LEARNING STUDIOS: A CLASSROOM DESIGN FOR ENABLING THE
SOCIAL CONTEXT OF LEARNING

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ABSTRACT

The purpose of this paper is to provide some literature background and a conceptual model for
the learning studio classroom environment. The premise of learning studio classrooms is that
knowledge is constructed by students engaged in a meaningful conversation with each other
about the subject. In the sociocultural and activity theories of learning knowledge moves from
the social context or plane to the internal representations of the individual (Lee & Smagorinsky,
2000; Sfard, 2001; Vygotsky, 1978). The question to be answered both in this paper as well as
in future empirical research is: How does the layout of the physical space affect learning?

Keywords

Learning Studio; Social Context; Collaborative Learning; Physical Layout; Pedagogy

INTRODUCTION

In the service operations management literature it has been shown that the layout of a facility
affects customer behavior, employee behavior, and store profit (Bitner, 1990; Wener, 1985;
Sulek, Lind, & Marucheck 1995). If consumers react to different layouts in a retail store it
seems plausible that students will also react to different layouts in a classroom. Behaviors are
modified in a retail store layout due to the effect of layout on patterns of travel, interactions with
merchandise and staff, and lines of sight. The layout or shape of a classroom may affect student
and faculty behaviors as well as student learning outcomes. Lines of sight and lines of
communication in a classroom may be affected by the specific layout of the space.

College classroom designs can affect the behaviors that emerge within these spaces. Strange and
Banning (2001) describe the effect of the physical environment on students. Three distinct
positions on the effect of architecture on behavior have been identified from the literature by
Strange and Banning (2001, Chapter 1). The first position is architectural determinism. This
position posits a direct link between the physical environment and behaviors that take place
within it (Bell, Fisher, Baum, & Green, 1990). The second position is architectural possibilism.
This position conceptualizes the physical space as a set of possibilities that may limit behavior
but not restrict it (Ellen, 1982). And the third position is architectural probabilism. This position
posits that space affects the behavior of the occupants by increasing the likelihood of some
behaviors over other behaviors (Taylor 2009, p.219).
Could it be that the shape of our classrooms shapes the learning behaviors and learning outcomes that take place within them? Prime Minister Winston Churchill clearly understood the interaction of architecture and discourse.

"We shape our buildings, and afterwards our buildings shape us. Having dwelt and served for more than forty years in the late Chamber, and having derived very great pleasure and advantage therefrom, I, naturally, should like to see it restored in all essentials to its old form, convenience and dignity." (Winston Churchill, 1943)

Prime Minister Churchill delivered his well-known aphorism in a speech to the House of Commons in 1943. The building had been significantly damaged during bombings in World War II. He recognized the importance of place and the essence of how spaces shape discourse and the exchange of ideas. The interaction of architecture and learning is clearly an important dimension that needs more study. For generations college classrooms have been built in a standard design and that design has shaped the nature of learning. The design of a typical college classroom has remained largely unchanged over the course of the twentieth century (Jamieson et al., 2000). The salient feature of the typical college classroom is the placement of the teacher at the front of the space and the students in rows of tables or desks facing the front of the room. These layouts reinforce the pedagogical style of lecture and listen.

If social constructivists and critical theorists had designed classrooms for the twentieth century, then perhaps the lecture mode of delivery would not have become the dominant teaching style. We might instead now have many more interactive and collaborative classrooms that may have naturally evolved from the more connected and interpersonally engaging spatial arrangements of classrooms such as the learning studio. School is primarily a social environment, a culture where people interact with each other and various cultural materials (Hausfather, 1996, p1). How does the layout of the physical space affect learning? The purpose of this paper is to present some background literature and a conceptual model with ten propositions to be examined empirically in future research. That empirical research has been completed and those results will be incorporated in a future paper.

**BACKGROUND**

Learning studios are not just for the artistic fields in which paintings, pottery, and other pieces are created. Learning studios create an environment for collaborative learning across a wide spectrum of academic disciplines. Learning studios feature a seating arrangement where students face each other and without a defined front or back of the room. Figure 1 illustrates a possible layout.
Rectangular tables may also be used. The number of students at each table is an additional variable in the design of the space. The learning studio may have digital display screens for each table or just a few for the entire room. The room may also be equipped with dry erase boards for each table. Display screens or dry erase boards may facilitate collaborative work at each table. Figure 1 also shows three laptop PCs at each table for groups of three to collaborate in problem solving.

