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Social Context Matters: Predicting Outcomes in Formal Learning Environments

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Research on different types of classroom spaces indicates that innovative classrooms can improve student learning. This study explores one mechanism that may underlie this effect, namely the social context of teaching and learning. The validated Social Context and Learning Environments (SCALE) survey was administered to over 2000 undergraduate university students in both traditional and active learning classrooms, and multivariate mixed-model analyses were conducted to determine whether social context was predictive of student learning. The data indicated that two out of four social context subscales predicted student learning in both types of learning environment, while one subscale had no significant relationship with student learning, and one subscale was predictive of outcomes in active learning classrooms but not in traditional spaces. From a theoretical standpoint, these results show that social context may be one of the mechanisms through which different learning spaces impact student learning outcomes, while from a practical perspective, they indicate that instructors may be able to support their students' learning by working to improve the social context in their classrooms.

Introduction

In 2018, EDUCAUSE identified active learning classrooms (ALCs) as the number two strategic technology for higher education and predicted that their adoption would become mainstream by 2022 (Brooks, 2017). This most recent assessment follows two decades of attention to and experimentation with the redesign of formal learning spaces, beginning at North Carolina State University in the mid-1990s. During this twenty-year period, significant effort has been expended trying to answer the question of whether or not the design of a learning space matters, and in particular whether ALCs yield a learning advantage for students. The answer seems to be yes, space does matter (Baepler *et al*., 2016, Chps. 1&2; Brooks, 2011; but see also Stolzfus & Libarkin, 2016).

Less attention, however, has been devoted to exploring how ALCs confer that advantage. The social aspects of teaching and learning represent one obvious avenue for exploration. Anecdotally, students often claim that they relate differently to each other when they face each other in an ALC. Experienced instructors, too, suggest their relationship with students is altered, particularly in large rooms, when they can walk up to a student who otherwise would be unreachable in a fixed-seating classroom. The change in social relations among students and between the instructor and students seems to be at the heart of much speculation about new learning spaces, and it begs the question of whether or not these changes are educationally important. In this paper, we present results from a multi-year study suggesting that at least some aspects of the social context of teaching and learning are indeed important, because they matter to student learning outcomes.

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Literature Review

For nearly half a century, higher education has witnessed a gradual shift in pedagogy, moving from an instructor-centered, information-delivery paradigm to an approach that puts students at the center of the teaching-learning process and focuses on allowing them to be active participants in their own learning (Bonwell & Eison, 1991; Freeman et al., 2014; Hake, 1998; Prince, 2004; Savin-Baden & Major, 2004). In part and as a result of this change, in recent years there has been a surge of interest in innovative classroom design at institutions of higher education, as faculty, administrators, and developers have come to realize that different types of learning spaces encourage and facilitate different types of pedagogy (Finkelstein et al., 2010; Grajek, 2017; Savin-Baden, McFarland, & Savin-Baden, 2008). The result has been efforts to design, build, and constructively use a wide variety of new learning spaces at numerous universities and colleges (Narum, 2013), along with an increase in research focused on new-style classrooms in an attempt to determine exactly what effects these spaces have on the teaching and learning process.

This research has been amply documented elsewhere (Baepler et al., 2016, Chps. 1&2; Gierdowski, 2013). For present purposes, we wish to note that most studies of new learning spaces have focused on investigating the impact of different classroom types on variables such as student and instructor perceptions, reactions, preferences, attitudes, in-class behavior, and learning outcomes. Almost no studies have investigated, to our knowledge, the mechanisms that underlie any effects that learning spaces have on variables related to teaching and learning. (One exception is Soneral & Wyse (2016), which examined the role of classroom technology as a mechanism.) In other words, if different types of classrooms are associated with different student or instructor outcomes, what accounts for this fact?

