

Impact of Collaborative Learning on Student Persistence in First Year Design Course

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Abstract

This research paper seeks to evaluate the impact of collaborative learning on student persistence and the methods by which the impact is mediated. Collaboration is frequently listed among skills required for students to succeed in the workplace. Engineering standards include developing “an ability to function on multidisciplinary teams” as well as “an ability to communicate effectively.” Active learning strategies, including collaborative learning techniques, have been encouraged to promote student learning and engagement. However, a gap exists in literature when it comes to connecting collaborative learning to student engagement and persistence.

A model has been recommended whereby collaborative learning impacts turnover intention (persistence) while being mediated by factors of campus connectedness, a sense of community, and organizational commitment. Prior research has applied this model to participation in a computer supported collaborative learning environment and been able to significantly describe relationships between nearly all factors. The purpose of this study is to apply the model in an introductory design course and assess model fit for these factors influencing student persistence.

Nine hundred fourteen students enrolled during two semesters of an introductory design thinking course were surveyed and included in analysis. The course is a flipped classroom where content materials are packaged via Blackboard and students use class time for interaction rather than lecture. Data was analyzed through structural equation modeling to simultaneously evaluate relationships among the factors.

Results from the model are reported. Researchers found that usability of the online collaborative system positively impact collaborative learning. Next, collaborative learning leads to a greater sense of campus connectedness and sense of community for students. These two factors contribute to organizational commitment and reduction of turnover intention.

Implications for this model include expansion of student attrition research as it relates to technology and engineering education and the contribution of this model to understanding student attitudes in the domain of engineering and design thinking. While collaborative learning is important the present research is an opportunity to assess its impact on students beyond the acquisition of new knowledge.

Introduction

Collaboration is frequently listed among skills required for graduates to succeed in the 21st century workforce. Engineering standards include developing “an ability to function on multidisciplinary teams” as well as “an ability to communicate effectively.” Active learning approaches, including collaborative learning practices, foster student engagement and learning that is better aligned with the workplace environment. The premise of active learning encourages students to engage in dynamic activities that require communication and a shared knowledge transfer among peers that is not found in a passive lecture delivery method¹⁻³. With each activity, the members of the group should be able to pull from past experiences, compare individual

viewpoints, and accept alternative perspectives of a topic, and express their interpretations back to the group⁴. The connection between the modern workplace and active learning in the classroom is found in 21st century skill requirements of today's employers. Organizations expect graduates to not only have the skills to successfully work collaboratively in groups, but also understand the impact that collaboration has on technology readiness, the complexities of global challenges, and benefits that come with multiple skillsets and knowledge domains.

With the overall traditional student population dropping, retaining college students is becoming more urgent. A response to these challenges has included tactics such as increased financial aid and fiscal support. However, a sustainable effort is warranted. The higher education environment must encourage a sense of connectedness and community by recognizing students' diversity of thought and opinion, and merit.

To retain students to degree completion at higher rates, the prior observations by Tinto⁵ are recommended for improving student persistence:

1. A commitment to success must include monetary resources and not just words.
2. A high expectation of student performance begins with the first year.
3. Develop support programs for navigating the new college environment.
4. Utilize student feedback and assessments of the learning environment.
5. Foster student involvement both academically and socially.
6. Focus on the development of a setting that encourages learning.

These factors are not domain specific, and are attainable with increased student involvement in his or her own learning through the promotion of social and academic immersion, and academic support for a student's motivation to persist⁶⁻¹⁰.

An active learning environment through collaborative learning principles has been encouraged in higher education as a means of improving student engagement¹⁻³, but there is a gap in the literature when it comes to connecting the two areas of research. The theoretical model used here was developed to analyze how the impacts of collaborative learning positively influences students' turnover intention (persistence), mediated by factors of sense of community, campus connectedness, and commitment to organization. This model has been applied to participation in an online computer supported collaborative learning environment and describes significant relationships among nearly all factors. The purpose of the current study is to apply this model in an introductory design course, evaluate model fit as compared to prior work in developing the model, and assess these factors' influence on student persistence.

