomes of this course was that students would value collaborative work with their peers. When developing and offering programs in the field, professionals frequently work in groups. The value of peer collaboration and group work was one of the main student engagement outcomes of this course.

**Classroom design**

The TEAL classroom was set-up in a modular layout such that the instructor had a standing room area positioned in the center of the room and the students had group tables circularly positioned around the instructor. The TEAL classroom included integrated technological features including HDMI laptop hookups for a TV screen at each group table, the ability for the instructor to project any group’s TV screen upon all of the other screens, and a central technological command center for the instructor to control all group table displays within the room. On the other hand, the traditional lecture hall was designed with students sitting in cascading rows of long tables and the instructor having a podium to stand at in the front of the room. Students in both classrooms were encouraged to use technology for group collaboration; in both classes, most students frequently used their laptops.
Measures

This study utilized an online survey to collect quantitative, retrospective data on students’ perceptions of classroom engagement. The survey included a modified version of Wiggins et al.’s (2017) Assessing Student Perspective of Engagement in Class Tool (ASPECT). The ASPECT was designed for use with active learning activities and measures three domains of student engagement: Value of Activity, Personal Effort, and Instructor Contribution. This measure was selected due to its demonstrated reliability and validity as well as its use in several recent studies (e.g., Addy et al., 2018; Cavanagh et al., 2018; Theobald, Eddy, Grunspan, Wiggins, & Crowe, 2017). In the development of the ASPECT, Wiggins et al. (2017) developed and validated the three constructs, tested the overall validity and reliability, and verified the external validity of the ASPECT. The measure includes 16 items that are asked on 6-point Likert scales where 1 = strongly disagree and 6 = strongly agree. In Wiggins et al.’s (2017) study, Cronbach’s alpha was used to determine the reliability of the ASPECT constructs. Value of Activity, Personal Effort, and, and Instructor Contribution displayed levels above 0.7 (α = 0.91, α = 0.84, and α = 0.78, respectively) (Cortina, 1993).

Minor changes were made to some items to reflect engagement in the semester-long project as opposed to a single day activity; for example, where the original item was “I made a valuable contribution to my group today,” it was altered to read, “I made a valuable contribution to my group this semester.” The Value of Activity construct was renamed in this study as Value of Group Work and was comprised of nine items; for example, “explaining the course material to my group improved my understanding of it.” Three items were included in the Personal Effort construct; for example, “I worked hard during this semester’s project workshops.” Instructor Contribution included four items such as “The instructor and TAs were available to answer questions during the project workshops.” Given the alterations made to the original ASPECT, we also performed reliability testing on the modified measure. The constructs of Value of Group Work, Personal Effort, and Instructor Contribution appeared to have high internal consistency as demonstrated through Cronbach’s alpha levels over 0.7 (Cortina, 1993). Some demographic information was also collected from students. This included self-reported GPA, area of concentration, class standing, and gender.

Students in the TEAL classroom were asked some additional questions regarding the degree to which the layout and some of the technological elements of the room either supplemented or inhibited their learning. These items were developed based on the authors’ observed elements of the classroom as well as informal student feedback and comments to the instructors about the unique classroom design. Items included: modular setup (tables for each group), central physical position of the instructor in the room, laptop hookups at each table, position of TV screens at each table, position of white boards at each table, and position of the TV screen in the center of the classroom. The central physical position of the instructor in the room referred to the instructor’s position in the center of the room as opposed to the traditional lecture hall position in which the instructor typically stands in the front of the room. Students were asked to report the extent to which these elements added to or subtracted from their learning on a scale from 1 = subtracted a great deal from my learning to 5 = added a great deal to my learning. Furthermore, TEAL students were asked to provide any additional comments or thoughts regarding the classroom design in an open-ended response designed to inform future practice.

Analysis

Analyses were conducted in SPSS Version 25. Descriptive statistics were used to describe the sample with regard to gender, class standing, major option, and self-reported GPA.
Analysis of covariance (ANCOVA) was used to examine differences in student engagement between the TEAL section and the traditional lecture hall section while accounting for students' self-reported GPA. Non-parametric testing yielded very similar results yet did not allow us to account for the influence of a covariate. Therefore, ANCOVA was utilized for the analysis. While we were most interested to compare perceptions of Value of Group Work, we also examined perceptions of Personal Effort and Instructor Contribution.

In addition to examining student engagement between the classrooms, we were curious to see how students in the TEAL classroom felt about the classroom design. Descriptive statistics were used to demonstrate student perceptions of how various aspects of classroom design either added to or subtracted from their learning. Moreover, content analysis was used to identify major themes of the open-ended comments regarding the overall classroom design.