Our study attempted to fill this gap by hypothesizing that one of the important differences between new and more traditional learning spaces lies in the classroom social climate that the spaces promote. ALCs undeniably reduce the physical distance between students and instructors by placing teachers on the same level and amid student tables. They also alter the physical configuration within which students relate to each other in the classroom by seating students at round tables, facing one another, rather than being seated in ranks with an attentional and visual focal point at the front of the room, as in traditional lecture halls. We predicted, on the basis of anecdotal evidence (Baepler et al., 2016, Chp. 3), that these changes in the physical layout of the classroom would result in an altered social dynamic – in other words, differences in how students related to one another and to their instructors.

This study also drew on psychometric research showing that social context can be measured in a reliable and valid way through the use of the Social Context and Learning Environments (SCALE) survey (Baepler *et al*., 2016, Chp. 3; Walker & Baepler, 2017). In that line of research, factor analysis showed that social context can be thought of as a latent variable measured by the SCALE survey, and that social context was composed of four related but distinct dimensions, two of which had to do with the relationships and interactions among students themselves, and two with the relations between students and instructors. (The full list of SCALE items can be found in Appendix 1.) The four dimensions of social context were:

I. *Student-student general* relations, or the extent to which students work well together, respect one another, are acquainted with each other, etc.
II. *Student as instructor*, or the degree to which a student has acted in the role of instructor with respect to his or her fellow students.
III. *Student-instructor formal*, which has to do with whether the instructor and students are perceived to be working together to support students' learning.
IV. *Student-instructor informal*, which describes non-class-related aspects of the student-instructor relationship, such as acquaintance, informal chatting, and so forth.

The main research question this study attempted to answer was: *Did social context predict student learning in different types of learning spaces?* In other words, did social context *matter* to the learning outcomes students achieve, and did it matter in different ways or to different degrees in different sorts of classrooms? Our hypothesis was that social context would be shown to predict student learning, while controlling for other variables. We based this hypothesis on previous research indicating that the social aspects of teaching and learning matter to the student experience (Amedeo, Golledge, & Stimson, 2009; Meyers, 2008; Tiberius & Billson, 1991).

This study also provided preliminary data in service of answering a second research question: *Did the levels of social context, as measured by the SCALE survey, vary in quantity across different types of learning spaces?* In other words, when we used the SCALE survey to measure the student-student and student-instructor relations that comprised social context, were those relations present to different degrees or in different amounts, depending on the type of classroom the class was held in? Our hypothesis, based on a large number of anecdotal comments from students and instructors who have taken or taught classes in ALCs at our institution, was that social context would indeed be found to be different in different learning spaces, and that we would measure higher levels of the four dimensions of social context in ALCs as compared to traditional lecture halls.

Data and Methods

Data for this study were collected in 2015 and 2016, when, following IRB approval, we administered the SCALE survey to the students in 14 classes at a large Midwestern university. The classes ranged in size from 57 students to over 300; most were introductory-level science classes, including chemistry, biology, and physiology, while two were introductory humanities classes. Because we delivered the SCALE survey face-to-face in each class, the response rate for the surveys was over 90% (n = 2154).

Table 1. Four Constructs Measured by the SCALE Survey

	Student-student general relations	**Student as instructor**	**Student-instructor formal relations**	**Student-instructor informal relations**
Reliability (α)	.915	.835	.727	.847
Sample item	I feel comfortable asking for help from my classmates.	I can clearly explain new concepts I've learned to others in class.	My instructor encourages questions and comments from students.	The instructor knows my name.

The SCALE survey contained 26 individual questions, answered on a four-point agree-disagree scale where 4 = *strongly agree* and 1 = *strongly disagree*. As described above, the instrument has been shown to measure four separate aggregated constructs reliably and validly (Walker & Baepler, 2017; also see Table 1), two having to do with student-student relations and two with student-instructor relations. Each of these constructs was used as a separate predictor variable in our analysis.

Eight of the classes were taught in ALCs, while six were held in traditional amphitheater-style classrooms, and the data set was divided in a corresponding manner for analysis. Demographic data were collected for all students in the study and are displayed in Tables 2 and 3. Learning outcome data, in the form of course grades on a 100-point scale, were also collected.