The pedagogy in a learning studio moves course delivery away from lecture and listen, and towards team-based learning. To date, more than 100 college campuses in the United States have introduced learning studio classrooms (University of New Mexico, 2012). The learning studio configuration can support interactive learning and problem-based learning through placing the focus of student interactions on those seated at their tables. The central construct in a learning studio is that knowledge is constructed rather than transmitted to learners (Innes, 2006, p 751). The students construct knowledge through dialogue with other students seated at the same table as well as adjacent tables. This is a fundamental shift in the traditional college classroom pedagogy.

Learning studios provide an enabling configuration for students to engage in problem-based learning (PBL). “There is evidence that powerful and useful knowledge can be constructed in problem-based learning groups if students engage in genuine dialog (i.e., if they actively confront each other’s’ ideas using central concepts and deep principles from the course content)” (Innes, 2006, p. 752). Innes (2006) further noted that it can be difficult for students to engage and confront each other’s ideas whether they are in a traditional classroom or in a learning studio classroom. The physical layout of the learning studio orients the students into face-to-face PBL teams.
Student engagement is a multidimensional construct (Appleton, Christensen, and Furlong, 2008). Appleton et al (2008) explicate how researchers utilize the engagement construct. These researchers identified the definitional variations of the construct found in the literature. The definitions of student engagement provided by Appleton et al (2008, p. 371) include student participation, student identification with education, behavioral involvement, persistence, motivation, willingness, attention, and effort directed at learning. Ahlfeldt, Mehta, and Sellnow (2005) found higher levels of achievement where students were engaged in problem based learning (PBL). These authors utilized 14 questions from the National Survey of Student Engagement (NSSE) to study student engagement in 56 classes at an upper mid-western university in the United States. Their instrument achieved an alpha reliability of 0.84. The multiple regression analysis performed in their study modeled student engagement as the dependent variable. The engagement score was determined based upon 14 questions chosen from the NSSE. The questions chosen were those that were measurable in relation to collaborative learning, cognitive development, and personal skills development (Ahlfeldt, Mehta, and Sellnow, 2005, p.10). The engagement score is then a summated value over the fourteen questions. Each question could be answered on a scale of 1 to 4. The mean of student engagement was 37, standard deviation 7.3, and a range of 15 to 56 (Ahlfeldt, Mehta, and Sellnow, 2005, p.11). The independent variables were: PBL, enrollment, course level, and academic college. The beta coefficients and their respective p-values are shown in Table 1. The dependent variable in Table 1 is student engagement.

<table>
<thead>
<tr>
<th>Variable</th>
<th>β Coefficient</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBL</td>
<td>0.335</td>
<td>0.00</td>
</tr>
<tr>
<td>Enrollment</td>
<td>-0.317</td>
<td>0.00</td>
</tr>
<tr>
<td>Course Level</td>
<td>0.088</td>
<td>0.001</td>
</tr>
<tr>
<td>Academic College</td>
<td>0.083</td>
<td>0.00</td>
</tr>
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Table 1: Student Engagement Results

The β coefficient of PBL suggests that problem based learning increases student engagement. The β coefficient of enrollment suggests that as class enrollment size increases engagement decreases. The β coefficient of course level suggests that engagement increases as course level increases. And the β coefficient of academic college suggests that there is some effect of the academic college of the student.

Cognitive psychology has long viewed learning from a behaviorist perspective (Hausfather, 1996, p. 1). The focus in cognitive psychology has been on the individual. Hausfather (1996) discusses a revolution in cognitive psychology in which learning is a function of the individual student’s prior knowledge but also affected by the context in which learning takes place. The social context of learning is a dominant factor in the educational experiences of the student.
Students interact with each other and with the instructor. Lecture rooms engage the student individually as they listen. In a study comparing a classroom to online education Nemanich, Banks, & Vera (2009) cited the importance of the classroom environment to student enjoyment and learning outcomes. Their study was a comparison of a traditional face-to-face classroom with a fully online class. They argue that the social context of the face-to-face classroom enhances the information connections between students when compared with online classes. Nemanich, Banks, and Vera (2009) studied 200 demographically diverse undergraduate students. Utilizing hierarchical regression models, these researchers found a significant interaction between student learning enjoyment and learning environment.