Background

In this section, a review of the factors that exist in a collaborative learning commitment model¹¹ are presented. The model has been recommended whereby collaborative learning impacts turnover intention (persistence) while being mediated by factors of campus

connectedness, a sense of community, and organizational commitment. Prior research has applied this model to participation in a virtual collaborative learning environment and has been able to significantly describe relationships between nearly all factors. As the purpose of this study is to apply the model in an introductory design course, a review of impacts of first year experiences is also addressed.

In a review of the factors included in the collaborative learning commitment model¹¹, the first measurement addressed in the model is usability. Usability can be simply defined as a measurement of how easy an interface is to use¹². As with previous research, in the case of learning management systems, if a student does not find the system to be adequately usable the effectiveness of the computer supported learning environment will be diminished. The students in this study utilized a course management system to collaborate in a flipped course environment. Some collaborative work was done in an active learning setting, and other work required the use of the course management system to collaborate outside of the classroom. One widely used tool for assessing usability is the System Usability Scale (SUS)¹³ developed by John Brooke. Bangor, Kortum, and Miller¹⁴ evaluated Brooke's scale by reviewing over 200 studies in previous years that have utilized the SUS, and found the scale to be a widely used and robust measure of usability. The SUS is free to use with the proper reference, it is a short questionnaire with 10 items, it produces a single number of overall usability, and it is not bound by any particular technology. A later study applied the SUS to assess the usability of 14 common, everyday products in an effort to demonstrate the flexibility of the scale¹⁵. In a subsequent study, it was noted that e-learning platforms were not included in the 14 chosen products, so research was conducted to evaluate a learning management system using SUS¹⁶. Other previous studies have also evaluated the usability of course and learning management systems¹⁷⁻¹⁸.

The next factor addressed by the model is Collaborative Learning Attitudes. Collaborative skills are central to 21st century skills. For example, the National Research Council refers to 21st century skills as

“being able to solve complex problems, to think critically about tasks, to effectively communicate with people from a variety of different cultures and using a variety of different techniques, to work in collaboration with others, to adapt to rapidly changing environments and conditions for performing tasks, to effectively manage one's work, and to acquire new skills and information on one's own.” (p. 1)¹⁹

The expectation of the workplace is that every employee must be able to adapt to change, use critical thinking skills and collaborate professionally²⁰.

One structured approach to fostering critical thinking via collaboration learning methods involves preparation, cognitive structuring, and role structuring²¹. Research in undergraduate student persistence has encouraged this shift in instructional delivery as collaborative learning is found to play a significant role in retention of first-year students^{1,6-7}. First, an instructor should select a topic that the majority of students can relate to or efficiently acquire knowledge about the topic. Second, apply cognitive structuring to the topic by invoking a task that requires deeper thought beyond a cursory discussion. Finally, the role-structuring process is meant to get all members of the group to participate with interest. This approach gives the students enough material at the beginning of the project that they can relate it back to prior personal experiences

and individually acquired knowledge²¹. Then, the instructor gives the students a task that relies on the input from everyone in the group to think critically on the topic. The final part of the process requires that all students participate in order to complete the task without hindering progress. It is noted in this approach that convincing students to embrace a different viewpoint on a topic can be challenging and sometimes sensitive due to upbringing or past experiences, so a structured approach to collaborative learning and critical thinking is essential for participation and engagement²¹.