Because the data in this study were nested in classes, we used multilevel regression modeling, with class as a random effect, to control for within-class correlation. Past experience indicated that students' scores on the comprehensive American College Test (ACT) and their cumulative GPAs were likely to account for a significant proportion of variance in outcomes in these courses. Those data were therefore included as fixed-factor predictor variables in our initial models, as was information about students' gender (Eddy *et al*., 2014). We used Akaike's information criterion (AIC) along with change in the -2 log-likelihood statistic as criteria for model selection (Akaike, 1974; Field, 2013; Heck *et al*., 2014). These criteria showed that, for the data set derived from ALCs as well as for the data gathered in traditional classrooms, a random-intercept model which included the SCALE variables as fixed effects and class as a random effect fit the data best (see Table 4).

The relationships between the fixed factors and the outcome variable, student grades, were similar in the traditional-room and the ALC regression models. In both analyses, ACT score and GPA accounted for a significant amount of variation in the outcome, as did the two student-student dimensions of social context. Furthermore, the student-instructor informal dimension was not a significant predictor of outcomes in either data set (see Tables 5 and 6).

There were differences between the traditional-room and ALC models, however. First, gender was a significant predictor of student performance in the traditional-room data, with female students performing worse than male students, but gender did not predict outcomes significantly in the ALC data. Second, the student-instructor formal dimension of social context significantly predicted student outcomes in the ALC data but not in the traditional-room data.

Descriptive data on each SCALE dimension were gathered and broken down by classroom type. As shown in Table 7, the mean levels of every aspect of classroom social context measured by the SCALE survey were higher in ALCs than in traditional classrooms, in some cases by a large amount (around a whole standard deviation, e.g., student-student general relations and student-instructor informal relations), and in some cases by only a small amount (e.g., the student-instructor formal dimension).

Discussion

In previous research, we determined that the SCALE survey reliably and validly measures social context and that it is composed of four discrete dimensions (Walker & Baepler, 2017). In this study, we were primarily concerned with the question of whether or not social context as measured by the SCALE survey predicted learning in different types of learning spaces. Our hypothesis was that each of the four dimensions of social context would positively predict student learning outcomes. Our results confirmed this hypothesis only in part (Table 8). They showed that the student as instructor dimension was positively predictive of final grades in both types of learning spaces, while the student-instructor formal dimension was also predictive, but only in an ALC. Contrary to our expectations, the student-instructor informal dimension had a null relationship with student learning. Possibly most surprising, the student-student general dimension emerged as a strong but *negative* predictor of student performance. In this section, we consider what might explain these findings, and we offer brief recommendations about pedagogical practice arising from them.

Table 2. Demographic Data for Students in ALC Classes	
ALC Classes	
n	1440
Classes	8
Sex	Female, 55.3%; male, 44.7%
Academic level	First-year, 31.7%; sophomore, 39.1%; junior, 14.1%; senior, 11.9%; non-degree, 1.8%
Ethnicity	Am Ind., 1.3%; Asian, 13.0%; Black, 3.1%; Hawaiian, 0.2%; Hispanic, 1.9%; Intl, 6.2%; White, 74.1%
Age (mean)	19.78
ACT score (mean)	28.14
GPA (mean)	3.29

Table 3. Demographic Data for Students in Traditional-Room Classes	
Traditional-Room Classes	
n	714
Classes	6
Sex	Female, 53.5%; male, 46.5%
Academic level	First-year, 43.2%; sophomore, 40.1%; junior, 9.4%; senior, 4.1%; non-degree 3.2%
Ethnicity	Am Ind., 1.4%; Asian, 8.8%; Black, 2.8%; Hawaiian, 0.0%; Hispanic, 1.8%; Intl, 6.0%; White, 71.3%
Age (mean)	19.3
ACT score (mean)	28.06
GPA (mean)	3.28

i. Student-student general relations

Why did high scores on the student-student general dimension of social context negatively predict student learning? A student strongly agreeing with these items might enjoy a sense of camaraderie with fellow students and feel comfortable around them, which one might think would be at worst neutral with respect to that student's learning, in and of itself, this sense of ease and comfort is not inherently negative. One can make the case that making friends and expanding a social network in college has long term positive benefits that persist beyond a single course (Pascarella & Terenzini, 2005).