In a learning studio students are placed into seating configurations where they can face each other and thereby engage the social context more fully in the learning experience. The social context includes passive and aggressive students, introverted and extroverted students, males and females, high achievers and low achievers, racial makeup of the class, ethnic makeup of the class, the age, pedagogical style, and experience of the instructor, and student experience in the type of classroom. A key difference between a lecture style of classroom and a learning studio style of classroom is that the student is placed into what may be an unfamiliar social role in a learning studio. Cohen (1986) discusses the differences in norms that a student must take on that are appropriate for small group work such as listening to each other, initiating discussion, taking turns speaking, and managing their time on group tasks (as cited in Weinstein, 1991, pg. 510). In a traditional lecture style of classroom the guiding norm is to listen to the instructor and to minimize interactions with other students unless directed to do so by the instructor. Research indicates that small group patterns of interaction are affected by the group composition in terms of ability level and gender (Webb, 1989). Webb (1989) examined 19 published studies on learning mathematics and computer science in small groups. The sample sizes over these 19 studies ranged from 24 to 105. The primary analytical method utilized in these studies was partial correlations. Webb concluded that understanding a student’s learning cannot be achieved in isolation from the group context.

Cooperative (interactive) learning preceded the concept of learning studios. Aronson et. al. (1978) conducted one of the first studies of cooperative learning. Blaney (1977) conducted the first experiment on the effects of the jigsaw method. The jigsaw method is implemented in a classroom by dividing the academic material into sections. Each student team member then reads only one section. The student teams disband and the student expert on a piece of the material then meets with other experts in that same piece of the material. These student experts will then work together to refine their understanding. The final stage is for the experts in each of the pieces of the material to rejoin their original teams and then teach their piece to the others in their team. In order for the pieces of the jigsaw to be assembled the students are required to cooperate. The students thereby cooperate and learn to trust one another. The social context of cooperative learning is engaged and thereby the higher order mental functions are also engaged (Hausfather,1996). Hausfather (1996) discusses the influence of Vygotsky on education in America. Vygotsky (1978) concluded that relations between humans lead to the development of mental processes on the social level. These mental processes are then internalized by the individual. Blaney (1977) conducted an experiment in elementary schools in Austin Texas. The sampled students were in ten fifth grade classrooms and seven elementary schools (as cited in Aronson, E. and D. Bridgeman. 2003, p. 427). Blaney found that children in jigsaw groups showed increases in self-esteem as well as in liking their classmates.
The Jigsaw method of group learning is not without its challenges for the student who has experienced primarily the traditional method of learning (Holtham, Mellville, & Sodhi. 2006). More experience in working with group members may be provided in a learning studio type of classroom. A challenge in many student groups is the free riders who don’t pull their weight. The Jigsaw method partitions the learning module into pieces that are assigned to each member of the group. Each group member is tasked with learning their piece of the puzzle and then teaching it to the others on their group. This method of learning may help to reduce the free rider phenomena. Such may be the case if the peer pressure is effective in motivating all members of the group.

The development of learning communities is a key element in the college experiences of students as well as faculty. Summers et al (2005) examined the effects of collaborative learning and community in the college classroom. Identified in their study was a significant lack of established measures in much of the research on cooperative learning in higher education. Summers et al (2005) provide a set of research scales for investigating variables involved in classroom communities. Gabelnick, MacGregor, Matthews, & Smith (1990) examine constructivist theories of learning as a foundation for research in learning communities in the classroom (as cited by Summers et al., 2005, p. 167). They found that learning communities produced positive outcomes including student retention. Student-to-student contact was well as student-to-faculty contact has been found to be positively related to student retention. Learning studio classrooms have the potential to enhance student retention through student to student interaction.