The context for our classroom, computer-supported collaborative learning (CSCL), emerged as a research field in the 1990s in response to new technology meant to bring students together online to learn²². A framework for CSCL research is divided into three main elements: pedagogical, social and technological²³. This framework is meant to provide structure for future research in the CSCL domain by identifying the varying qualities of the environment and areas that are lacking in research. The *pedagogical* element pertains to the learning portion of the collaborative learning environment, the *social* element pertains to the skills that students use to work collaboratively in a team including communication, motivation, and engagement in assigned tasks, and the *technological* element pertains to technological needs of the activity depending on the makeup of the environment. CSCL environments with both educational functionality and social functionality fulfill the learning needs of the students²⁴. It allows for a complete learning experience, called a *sociable* CSCL environment. Such an environment can reduce feelings of isolation and encourage persistence as students develop a sense of community through exchanges of information and a commitment to contribute in the community²⁵. Research by Abedin, Daneshgar, and D'Ambra studied the difference between on-task (instructional activities) and non-task (not directly related to learning) social interactions with a focus on the factors that affect non-task sociability of CSCL environments²⁶. It was determined that the students who can alter their communicative behaviors to adapt to a course CSCL environment will enjoy the educational experience more and will participate more with a greater sense of community, but the impact of the sense of community on student intention is not addressed. The role that CSCL plays in a course is based on an instructor's setup and design of the course, not just adding technology to a course²⁷. The communication of expectations, a positive social environment, the encouragement of information sharing, and an understanding of the technology readiness of the students are important considerations in the design of the course.

This sociable environment and desirable community represent the next factors in the model, Campus Connectedness and Sense of Community. Lee and Robbins have identified social connectedness as an aspect of the self that reflects individual awareness of interpersonal closeness with the social world as a whole²⁸⁻³⁰. Campus connectedness is the characteristic of social connectedness relating to a student's connectedness and feelings of belonging with their peers in the context of a college environment³¹. While the collaboration that occurs in learning groups is found to be an important factor to student persistence, it is the responsibility of an institution to provide an encouraging environment beyond the confines of the classroom⁵. The institution is charged with providing a campus level student support system, a commitment to both academic and social immersion, and programs designed to provide students with the skills necessary to be successful in college. When an institution conveys its commitment to a collaborative learning environment, students may be more likely to participate effectively in group activities, which should strength their connection with the institution. Otherwise, a student may leave the university due to a low sense of connectedness on a campus level when not given

the tools and support to succeed. Summers, Beretvas, Svinicki and Gorin assessed collaborative learning methods based on feelings of campus connectedness, academic classroom community, and effective group processing³². Using an adapted a scale developed by Lee and Robbins to measure social connectedness to peers on campus, their analysis found that classroom community may positively influence campus connectedness²⁸.

The theoretical framework for community in this study is based on the work by McMillan and Chavis³³. They propose that a sense of community consists of four elements: membership, influence, integration, and shared emotional connection. They further define sense of community as “a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members’ needs will be met through their commitment to be together” (p.9)³³. A sense of community index (SCI) was then developed to quantitatively measure the sense of community that an individual experiences in a particular community³⁴. As a response to inconsistencies in reliability of the SCI experienced by other researchers, a new instrument called the SCI2 was developed to better represent the original four-dimensions found in the McMillan and Chavis original sense of community theory³⁵.

As students ultimately prepare to enter the workplace environment after graduation, it is appropriate to measure a student’s commitment to an academic institution much like an organization would measure an employee’s workplace commitment and consequential turnover intention^{11, 36-38}. In a prior research study, an analysis of organizational commitment across domains investigates how organizational commitment and embeddedness are related to an intention to persist³⁸. As hypothesized, an individual’s level of commitment predicted graduation. McNally and Irving also sought to extend organizational commitment research into the study of student behavior by utilizing prior research in workplace commitment³⁹ to analyze the effects of affective, normative, and continuance commitment on a student’s commitment to his/her university³⁷. It is proposed that individuals who stay in an organization because they want to stay experience a level of affective commitment³⁹. Those who stay because they need to stay experience a level of continuance commitment, and normative commitment is when individuals stay because they feel obligated to the organization. The results of the study supported prior research that affective commitment leads to lower turnover intention suggesting that future research could identify antecedents of commitment for the purpose of improving student retention programs.