Our area of focus, however, is on the immediate effect of the student-student general dimension on course-level outcomes. With this in mind we can imagine that a general sense of comfort and friendliness could easily wander into the realm of distraction and what might have begun as a collegial discussion about course material could gradually slide into a well-meaning but completely off-topic conversation. Many instructors have commented to colleagues, if all the talk they hear among students is necessarily productive, and our data indicate that they are likely right that it is not. As students get to know each other, they may not always be attending to the work at hand to the degree that it would take to perform well on class assignments. Since we know that the student-student general dimension negatively predicts learning outcomes, it makes sense to remind students to stay on track and not to be misled into thinking that an informal classroom environment means that they should take their learning casually.

In a student focus group conducted in the spring of 2017, we learned of a possible explanation for why agreement with one of the student-student general dimension statements – "The students sitting near me rely on each other for help in learning class material" – might point to lower student outcomes. The focus group participants indicated that some students grow to trust other students' capabilities to such an extent that they become overly reliant on them. We termed this mechanism *the crutch effect*, when students felt they could miss class or do their homework in class because others would catch them up on what they might miss and cover for them if their group were questioned by the instructor. These students chose to bypass the instructor's course plan – the learning activity, the reading, the lecture, etc. – in favor of a trusted synopsis from a colleague rather than engage with the material as the teacher intended.

We captured the same phenomenon in a student response to an open-ended question on the SCALE survey. This comment came from a student acting as *the crutch*: "The people around me are busy studying for another class but explaining what was just said to them helps me cement an idea." This student's colleagues may have substituted listening to him or her explain the course material for the learning activity designed by the instructor. When a student simply listens to a colleague explaining a solution, if that is what is happening, it is not the same as working through the problem herself or teaching it to someone. Because this process may confer a false sense of security, the crutch effect is consonant with research that argues people regularly overestimate their abilities, a fact brought home when objective tests contradict these mistaken beliefs (Atir, Rosenzweig, & Dunning, 2015; Moore & Healy, 2008). To address this problem, several formal instructional methods

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Table 4. Multilevel Regression Models for ALC and Traditional Classes

ALC Classes			
Model	**AIC**	**-2LL**	**Variance estimate for random effect**
ACT + GPA + Gender	8084.784	8080.784	N/A
ACT + GPA + Gender + SCALE dimensions	6463.600	6461.600	N/A
ACT + GPA + Gender + SCALE dimensions + Class	6152.980	6148.980	20.036 (39.3% of total)
Traditional-Room Classes			
Model	**AIC**	**-2LL**	**Variance estimate for random effect**
ACT + GPA + Gender	7067.067	7065.067	N/A
ACT + GPA + Gender + SCALE dimensions	3851.466	3831.466	N/A
ACT + GPA + Gender + SCALE dimensions + Class	3818.636	3814.636	30.375 (28.1% of total)

are available to encourage students to see the value of retrieval and practice, and these can be easily integrated into any classroom (Baepler *et al*., 2016).

ii. Student as instructor

That the student as instructor dimension positively predicts learning outcomes should not come as a surprise given what we know about the importance of retrieval and transfer to learning (Brown *et al*., 2014; Felder & Brent, 2016). For a student to teach something to another, she must recall information and organize it appropriately (National Research Council, 2000). Instructors can encourage this in a number of ways, such as incorporating reciprocal teaching (Larson & Dansereau, 1986; Palinscar & Brown, 1984), using peer learning (Crouch & Mazur, 2001), or assigning jigsaw activities. Any assignment that calls upon students to explain their reasoning can help students rehearse what they do and don't know (Lang, 2016). Any assignment that compels a student to retrieve information, particularly over time, exercises the *testing effect* in the classroom and makes that information easier to recall in the future, perhaps on assessments. In recalling information, students might practice *elaboration*, extending and situating the knowledge within what they already know about a topic; this exercise also helps retrieval (Brown *et al*., 2014). Many students seem aware that having to explain a concept to someone else helps their learning, such as the student who was grateful that "the people around me have allowed me to teach them, which strengthens my knowledge."