In addition to comparing perceptions of Value of Group Work between the classrooms, we were particularly interested in perceptions of Value of Group Work among students in the TEAL classroom, as research suggests that TEAL classrooms should be ideal for collaborative work. Stepwise multiple linear regression was used to examine the elements of the TEAL classroom design which related to students' perceptions of Value of Group Work, while also controlling for Personal Effort and Instructor Contribution. More specifically, the purpose of this stepwise regression model was to examine how these specific features of the TEAL classroom influenced the perception of Value of Group Work. As the traditional classroom did not have these additional design elements, it was not feasible to ask these questions of the traditional classroom students.

Results

Demographics

The sections were similarly distributed by gender with a higher percentage of females in both sections. Most students in each section were Juniors, which is consistent with the recreation management department's curriculum track. Both sections consisted primarily of students in the Program & Event Management option of the major. One-way analysis of variance demonstrated differences in self-reported GPA between the sections, with the students in the traditional classroom averaging a significantly higher GPA compared to those in the TEAL classroom ($M = 3.27, SD = .34; M = 3.09, SD = .43$, respectively).

Analysis of covariance

Analysis of Covariance results suggested statistically significant differences between sections on one of the three factors of the ASPECT when controlling for GPA (Table 1). Students in the TEAL classroom scored significantly higher in Value of Group Work than students in the traditional classroom ($p = .034; M = 5.15, SD = .59; M = 4.80, SD = .73$, respectively). There were no statistically significant differences between the TEAL classroom and the traditional classroom with regard to Personal Effort ($M = 5.30, SD = .56; M = 5.07, SD = .50$, respectively) or Instructor Contribution ($M = 5.52, SD = .50; M = 5.43, SD = .56$, respectively).

Perception of the TEAL classroom

On average, students perceived that all the elements of the TEAL classroom design added to their learning throughout the semester. The highest rated elements, that is those which students reported added the most to their learning, included the laptop hookups at each table ($M = 4.27,$
SD = .92), the modular setup with tables for each group (M = 4.25, SD = .81), and the position of TV screens at each table (M = 4.17, SD = 1.02). Students rated the central physical position of the instructor in the room as the lowest of all the classroom element items (M = 3.84, SD = 1.07).

Content analysis of open-ended comments (n = 24) from students in the TEAL classroom revealed the following themes with regard to the classroom design: technology integration, group work, physical position of the instructor in the room, and general positive perceptions of the classroom. For example, in terms of technology integration, one student said: “I thought it was nice to have the technology to hookup our laptops to the computers.” Relative to both technology integration and group work, another student stated: “I enjoy the TVs at every table, it makes group work awesome and easy for everyone to see.” Several students additionally identified that the central position of the instructor in the room was somewhat problematic. For example, “When we have lectures in this class it is hard to focus because the instructor has a hard time finding the right place to stand (which is nowhere), but for the students this classroom is not meant for a lecture.” General positive comments included statements such as “I would love to take another class in here next semester!”

**Multiple regression analysis**

Using the additional data collected from students in the TEAL classroom, a stepwise multiple linear regression was run to examine the predictors of student perception of Value of Group Work. The initial model included Personal Effort, Instructor Contribution, and all the items related to elements of the TEAL classroom design. The final model demonstrated that Personal Effort, Instructor Contribution, and central physical position of instructor in the room explained a substantial portion of the variance in Value of Group Work (R^2 = .702, p < .001). Personal Effort, Instructor Contribution, and central physical position of the instructor in the room were all positively related to students’ perceptions of the value of collaborative work (Table 2).

**Discussion**

Overall, students’ perceptions of the TEAL classroom were very positive. Major themes of the open-ended comments reflected students’ general satisfaction with the learning environment,
particularly for group work. Several students noted that the laptop hookups at each table were valuable for group work, especially because everyone could see the same screen. Moreover, responses corroborate previous research regarding the effectiveness of the use of technology in education and students’ enjoyment with utilizing technology for their education (e.g., Barcelona, 2010; Barcelona & Rockey, 2010; Diemer et al., 2013; Laird & Kuh, 2005). It is not surprising that students expressed satisfaction with using the technological aspect of the classroom as technology is largely engrained into their lifestyles as well as educational experiences (Diemer et al., 2013; Roehl et al., 2013). The positive perceptions of the TEAL classroom may suggest that the classroom design is an important aspect of technology which can be used to meet Chickering and Gamson’s (1987) Seven Principles for Good Practice in Undergraduate Education (Chickering & Ehrmann, 1996). Recreation management students may enjoy using TEAL classrooms for other project-based courses. Using TEAL classrooms for these courses could be one strategy to improve student perceptions of group collaboration. It is possible that the features of the TEAL classroom can serve as additional technological tools for student collaboration as well as communication between students and faculty such as the online methods described by Barcelona and Rockey (2010). However, as Barcelona (2010) noted, simply providing the technological tools does not ensure successful collaboration; the role of the instructor as a facilitator is crucial.