Just as Tinto’s research is devoted to student persistence, Bean dedicated his research focus to the study of student attrition⁴⁰. The prior work of Price pertaining to employee turnover in the workplace⁴¹ is the foundational basis of Bean’s research model. Bean’s definition of student attrition is “the cessation of individual student membership in an institution of higher education.”(p. 157)⁴⁰. The justification for this type of connection is a comparison of an employee dissatisfaction of the workplace and student dissatisfaction of his or her chosen institution of higher education. Our study utilized the factor of student Turnover Intention and theorized that it would be predictable by the previously included factors. Prior studies utilized similar intention to leave scales that included measures of how likely an individual is going to leave his or her current profession, and the level of effort that has gone into this decision^{36, 42}. In one of the studies, participants were nursing students³⁶ and the other included employees that may or may not be experiencing work-family conflict⁴². In both studies, the level of commitment determined the level of turnover regardless of the domain.

Methods

The present study used a correlational design to examine student perceptions of persistence. Our research purpose was to examine the collaborative learning commitment model within the context of an introductory design course; students were recruited near the end of the course and used the survey to reflect on their experience with design and collaborative learning in the classroom. We briefly describe the context for administration, especially similarities and dissimilarities to the prior application of the collaborative learning commitment model. Further details on the compilation of our survey instrument, and its delivery are also provided.

The course, “Design Thinking in Technology,” is a first-year introduction to design. It is delivered using a flipped and blended education model meaning that much of the time students spend on the course is done online preparatory to our class meetings. Each class met for one hour per week face-to-face, while the instructor led the class in active learning strategies including group discussion of the online material and application of the strategies learned in a new way. The flipped classroom approach has rivaled student expectations for the course; as such, several pedagogical and educational technology tools have been implemented to support student learning for their first semester and in this new manner of teaching. The course is made available through Blackboard Learn for student access; and collaborative learning is supported through use of the CATME team evaluation system (<http://www.catme.org>)⁴³. These digital similarities parallel the virtual learning community setting that was used in the establishment of the research model¹¹. Both courses also used design projects as a central focus. On the other hand, the Design Thinking in Technology course was delivered in a sustained manner throughout the semester while the virtual learning community had a few focused times throughout the semester leading up to their only in-person experience.

In order to apply the model proposed by Laux, Luse, and Mennecke¹¹ to our introductory design classroom, an online end-of-semester survey was administered to students via Qualtrics. It contained the previously discussed questions on system usability, collaborative learning attitudes, campus connectedness, sense of community, commitment, and turnover intention. The survey had 64 questions and utilized Likert-type responses ranging from *Strongly Agree* to *Strongly Disagree*; items are contained in Appendix A. For example, students marked their agreement to “I actively exchanged my ideas with group members” (collaborative learning), “Fitting into this community is important to me” (sense of community), and “I don’t feel related to anyone on campus” (campus connectedness). Students enrolled in two semesters (Fall 2014 and Spring 2015) of the course were given a nominal amount of extra credit for participation. Among students enrolled, 741 students completed the survey entirely (79.08%). The large sample size enabled us to use structural equation modeling (SEM)⁴⁴; “in general, factor analysis [including SEM] is a large sample technique, so the more cases the better”⁴⁵.

The hypothesized model is that proposed Laux, Luse, and Mennecke¹¹. We expect that in our environment of collaborative learning and online, flipped instruction, students participating in teamwork will increase their sense of community, campus connectedness, and organizational commitment, and reduce their turnover intentions (see Figure 1).