**CONCEPTUAL MODEL**

Student persistence to complete a four-year college degree is influenced by a wide variety of factors. Reason (2009) examined persistence research through a conceptual framework. In his review of the literature Reason found little research exploring the student’s in-class learning experiences and persistence. I develop a conceptual framework that is inspired by the framework developed by Terenzini and Reason (2005). I conceptualize the classroom learning environment as composed of four general domains that overlap and interact: The Pedagogy, the Physical Layout, the Students, and the Social Context (See Figure 2). Individual learning outcomes are derived within a social context of learning.

Conceptualizing learning within a social context brings to light the process dynamic of learning. Therefore I propose:

*Proposition 1: The pedagogy, the students, and the physical layout of the learning environment interact with each other and in combination affect the social context of the learning environment.*
Figure 2: A Conceptual Framework for the Learning Studio Classroom Environment.
Pedagogy

The learning studio design enables and encourages doing learning in groups. Class time in a learning studio is focused on group work rather than a lecture based on the textbook material. The arrangement of students at tables of up to nine encourages active learning as long as the pedagogy of the teacher takes advantage of this. Clearly the amount of retention and the period of time over which the learning remains with each student will vary by class, by teacher, and by student. More importantly the ability of the students to apply the knowledge at a later time in their work environment may also vary.

In a learning studio instead of class time being primarily a lecture it is now primarily teacher facilitated group work with the teacher acting as more of a guide and less of a lecturer. And it is founded upon the belief that the more students do themselves the more that they learn. Learning studios might enhance student interactions and allow for more active discussions at each table. Learning in such a setting can occur more through students sharing ideas with each other with the teacher facilitating and moving between tables. Learning studios might facilitate active learning through the physical orientation of the students. The arrangement of students around an oval, rectangular, or a round table creates a social context connecting students to each other in a way that linear seating arrangements cannot easily do.

Active learning through students doing activities in teams is an alternative worth considering (Berry, 2008). Lecture delivery is certainly efficient. But engaging students in the material can be very challenging in a traditional lecture format. Active learning pedagogies call for student-to-student dialogue and activity. Active learning pedagogies are enabled in a learning studio classroom through the social context of the group tables and the face-to-face orientation of the students at each table.

Even more interesting is the design necessity to change how we teach in such a learning environment. The learning studio allows, enables, and entices change in both teachers and students. It has been postulated that the more that students are engaged in doing learning experiences in a classroom the more that learning takes place. Edgar Dale’s (1969) cone of learning (See Figure 3) provides a conceptual model of learning by doing versus learning by reading, listening, and seeing.
Dale’s model suggests that with more active experiences of doing students will remember more. Students remember more of what they said and did as compared with what they read, heard, or saw.

A learning studio creates a physical opportunity for more engagement through students expressing ideas verbally and doing active learning at their group tables. If the Dale cone of learning predicts reasonably well then the students in a learning studio environment will remember more of what they did in the classroom for a period of time following the class. This result would be expected due to the classroom experience of actively doing learning as contrasted with passively capturing lecture material. Learning by doing may be enhanced when experienced in a learning studio environment due to the social context that is created by the layout of the physical space. Therefore I propose:
Proposition 2: **Students learn more by doing activities in groups in the classroom as opposed to individually listening to a lecture.**

The nature of the communication in a learning studio classroom may change when the instructor encourages dialogic communication over the transmission of knowledge in one direction from a lecturer. Dialogic communication is defined as a genuine two-way communication where students working in small groups openly and actively confront each other’s ideas, actively listen to the ideas of others, and draw from the concepts and principles that are fundamental to the course (Innes 2006, pg. 752). The learning studio environment may well assist in that endeavor if the seating arrangement and the pedagogy facilitate such a dialog.