Further, as seen through the comparison of student engagement between the classrooms, students in the TEAL classroom displayed significantly higher perceptions of Value of Group Work than their traditional lecture hall counterparts. These differences in student engagement could be a function of the integration of technology with the physical classroom environment and offer support for the value of intentionally designed educational spaces (Bemer et al., 2009; Lee et al., 2014; Neill and Etheridge, 2008; Scott-Webbet et al., 2014; Smith et al., 2005). Although the effect size was small, these differences provide important evidence to support the need for future research on the effectiveness of TEAL classrooms. It is additionally important to note that students in both courses perceived a relatively high value of collaborative work, perhaps suggesting that at least in this particular class, students were not as ambivalent to group projects as previous research has suggested (Barfield, 2003; Payne et al., 2006).

Given previous research, we had hypothesized that students’ personal effort, their perception of the instructor’s contribution, and the elements of the TEAL classroom physical design may impact perceptions of the value of group work. Personal effort and instructor contribution were significantly and positively related to students’ perceptions of the value of group work, which likely speaks to students’ individual interest as well as the role of the instructor as an effective facilitator. On the other hand, most physical elements of the TEAL classroom were not significant in our regression analysis. This could be a function of using single-item indicators which had not been previously tested. On the other hand, it is possible that there was not much variation in the perception of the value of group work among the TEAL students. Findings related to the physical design of the TEAL classroom suggest the importance of the instructor being positioned in the center of the room as opposed to at the front of the room in a traditional lecture hall. Results showed that as students more strongly identified that the physical position of the instructor added to their learning, their perception of the value of collaborative work increased. These findings corroborate previous literature which has suggested the importance of the instructor serving as a

Table 2. Final stepwise regression model for TEAL students’ perceptions of value of group work.

<table>
<thead>
<tr>
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<th>Function</th>
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<th>Sig</th>
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<td>Personal effort</td>
<td>.460</td>
<td>.000</td>
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<td>.000</td>
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</tbody>
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*p $\leq .050$, **p $\leq .010$, ***p $\leq .001$, Only significant variables were used in this model.

Additional items included in full model: GPA, modular setup (Table for each group), laptop hookups at each group table, position of TV screens at each table, position of white boards at each table, and position of TV in center of classroom.
facilitator in active learning pedagogy (Smith et al., 2005), but also provide support for the physical design of classrooms which lends themselves more to facilitation than lecturing. However, as suggested in the open-ended responses, the TEAL classroom was not designed for a lecture, making it an awkward environment for when the instructor needed to deliver a lecture.

It is important to recognize that there may be additional factors at play in the TEAL classroom besides the classroom layout and technology integration. Although there were no statistically significant differences in students’ perceptions of the course instructor, it is possible that having a classroom with an atypical layout may force instructors to alter their teaching style and invest more in curricular design and delivery. A greater contribution of the instructor could impact students’ perceptions of group work, although this was not apparent in the findings of this study. Future research should seek to control for the increased effort required of the instructor in designing courses that move into TEAL classrooms. The capability of the instructor to teach in various settings is certainly important. Despite this being the instructor’s first-time teaching in a TEAL classroom, the instructor of the course in the current study was very capable and had significant experience working with large groups of students.

It is also important to note that TEAL classrooms are not without their challenges. As with the use of any type of technology, there are bound to be glitches or problems which may be frustrating for both the instructor and students. In the open-ended portion of the survey, some students identified minor technological issues such as a lack of HDMI adaptors. Universities using TEAL classrooms should ensure accessibility of support from the department of information technology and provide adaptors suitable for a variety of student devices. Lastly, as previously mentioned, the classroom design may affect the instructor’s delivery of the material, and likewise, not all instructors may be able to maximize the technological resources available in the TEAL classroom.

Within the concept of the TEAL classroom, it is difficult to parse out the nuances between classroom layout and the integration of technology. It is possible that these could represent two different constructs with regard to TEAL classrooms. Future research should attempt to control for the classroom layout, for example using two modular style classrooms would allow for a more comprehensive understanding of the role of technology in student engagement. This would also allow for the same battery of classroom layout questions to be asked of both groups, which was not feasible in this study. Due to the differences in both layout and technology integration in the classrooms used in this study, we are unable to know the individual strength or potential interaction of these variables. For future research, it would be interesting to examine other measures of student outcomes that may relate to TEAL classrooms, such as academic performance or course attendance.