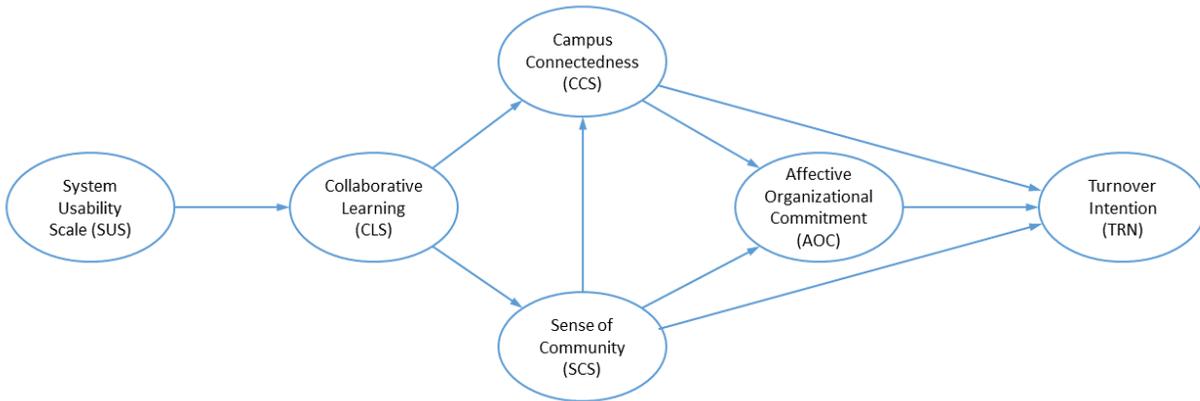


Figure 1. Hypothetical model for collaborative learning commitment, copied from Laux, Luse, Mennecke¹¹ with permission.

Results

Data were screened following recommended procedures⁴⁶ including checking for accuracy of input, evaluating and dealing with missing data, checking for linearity, homoscedasticity, and normality. Responses were removed for inaccurately answering an engagement check question or missing answers on more than 5% of the survey⁴⁶; this left a sample of 680 students between the two semesters who had completed all questions on the survey. Inspection of correlations suggested that the relationships among survey items were linear, and descriptive statistics suggested that the data met acceptable criteria for normality. It is suggested that with large samples, the significance level of skewness and kurtosis are not as meaningful as the actual shape of the distribution⁴⁶; all survey items were less than |1.5| in skewness and kurtosis.

Psychometric properties of the instrument were reviewed because of administration in a new setting. These values include internal consistency (Cronbach's alpha), composite reliability and average variance extracted for each scale (see Table 1). The sense of community scale was treated as a second-order construct and psychometric properties were examined for the first-order and second-order constructs. It is recommended that Cronbach's alpha for each scale be greater than .6 and less than .95⁴⁷; too high a measure of internal consistency might suggest that there is not enough diversity in the questions being asked⁴⁸. All of the scales had a good measure of internal consistency with the exception of the second-order scale for sense of community. However, because Cronbach's alpha is inflated by the number of items used⁴⁹, and the value is only slightly above our range, the scales were satisfactory. Each scale composite reliability⁵⁰ was above recommended cutoffs. Average variance extracted⁵¹ for all scales except system usability were above recommended cutoffs of .50. Upon closer examination however, the average variance extracted for system usability was greater than the square of any factor correlations, addressing concerns about discriminant validity between the factors⁵². In other words, each scale was able to explain a unique portion of variance, separate from the relationship with other survey items.

Table 1. Cronbach's alpha, composite reliability, average variance extracted, and correlations for latent constructs, with the square root of the AVE along the diagonal.

| Factor | Cronbach's α | CR | AVE | Correlations and Square Root AVE | | | | | | | | | | | |
|---|---------------------|------|------|----------------------------------|-------|-------|-------|-------|-------|------|--------|-------|------|--|--|
| | | | | SUS | CLS | CCS | SCS | SCSFN | SCSI | SCSM | SCSSEC | AOC | TRN | | |
| Usability (SUS) | 0.83 | 0.79 | 0.30 | 0.55 | | | | | | | | | | | |
| Collaborative Learning (CLS) | 0.82 | 0.88 | 0.57 | 0.24 | 0.76 | | | | | | | | | | |
| Campus Connectedness (CCS) | 0.96 | 0.96 | 0.62 | 0.15 | 0.36 | 0.79 | | | | | | | | | |
| Sense of Community (SCS) | 0.93 | 0.93 | 0.68 | 0.19 | 0.43 | 0.86 | 0.82 | | | | | | | | |
| SCS Fulfillment of Needs | 0.88 | 0.88 | 0.54 | 0.09 | 0.30 | 0.92 | 0.74 | 0.74 | | | | | | | |
| SCS Influence | 0.89 | 0.90 | 0.59 | 0.18 | 0.31 | 0.92 | 0.70 | 0.80 | 0.77 | | | | | | |
| SCS Membership | 0.92 | 0.92 | 0.66 | 0.09 | 0.26 | 0.90 | 0.66 | 0.76 | 0.80 | 0.81 | | | | | |
| SCS Shared Emotional Connection | 0.92 | 0.92 | 0.50 | 0.31 | 0.24 | 0.22 | 0.22 | 0.19 | 0.20 | 0.17 | 0.71 | | | | |
| Affective Organizational Commitment (AOC) | 0.91 | 0.91 | 0.64 | 0.50 | 0.23 | 0.41 | 0.38 | 0.35 | 0.37 | 0.38 | 0.45 | 0.80 | | | |
| Turnover Intention (TRN) | 0.91 | 0.91 | 0.71 | -0.24 | -0.14 | -0.05 | -0.10 | -0.04 | -0.05 | 0.00 | -0.46 | -0.31 | 0.84 | | |