Bakhtin (1981) discusses the differences between authoritative discourse, where knowledge is delivered to us by authorities, and persuasive discourse, where knowledge is acquired through dialog with others and assimilation of our ideas with others (as cited in Innes, 2006, pg 751). If learning studios are effective in promoting dialog where students confront each other’s ideas then the stage is set for persuasive discourse and engagement of the central concepts and themes of the class materials. The use of team learning pedagogy in a learning studio classroom may lead to a greater use of persuasive discourse as distinguished from authoritative discourse. Therefore I propose:

**Proposition 3: Learning studios increase the opportunity for dialogic communication.**

The authenticity of the problems given to student teams in a learning studio classroom may also matter. Innes (2006, p. 754) argues that authentic problems that represent what the students will face in the workplace are a key in establishing the authenticity of the classroom experience. The students need to see that the problems that they work on during class time are relevant for the working world that they see themselves entering. So, it is not enough that the students are sitting in a learning studio, engaging in problem based learning, and having a dialog with each other. Rather it is necessary to cultivate deep learning through authentic problem solving that is enabled by dialogic interactions. The contribution of a learning studio classroom to this goal is yet to be fully understood in the current body of research on the subject. Therefore I propose:

**Proposition 4: Authenticity of student activities increases knowledge construction that may be applied in a work environment.**

Teacher experience in a particular typology of classroom and with a given pedagogy may affect the social context of learning and the learning outcomes. Shaping our pedagogy to take advantage of a learning studio environment is a transition that can take several cycles of academic terms (Beichner, et al., 2007). Taylor (2009) examined the effect of learning studio spaces on teachers. Taylor explored the question of whether learning studios would launch teachers into an active learning pedagogy. Taylor studied the effects of the learning studio on two teachers in two science classes. One class was an undergraduate Astronomy class with 25 students and the second one was a Genetics class with 9 students enrolled. Each faculty member was interviewed four times and each class was surveyed four times. The classes were selected randomly. Clearly the sample sizes were small and there are no quantitative measures of differences in learning outcomes. Nonetheless Taylor provides some very interesting insights on
the effects of a learning studio on two different types of teachers. Future research with larger samples would provide more statistically valid evidence of such insights.

One of the teachers in this study, referred to as Jim, aspired to use active learning. The other teacher, referred to as Jenny, being very different in orientation did not aspire to use the learning studio to engage in active learning but instead wanted the room due to the location and time that it was available. Both teachers in that study did adopt active learning pedagogy once in the learning studio. Both teachers adopted and worked to utilize the learning studio space. Jim planned ahead of time to use active learning pedagogy in the learning studio space. Jim reported that the learning studio changed his teaching style. He was able to successfully implement collaborative student work in the classroom. Jim had not had good results when attempting collaborative student work in a traditional classroom setting. Jenny on the other hand had expected to continue to use her top-down teaching style as she had done in the past. She did not expect to use active learning pedagogy in the studio setting. But Jenny did experience a significant change in her pedagogy. She found herself sitting at student tables to interact with the class in small groups (Taylor 2009, p.222).

The experiences of Jim and Jenny are likely not atypical. It is a significant pedagogical shift from a top-down lecture approach to a facilitative active learning approach within the context of a learning studio. Students in a learning studio environment engage in active learning conversations. The social context of learning then develops and matures. The focus in a learning studio is for a time taken off the teacher who in a traditional classroom is positioned at the front of the room. The learning studio provides an opportunity for the teacher to engage with the students at their group tables. The group tables become the genesis of the social context of the classroom.

The learning studio can be utilized for traditional lecture/listen pedagogy. The trouble is the students will not be facing the teacher but rather they will be facing each other. While students face each other non-verbal communication is already taking place. The opportunity is there for verbal communication as well if the teacher has designed such an opportunity into the class time. Taylor (2009) discovered that even teachers who are not inclined to implement active learning pedagogy can be motivated by the learning studio setting to experiment with it. Therefore I propose two propositions:

*Proposition 5: Teacher experience in the learning studio typology of classroom and pedagogy increase student learning as the number of academic terms increases.*

*Proposition 6: The physical layout of a learning studio causes the pedagogy of instructors to change to more activity based learning.*