iii. Student-instructor formal relations

The key to understanding the student-instructor formal dimension is to see it as a measure of trust between the student and the instructor as well as a belief that the instructor is on the same team as the student in pursuit of learning. We might think of this as the perception of empathy or the development of rapport that has been associated with student learning and other educationally beneficial behaviors (Benson *et al*., 2005; Wilson, Ryan, & Pugh, 2010). More broadly, the student-instructor formal dimension might be an expression of an aspect of motivation. Students are motivated when they have *positive outcome expectancy*; that is, they are motivated when they believe that it is possible to achieve their goal (Ambrose, 2010). Agreeing with statements in the student-instructor formal dimension such as, "My instructor wants me to do well on the tests and assignment[s] in this class," while disagreeing with the statement, "Sometimes I feel like my instructor and I are on opposing teams in this class," are indicative of a student who believes that the class is fair and the target outcomes are plausibly within reach. If such a student were more strongly motivated than a student who believes the opposite, that could explain why higher scores on the student-instructor formal dimension of social context were associated with stronger student learning outcomes.

What is less clear is why the student-instructor formal dimension was predictive of student outcomes in ALCs but not in traditional rooms. First, we should note that this finding might have been a statistical artifact. To begin with, the regression coefficient for this dimension in traditional classrooms (1.135) was positive, but not large enough to test as statistically significant. The *N* for the traditional-room data set was about half of the *N* for the ALC data set, and the standard error for the student-instructor dimension was almost twice as large in the traditional-room analysis, which means that the traditional-room analysis had less power than the ALC analysis. With a larger sample, the student-instructor formal coefficient might have tested significant.

If this finding was not spurious, we speculate that it might have arisen from the intermittent proximity of the instructor to the student in ALCs. The design of the ALCs allow an instructor to get close to a student to ask or answer a question or even to comment on whiteboard work in a manner that is physically challenging in a traditional room. As one ALC student put it, "It's helpful when the instructor walks around the room, inviting students to ask questions." In traditional classrooms, by contrast, the instructor may be perceived as more distant – in part because he or she *is* more distant – and students may believe that their success has less to do with the instructor, so that they are less motivated by considerations of trust and fairness than students in ALCs.

We also suspect that, in the classes represented in our data, few instructors lecture in these rooms for long periods of time and instead ask students to work on activities collaboratively. ALCs are well suited for group work, and students have consistently noted this in previous surveys. The sense that the instructor is matching the pedagogy to the room design and making herself or himself available to groups reinforces the notion that the instructor wants the student to succeed and is available to help. A student engaged in a series of group exercises expressed it this way:

> My group encourages me in and out of class. We all have set high levels of expectations for each other in class contribution and attending class. The instructors set up activities, so we may learn and draw conclusions instead of giving us the answers.

Another student, perhaps marred by a spotted history with collaborative work, put it this way: "I am surprised but very happy to say that I really enjoy the group I'm in. The instructors are quite helpful *when we ask* for help."

These dynamics in ALCs may contribute to a sense on the part of students that it is important for the instructor to be "on the same team" with them, and this conviction may motivate them in their work, while in traditional classrooms there may be a greater sense that students' performance is more independent of the instructor. It is important for instructors to realize that, particularly in ALCs, designing groups and collaborative activities thoughtfully can alter the social context and improve learning. Additional teaching strategies that build trust and increase perceived fairness and strengthen preparation in advance of assessments are also suggested by these findings (Baepler *et al*., 2016).