Factor analysis proceeded first with exploratory factor analysis (EFA), then confirmatory factor analysis (CFA) to evaluate the measurement model. Finally, structural equation modeling (SEM) was performed to test the overall fit of the model and causal relationship among the constructs.

Parallel analysis to determine the number of factors revealed that there were 10 factors in the data with eigenvalues greater than 1, a common method for determining the number of factors⁵³. This number aligned with the hypothesized model for collaborative learning impacts. Subsequent maximum likelihood EFA began by extracting 10 factors using Promax rotation, however the factor structure was unclear. A more parsimonious structure emerged when seeking only six factors by collapsing the second-order Sense of Community factor. This structure held items to the correct scale with few exceptions; because the factor structure was already theorized, this served for a visual inspection before using CFA. One reverse-coded item from the Collaborative Learning Scale, “Collaborative learning in my group was time-consuming,” was negatively loaded in the factor analysis results. It is possible that students did not perceive a negative impact for the time spent on collaborative learning in this environment; it is also possible that students did not engage in their groups for as long and group work was less time-consuming as a result. The indicator still had a significant loading on the factor, albeit negative, and so it was retained for further analysis.

The next step, CFA, required the researchers to designate hypothesized factor loadings a priori and assesses the fit of the resultant model⁴⁴. The CFA results showed had significant factor loadings for all indicators. Factor loading absolute values ranged between .12 and .94. Goodness-of-fit indices showed conflicting information: the χ^2/df ratio was good (3.68), RMSEA was good (.06), CFI good (.84), and AGFI poor (.66). Byrne has warned that the array of goodness-of-fit indices should be interpreted as a whole⁵⁴. In general we are satisfied with this model although there is room for improvement.

The final specified structural model contained a second-order factor structure for Sense of Community (designed with four first-order factors in the original literature), and causal relationships for System Usability on Collaborative Learning, then Sense of Community and Campus Connectedness. These two factors simultaneously affect Turnover Intention with their effect partially mediated by Affective Organizational Commitment (Figure 2).

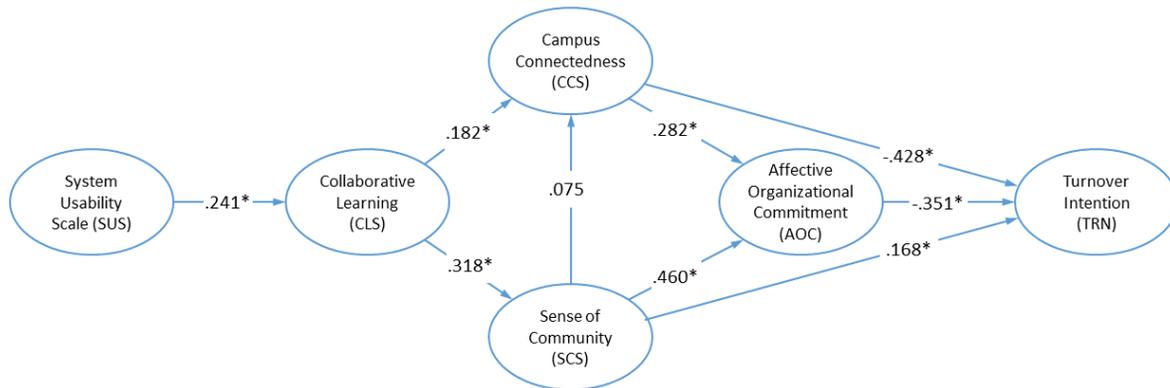


Figure 2. Structural model with path coefficients for collaborative learning commitment.