**Physical Layout**

Learning studios were first implemented at North Carolina State University and a group of more than two-dozen collaborating schools in 1997 (Beichner, 1999). The departments of Physics, Astronomy, and Chemistry at these schools tested a new way of education. And the learning studio concept was born. The classroom design experiment launched by these schools was given the acronym SCALE-UP. The acronym stands for Student Centered Activities for Large
Enrollment Undergraduate Programs. Originally the studio concept was implemented for small class settings. The key element of these types of spaces is round tables that seat nine students each. Beichner and Saul (2003) carefully studied the diameters and shapes of tables in the SCALE-UP classroom. After testing both rectangular and round tables they determined that the round tables are more conducive to communication between students. They also tested tables of diameters 6, 7, 8, 9 and 10 feet. While the students preferred the larger tables it was found that conversation distance and “elbow room” were optimized at tables with a 7 foot diameter (Beichner & Saul, 2003, p.4). The faculty teaching calculus-based physics at North Carolina State were motivated to find out if they could scale up their classes to sizes of around one hundred. The benefits to the students at North Carolina State by being in the SCALE-UP classrooms were found to be an increase in conceptual understanding, improvement in attitudes, more successful problem solving, and higher class success rates. In particular it was found that increases in success were more pronounced for females and minorities (Beichner et al., 2007).

It is more difficult to implement active-learning strategies in traditional lecture style room configurations. Often teachers will dismiss these strategies due to the perceived constraints of a lecture style classroom design (Yazedjian & Kolkorst, 2007). Typically the students sit at tablet arm chairs and are facing the front of the room to receive the lecture. Because it is easier in a large lecture class to remain anonymous and to hide during class time it is even more important to find ways to engage the student in active learning. The SCALE-UP studio classroom was developed to address this problem. The shape and size of the table was carefully studied. Students are typically seated at round tables that seat up to nine. Where the tables accommodate nine students the groups then function as groups of three with super groups of nine.

In a learning studio configuration where students face each other a social dynamic can occur at each table and hence interactive communication can be greatly enhanced. Rectangular tables may also be utilized. The essential aspect of the configuration is that students face each other. And the table arrangement allows the teacher to move about the room with a greater opportunity to engage every student in the room. Engagement of the students with each other is almost automatic. Engagement of the student with the class material must be designed in by the teacher(s). If the class is in a traditional large lecture hall then active-learning activities can still be utilized. The seating will not facilitate it but at the same time it will not completely preclude it. Yazedjian and Kolkorst (2007) provide very good suggestions for making the best of the physical layout of a traditional large lecture hall. The student comments coming out of their survey indicated that the students felt that the group exercises did not work well in the classroom due to the size and the physical setup of the room. Interestingly the students also commented that they did not know each other well enough to open up and to engage in an active discussion (Yazedjian & Kolkorst, 2007, p.168). This result contrasts dramatically with rooms that are set up as learning studios where students face each other. Learning studio seating arrangements may lead to the development of the social connections that can facilitate learning in the classroom with active-learning pedagogies. Social connections can develop as a result of face-to-face verbal and non-verbal communication. Indeed this can take place in a traditionally configured room but it will likely be limited to adjacent students and therefore the social network may not extend to more students.
The SCALE-UP type of space is designed to handle class sections that have traditionally been scheduled into tiered lecture hall types of spaces. North Carolina State has utilized spaces that can seat over 100. Generally SCALE-UP spaces can accommodate fewer students than a space that is set up with tablet arm chairs. The experience in SCALE-UP studio classrooms at North Carolina State has led to the implementation of nine-person round tables (Beichner, 1999). The orientation of the students to each other and to the teacher is a paradigm shift from a traditional lecture hall. More face-to-face learning within a social context may be enabled by the learning studio typology. Therefore I propose:

Proposition 7: Learning studios increase the frequency and academic depth of social interactions between students during class time.

Students

Given the same classroom with the same physical layout the resulting classroom experience and therefore learning may be modified by student demographics and student experience in the typology of classroom and pedagogy. These modifiers may affect the learning outcomes through the social context of learning. Student demographics may modify the effectiveness of the learning studio classroom. Engaging the Millennial Generation, born between 1981 and 1999, can be challenging in a lecture setting. The Millennial Generation is the majority population in undergraduate classes today. For the Millennial Generation in particular active small group engagement with the material creates a social context within which motivation, interest and retention of learning can be nurtured. Even in a room designed for lecture delivery discussions can still take place amongst the students. However the seating orientation of each student relative to other students is not conducive to interactions and discussions. Active learning through doing and peer-to-peer engagement are essential components of how the millennial generation learns (Roehling et al., 2011). The millennial generation engages with learning material in ways that differ from past generations. “Compared to recent generations, Millennials are easily bored, expect variety, are self-directed, have high levels of self-esteem, are collaborative, are ethnically diverse, and crave interactivity (Oblinger, 2003; Raines, 2002; Rainie, 2006; Prensky, 2001; Twenge, 2006). Because of their interest in working in groups and their low tolerance for boredom, the traditional lecture may not be as effective with the Millennial Generation as it was with previous generations.” (Roehling et al., 2011, p.1).