iv. Student-instructor informal relations

As we reported, the fourth social context dimension, student–instructor informal, was not predictive of learning outcomes. This does not mean that the informal elements of teaching are not important in general. We know that working with students outside the classroom, for example, aids in retention and engagement. We also know that demonstrating expressiveness, displaying a sense of humor, and even smiling all contribute to a positive classroom atmosphere and to the ability to learn content (Pascarella & Terenzini, 2005). Our study, however, looks more narrowly at individual course outcomes and is consistent with previous research that suggests that casual personal connections do not predict learning (Pascarella & Terenzini, 2005). It might indeed be true that being friendly and approachable and even funny could have positive results, particularly as students rate instruction (Benton & Cashin, 2014; Erdle, Murray, & Rushton, 1985). Perhaps the best way to think about this result is to understand that the key to improving student learning is through sound pedagogical design and practice and that those instructors who may not naturally tend toward an informal demeanor should still strive to make the course relevant and engaging while worrying less about forcing themselves to be more casual than their own comfort would warrant.

v. Did levels of social context vary between different types of learning spaces?

In this study we were secondarily concerned with the question of whether we would measure different levels of social context using the SCALE survey in ALCs as compared to traditional classrooms. Our hypothesis, that the measured levels of the four SCALE dimensions would be higher in ALCs, was confirmed, although the magnitude of the difference in mean levels was very small for some SCALE dimensions, such as student-instructor formal relations. Assessing the levels of social context in different types of learning spaces is important for understanding its role in the learning process, for if social context is stronger or more intense in some spaces than it is in others, that fact may support (or undermine) student learning in those spaces.

Limitations and Future Directions

Our data derived from a single large, research-oriented university in the upper Midwest and were gathered in classes that were primarily, though not exclusively, introductory-level courses in the STEM fields. The validity of our findings is therefore limited to this population. We hope that future researchers attempt to measure social context and assess its relevance to student learning in a variety of settings, particularly in community colleges, professional schools, and liberal-arts institutions; in courses that represent a broader range of disciplines and class sizes; and with student populations that are more diverse with respect to ethnicity, age, disability status, etc.

As noted above, gender proved to be an important predictor of learning outcomes in traditional rooms but not in ALCs (Tables 5 and 6). This finding presents the intriguing possibility that ALCs may mitigate the "gender penalty" that negatively affects female students' performance in science classes held in traditional learning environments (Koester, Grom, & McKay, 2016; Walker & Baepler, 2018), possibly because the social context in ALCs alters adverse attitudes, dispositions, expectations, and values. Further research should focus on determining whether social context has a differential impact on subgroups of students, particularly men and women but also students of different ethnicities, ages, personality types, etc.

The conclusions that can be drawn from our finding regarding the differences in mean levels of each dimension of social context across classroom type (Table 7) are limited by the fact that different courses, taught by different instructors, were contained in the two data sets we analyzed. Because of this, it is possible that variability in the course instructors or in some other factor was responsible for the observed differences in mean social context levels between ALC and traditional-room courses. This finding should therefore be understood as a preliminary result that is suggestive of a direction future research into social context might take.

Table 5. Effect Size Coefficients and Significance Levels for Predictor Variables, Traditional-Room Classes

Traditional-Room Classes				
Predictor	**Beta**	**Standard Error**	***t***	***p*-value**
ACT	0.891	0.131	6.777	.000 ***
GPA	9.748	0.856	11.387	.000 ***
Female	-3.438	0.798	-4.307	.000 ***
Student-student general	-2.525	0.863	-2.926	.004 **
Student as instructor	4.378	1.166	3.755	.000 ***
Student-instructor formal	1.135	1.093	1.038	.300
Student-instructor informal	0.294	0.603	0.487	.627

(Beta = unstandardized effect size coefficients. **p < .01, ***p < .001)

Table 6. Effect Size Coefficients and Significance Levels for Predictor Variables, ALC Classes