Factor loadings for the measurement model and second-order organization for Sense of Community (not pictured in Figure 2) were all significant, $p < .001$. The structural path coefficients for the collaborative learning commitment model were significant, $p < .001$, except for the regression of Campus Connectedness on Sense of Community. In comparing these results to those obtained in the original establishment of the model, many similarities are identified. Laux, Luse, and Mennecke¹¹ reported on the overall model for all students in their sample, as well as separate models for low and high participation in the virtual learning community; readers are referred to their work for a more elaborate discussion of significant loadings in the model. Our model demonstrated a significant relationship between Collaborative Learning and Campus Connectedness which was only realized for highly participatory students. We also found a significant relationship between Campus Connectedness, Affective Organizational Commitment, and Sense of Community, which was seen in the low participation group. Our results did include a weakened relationship between Sense of Community and Campus Connectedness, although we believe that among our sample this relationship is captured by the significant relationship between Collaborative Learning and Campus Connectedness. Because our course is a freshman-level offering, it represents a first exposure to campus for many of our students; we believe that this influenced the significant connection between collaboration and campus connectedness. Our findings are concordant with the original work and reinforce a model whereby collaborative learning impacts student desire to persist within the university.

Implications

This study has applied the collaborative learning commitment model¹¹ to student beliefs of perceived turnover intention in a first year design course. In comparing model fit between our recent context and prior use of the model¹¹, our context also revealed good indicators for model fit which substantiate the reliability of the collaborative learning commitment model. This study has tested the model in a flipped course with significant computer supported collaborative learning activities that occurred primarily face-to-face as opposed to the original study that

focused on commuting students. The results also reinforce the belief that collaborative learning impacts a student's intention to persist to degree completion and point to specific factors of collaborative learning which influence persistence; these results further research in the gap between a collaborative learning environment and turnover intention of students. The results did not find a significant relationship between sense of community and connectedness, but the relationship between collaborative learning and connectedness was significant. This may be because the students in this study are primarily first year students living on campus and there are more opportunities for connections to the academic institution and less reliance on community.

The practical implication of this study provides insight on areas of improvement in the first year design course as it applies to collaborative learning impacts. The goal is to strengthen a student's intention to persist. By applying engaging collaborative learning techniques, building community in the classroom, and providing awareness of campus opportunities, a student's likelihood to persist are increased. The collaborative learning commitment model is a means of measuring the success or failure of how these factors impact persistence. It also identifies several factors which meaningfully impact student intentions to persist. Future research may apply this model longitudinally to determine how student perceptions affect enrollment and degree completion in our program. The model has room for improvement, and there are additional factors to be identified to further explain the variance. In the future, this model may find applications beyond credit based student experiences to other important areas that bind the student to the modern campus environment. In an era where digital technologies are being developed which provide alternatives to the holistic approach to college education, it is important to understand what this unbundling, that has impacted other areas such as industry, would do to the academic environment. By understanding what binds students to the college experience, perhaps the 21st century higher education approach may be improved through more intentional efforts that are poorly understood today.

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Appendix A: Survey

The following subscales are included in the survey with sources as described in the article. Items with an asterisk should be reverse coded.