As noted previously Beichner et al. (2007) found that increases in success in a learning studio at North Carolina State were more pronounced for females and minorities. It was found that failure rates were dramatically reduced, in particular for women and minorities. The amount of experience that students have with the learning studio type of classroom may also affect both their perceptions as well as their learning outcomes.

Whiteside, Brooks, and Walker (2010) found in their study of active learning environments (ALCs) at the University of Minnesota that students from metropolitan counties rated the ALCs significantly higher than those students from rural counties on all dimensions surveyed. They postulated that previous student exposure to technology and differing value systems affected their perceptions of the ALCs. “On this last point, research shows that metropolitan students are more likely to emphasize the importance of autonomy and self-expression while rural students
place greater currency on economic and physical security. These differences may translate into a greater appreciation for the educational opportunities afforded by the ALCs (metro) and a perception of the ALCs as excessive and a waste of valuable resources (rural)” (p. 10).

Therefore I propose:

Proposition 8: Student demographics impact individual student perceptions of learning studios and therefore the effect of the learning studio on individual learning outcomes.

Whiteside, Brooks, and Walker (2010) compared student outcomes in a traditionally configured classroom with an Active Learning Classroom configuration for the same class, at the same time of the day, and taught by the same teacher. Whiteside, Brooks, and Walker noted that ACT scores are a strong predictor of student course grades. They found that the students in the traditionally configured classroom had higher ACT scores. Students in the ALC classroom achieved significantly higher grades than their ACT scores would have predicted. Interestingly these researchers found divided reactions from the students who were in the ALC classroom environment. They found that first-year students expressed greater satisfaction with the ALC space than did junior and senior year students. Such a result is likely due to more senior level students becoming socialized into traditionally configured classrooms in their early years of college. Therefore I propose:

Proposition 9: A greater amount of time of student experience in the typology of the learning studio classroom and pedagogy will lead to an increase in the level of positive student perceptions of the learning studio environment.

Brooks (2011) examined the explained variation of ACT scores on class grades in a traditional classroom versus an ALC. He found that a traditional classroom significantly enhances the explanatory power of ACT scores. Brooks also found that ACT scores for students in ALC environments predict approximately 50% less variation in the final course grades. The effect of the classroom space is therefore much more significant in the ALC as compared with a traditional classroom configuration. The contribution of Brooks (2010) research is significant in that it is the first study to control for the effects of other variables so as to specifically identify the effect of the space on student learning.

Social Context

“Constructivist and sociocultural theories see knowledge as appropriated through interactions in social contexts” (Innes, 2006, p. 756). Constructivist and sociocultural theories converge on the idea that students construct knowledge rather than acquire knowledge through transmission from authorities. The social connections that students form with each other may be affected by the typology of the classroom and the pedagogy. Tables where students face each other enable learning within a social context. Student demographics and student experience in the typology of classroom and pedagogy also interact with and modify the social context. Millennial students value interaction and active discussions with their peers. They learn best when sharing their ideas with others in their own group. Their learning is highly contextualized within their social networks. It is in the small groups that are formed at learning studio tables where each individual may feel more comfortable expressing ideas on a subject or a problem. They do so because of
the social context in which the class takes place. The Millennial student may feel much less comfortable with expressing an idea or responding to a question directly to the teacher while the rest of the class listens in. In a learning studio configuration each student will get to know more of the other students in the classroom and therefore build upon that classmate familiarity in learning the class material. Roehling et al. (2011, p.4) discovered in focus group interviews with Millennial students that 60% of the atmosphere comments addressed how well the students knew each other. “A 19-year-old mathematics major sums up this feeling: You have to know the people in your class pretty well. You can talk to your friends easily, but once you get in a class with strangers its more, ‘Ahh, do I want to say that or do I not want to say that.’ If people knew each other better in class that would help” (Roehling et al., 2011, p.5). Beyond discussions in traditionally designed classroom spaces a learning studio can further enhance the ability of students to gain familiarity with each other due to the layout of tables and chairs. The layout of the learning studio room creates an environment in which the social connections may facilitate the learning connections.