ALC Classes				
Predictor	**Beta**	**Standard Error**	***t***	***p*-value**
ACT	0.128	0.031	4.152	.000 ***
GPA	11.64	0.435	26.757	.000 ***
Female	-0.620	0.375	-1.653	.099
Student-student general	-2.404	0.582	-4.132	.000 ***
Student as instructor	3.143	0.613	5.127	.000 ***
Student-instructor formal	2.134	0.520	4.110	.000 ***
Student-instructor informal	-0.292	0.353	-0.825	.410

(Beta = unstandardized effect size coefficients. **p < .01, ***p < .001)

Table 7. Social Context Means by Dimension for ALCs and Traditional Classrooms

	ALC	**Traditional**
Student-student general	3.2988(.430)	2.7312(.614)
Student as instructor	3.1433(.410)	2.8798(.474)
Student-instructor formal	3.2306(.481)	3.1731(.485)
Student-instructor informal	2.6576(.606)	2.2263(.716)

(Mean levels of each subscale, with standard deviations in parentheses.)

Table 8. Summary of the Predictive Relationships between Social Context and Learning Outcomes

	ALC	**Traditional**
Student-student general	Negatively Predictive	Negatively Predictive
Student as instructor	Positively Predictive	Positively Predictive
Student-instructor formal	Positively Predictive	Not Predictive
Student-instructor informal	Not Predictive	Not Predictive

Conclusion

The main conclusion of this study is that *social context matters to student learning* – or at least certain aspects of it do, in different ways. This research advances our understanding of how ALCs contribute to better student learning outcomes by offering evidence that alterations in the social relations among students and between the instructor and students may be a mechanism driving the learning outcomes that students achieve. By illustrating the predictive qualities of three social context dimensions—student-student general relations, student as instructor, and student-instructor formal—we offer a partial understanding of how interpersonal dynamics in the classroom are influenced by the physical space and how they contribute to learning. This approach allows researchers to measure the social context in any space and encourages practitioners to focus on the elements of social relations that have both positive and negative effects on learning. If we are to take full advantage of new learning spaces, we need to gain a more nuanced understanding of how they change the interpersonal classroom environment so that we can adjust teaching practice accordingly. Social context should not be thought of as a static, unchangeable quality of a learning environment, and our results lay the groundwork for the types of guidance and experiences instructors can give students to take full advantage of the social consequences of teaching in these classrooms.

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Appendices

Appendix 1: Full list of SCALE items

(All questions answered on a 4-point scale where 4 = "Strongly Agree" and 1 = "Strongly Disagree")

Item	**Factor**
Q1: I've learned something from my classmates.	**Student-Student General**
Q8: The students sitting near me rely on each other for help in learning class material.	
Q9: In general, the people sitting near me in class work well together on class assignments, questions, etc.	
Q14: I know something personal about the people sitting near me in class.	
Q15: I feel comfortable asking for help from my classmates.	
Q21: I am acquainted with the students sitting near me in class.	
Q24: During class, I often have a chance to discuss material with some of my classmates.	
Q25: The students sitting near me respect my opinions.	
Q26: Other students pointed out a helpful resource.	
Q27: Other students explained a concept to me.	
Q2: I can explain my ideas in specific terms.	**Student as Instructor**
Q4: The people sitting near me have learned something from me this semester.	

Q7: I can clearly explain new concepts I've learned to others in class.	
Q13: I can persuade my classmates why my ideas are relevant to the problems we encounter in this class.	
Q16: I can use the terminology in this class correctly.	
Q19: I can explain my thought process from start to finish to others in class.	
Q23: I can help others in this class learn.	
Q3: The material covered by the tests and assignments in this class was presented and discussed in class or online.	**Student-Instructor Formal**
Q6: My instructor makes class enjoyable.	
Q11: My instructor wants me to do well on the tests and assignments in this class.	
Q17: Sometimes I feel like my instructor and I are on opposing teams in this class.	
Q22: My instructor encourages questions and comments from students.	
Q5: The instructor knows my name.	**Student-Instructor Informal**
Q12: The instructor is acquainted with me.	
Q18: I am acquainted with the instructor.	