System Usability Scale

Please indicate your level of agreement for each of the following statements as they pertain to the use of Blackboard Learn for collaborative learning in the course: (Range: Strongly Agree to Strongly Disagree)

1. I think that I would like to use this system frequently.
2. I found the system unnecessarily complex. (*)
3. I thought the system was easy to use.
4. I think that I would need the support of a technical person to be able to use this system. (*)
5. I found the various functions in this system were well integrated.
6. I thought there was too much inconsistency in this system. (*)
7. I would imagine that most people would learn to use this system very quickly.
8. I found the system very cumbersome to use. (*)
9. I felt very confident using the system.
10. I needed to learn a lot of things before I could get going with this system. (*)

Collaborative Learning

Please indicate your level of agreement for each of the following statements as they pertain to your collaborative learning experience this semester with your classmates: (Range: Strongly Agree to Strongly Disagree)

1. Collaborative learning experiences in a virtual community are better than in a face-to-face learning environment.
2. I felt part of a community within my group.
3. I actively exchanged my ideas with group members.
4. I was able to develop new skills and knowledge from other members of my group.
5. I was able to develop problem solving skills through peer collaboration.
6. Collaborative learning in my group was effective.
7. Collaborative learning in my group was time-consuming. (*)
8. Overall, I am satisfied with my collaborative learning experience this semester.

Campus Connectedness

Please indicate your level of agreement for each of the following statements as they pertain to Purdue University: (Range: Strongly Agree to Strongly Disagree)

1. I feel disconnected from campus life. (*)
2. There are people on campus with whom I feel a close bond.
3. I don't feel that I really belong around the people that I know. (*)
4. I feel that I can share personal concerns with other students.

5. I feel so distant from the other students. (*)
6. I have no sense of togetherness with my peers.
7. I catch myself losing all sense of connectedness with college life. (*)
8. I feel that I fit right in on campus.
9. There is no sense of brotherhood/sisterhood with my college friends. (*)
10. I don't feel related to anyone on campus.
11. Other students make me feel at home on campus. (*)
12. I don't feel I participate with anyone or any group.

Sense of Community

The following statements about community refer to the sense of community that you have with other students in your degree program. Please indicate your level of agreement with each of the following statements. (Range: Completely Agree to Not at All)

1. I get important needs of mine met because I am part of this community.
2. Community members and I value the same things.
3. This community has been successful in getting the needs of its members met.
4. Being a member of this community makes me feel good.
5. When I have a problem, I can talk about it with members of this community.
6. People in this community have similar needs, priorities, and goals.
7. I can trust people in this community.
8. I can recognize most of the members of this community.
9. Most community members know me.
10. This community has symbols and expressions of membership such as clothes, signs, art, architecture, logos, landmarks, and flags that people can recognize.
11. I put a lot of time and effort into being part of this community.
12. Being a member of this community is a part of my identity.
13. Fitting into this community is important to me.
14. This community can influence other communities.
15. I care about what other community members think of me.
16. I have influence over what this community is like.
17. If there is a problem in this community, members can get it solved.
18. This community has good leaders.
19. It is very important to me to be a part of this community.
20. I am with other community members a lot and enjoy being with them.
21. I expect to be a part of this community for a long time.
22. Members of this community have shared important events together, such as holidays, celebrations, or disasters.
23. I feel hopeful about the future of this community.
24. Members of this community care about each other.

Affective Organizational Commitment

Please indicate your level of commitment to your academic career based on the following statements: (Range: Strongly Agree to Strongly Disagree)

1. I would be happy to spend the rest of my academic career at this institution.
2. I feel that my academic institution's problems are my own.
3. I feel like "part of the family" at my academic institution.
4. I feel emotionally attached to my academic institution.
5. Taking classes at my academic institution has a great deal of personal meaning for me.
6. I feel a strong sense of belonging to my academic institution.

Turnover Intention Scale

Please indicate your level of agreement for each of the following statements as they pertain to your institution: (Range: Strongly Agree to Strongly Disagree)

1. I am seriously thinking about leaving this academic institution at the end of the semester for reasons other than graduation. (*)
2. I am planning to look for a new academic institution to attend for reasons other than graduation. (*)
3. I intend to ask people about new academic majors because I want to transfer out of my current major. (*)
4. I don't plan on being at this academic institution much longer for reasons other than graduation. (*)