In a traditional classroom layout some students can hide at seating locations that are not easily accessible by the teacher. Students that do not achieve a rapport with fellow students and the teacher have a reduced motivation to engage in the class material (McKeachie, 1999). Anonymity is not a good condition for any student in a classroom (Yazedjian & Kolkorst, 2007). Research has found that students who feel anonymous in a classroom are less motivated to learn the material and more likely to skip class (Cooper & Robinson, 2000). Traditional large lecture halls may promote anonymity through the layout of the space. Therefore I propose:

Proposition 10: The social connections that are formed in a learning studio classroom positively impact the learning outcomes in a way that yields a significant difference from the learning outcomes measured in a traditional lecture style classroom.

DISCUSSION

The key factors that activate the social context of learning in a learning studio classroom may be the physical orientation of the students towards each other, dialogic communication, authentic problems, and a change in the pedagogy of the instructor. Learning studios create the physical space for the social context of learning through both the physical orientation of students towards each other and changes in pedagogy that promote active learning. But the layout of the space alone is not sufficient to engage the social context of learning. Clearly future research can empirically illuminate the mechanisms by which learning takes place in a learning studio. Future research on learning studios should compare across three different types of learning environments: learning studio, traditional classroom, and online delivery. Doing so may contribute to a better understanding of the factors that are uniquely combined in a learning studio. Learning studio classrooms may have the potential to enhance student retention through student to student interaction. Future research should explore this dimension of student retention. The learning studio environment may well assist in engaging students in dialogic discussions if the seating arrangement and the pedagogy facilitate such an interaction. Future research in these areas will be necessary in order to explicate the relevant factors in play.
Learning studios have been shown to create significant benefits for the student. Beichner et al. (2007, p.34) and Beichner and Saul (2003) examined data from over 16,000 students over a five-year period in SCALE-UP classrooms. They report that the SCALE-UP classes showed better gains in conceptual understanding than classes that were conducted in traditional Lecture/Laboratory settings. For the Mechanics class exam problems the SCALE-UP student average was 73.1 versus an average of 61.7 for students in traditional classrooms. They also found that the top one third of a class showed the greatest improvement. Interestingly they also found that the ability of students to solve problems was as good as or better than in traditional classroom settings. Furthermore it was found that class attendance was higher in the SCALE-UP spaces when compared with traditional settings.

Brooks (2010) conducted the first study to demonstrate that the physical space alone can improve student learning outcomes. Brooks controlled for the effect of change in pedagogy that goes along with a move to a learning studio. Future research should examine the ten propositions put forth in this paper. Future research should examine the interplay between learning studios and the types of pedagogy that will result in the highest student learning outcomes. Learning studios may be a catalyst for a paradigm shift in pedagogy that takes advantage of socially contextualized active learning. Active learning pedagogy combined with these new environments may be the context within which social connections among the students develop and therefore enhance interactions for learning. It may not be sufficient to place students at round tables to be engaged in problem based learning. More appears to be required. Dialogic discussion with authentic problems that draw upon central concepts and deep principles is also necessary (Innes, 2010). The social context of the learning studio classroom may be a dynamic enabler for the teacher. The focus is no longer solely on the teacher positioned at the front of the room. The role of the teacher therefore must evolve. Learning how to take advantage of this change in focus and a growing student social network may have benefits for both the student and the teacher. And the students may need to be educated on how to interact with each other in ways that enables engagement with fellow students to challenge, to listen, and to construct knowledge on the social level that then becomes a part of how they view problems in the business world. Future research should examine whether students become more engaged in a learning studio because they form social connections that are not equally present in a traditional classroom setting.

There are teachers who will wish to stay with the lecture format and a traditionally configured classroom. And for them the lecture hall is their performance theatre. But clearly the current generation of students provides us with an opportunity to explore what may well be more effective ways of teaching and learning.

REFERENCES


University of New Mexico (2012) Study results on Learning Studios in the United States.