Educators should note that TEAL classrooms are typically not designed for lecturing. Using the TEAL environment for anything other than active student collaboration may be challenging for both the instructor and the students. As TEAL students in this study identified, there is not even a place in the room for the instructor to stand while lecturing. Other universities with TEAL classrooms have also recommended limiting their use for lecturing and having only “mini lectures” in them (MIT, 2014; Yale University, 2016). When used for their intended purpose of active learning, a TEAL classroom would function ideally with a flipped classroom design such as that used in Kim et al. (2014). If an entirely flipped classroom is not possible (as was the case with the course examined in this study), it would be recommended to use the TEAL classroom only on lab/workshop days and hold the class in a traditional lecture hall when the instructor must deliver lectures. Having two sections of the same course run at the same time would allow for students to switch classrooms based on whether it was a lecture or workshop day.

While this study provides some important insights with regard to using TEAL classrooms, a small sample size and only one semester of evaluation are not enough to make generalizable conclusions. Another limitation of our study is that students in the traditional classroom were not
asked about the characteristics of the classroom layout like the students in the TEAL classroom were. Moreover, this study utilized a retrospective measure at the end of the semester, therefore we cannot know with certainty if the TEAL classroom had an effect on engagement or if the students in that class just happened to be more engaged. Future research should consider adopting a pre/post design to address this limitation. It would also be interesting for future research to assess the long-term impact that the TEAL classroom could have on the future performance of students once they enter professional jobs. It is additionally important to note that because two of the researchers were involved with the course, this could have encouraged students to participate in the survey, despite there being no incentive involved. Students were also not randomly assigned to sections of the course and the class sizes were not the same in each section. There is a lack of research assessing the ideal class size in a TEAL room and different sized classrooms exist. For example, when TEAL classrooms were installed at the university used in this study (2018), two different sized classrooms were built— one which holds 35 students, and the other which holds 90 students. Further research should be conducted to evaluate the effect of class size. It is important, however, to keep in mind that outcomes may be heavily dependent on the ability of the instructor to engage a large group of students.

It should also be mentioned that the response rates were inconsistent between the TEAL and traditional classrooms; while we cannot know why this is, it is possible that students in the TEAL classroom desired to be involved in the process to share their thoughts about the TEAL classroom, especially given this was the first semester the university had the TEAL classroom.

While it may be possible to change certain elements of the classroom, the physical infrastructure is generally more fixed. For universities that are unable to acquire TEAL classrooms, there are alternative group collaborative techniques that may be useful when all students have access to a device (e.g., computer, tablet); for example, using collaborative software like Google Docs or Wikis is valuable for students. However, the TEAL classroom provides notable benefits beyond technological tools; for example, the instructor is able to easily see what students are working on in real-time at each table. While TEAL classrooms are a large investment for a university, they may help to eliminate some technological barriers for students who have not previously been exposed to or had access to certain technologies. For example, only one person needs to have their laptop plugged into the group table’s screen and thus not all students need a device. The group environment could facilitate people teaching each other and sharing techniques; students and the instructor all see the same screen, making it easy to demonstrate different techniques and help reduce barriers. Moreover, if an instructor does not have access to a computer lab, but has access to a TEAL classroom, students can provide their own laptop and only one student per table would need a laptop or special software. They could then all work together while having access to the instructor for lab work. Finally, for classes that tie in the occasional use of specialized software (e.g., GIS) but are not focused on it enough to warrant semester-long use of a computer lab, TEAL classrooms may help to expose students to these programs.

TEAL classrooms are valuable for projects and assignments which emphasize collaborative thinking and problem-solving. Since recreation management programs tend to include many applied projects and collaborative assignments, TEAL classrooms provide a valuable teaching asset. Moreover, outside of the classroom, many college campuses provide additional collaborative spaces. The translational skills learned through working in the TEAL classrooms could then be applied in other group work or collaborative settings on campus and beyond. As more of these classrooms become available, recreation management departments should encourage the use of these spaces for active learning classes and workshops.

**Conclusion**

The ability to effectively work in groups is a critical competency required of entry-level professionals. Undergraduate programs have a responsibility to prepare their students with the
interpersonal skills necessary to succeed in the field of parks and recreation management. Overall, TEAL classrooms appear to be a valuable resource integrating both physical design and technology for courses based on active, hands-on learning. Moreover, the findings of this study suggest that students enjoy using the TEAL classroom for group collaboration. As many recreation management programs include significant group collaboration, the use of TEAL classrooms seems to be a natural fit moving forward. It is important for educators to keep in mind the intended purpose of the TEAL classroom, and in general, to make sure to match the classroom design with the intended pedagogical style.

References


