PEER TUTORING IN THE CIS SANDBOX: DOES IT WORK?

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ABSTRACT

This paper reports on a student-created and facilitated peer-tutoring activity to assist first-year students in preparing for their final exam in an introductory information technology course. Tutors at the CIS Sandbox, a collaborative learning lab at an American university, offered a series of "Crunch Sessions" to their peers. This paper examines how these sessions model characteristics of peer tutoring, and describes how social media and Internet-based collaboration tools support a blended learning environment where an in-person event is aligned with a web presence. Interviews with student tutors and participants suggest that the peer relationship between tutors and tutees was conducive to an open exchange of questions and answers among participants, and that the sessions contributed to student learning for those who attended. Implications for designing and researching online peer learning activities in higher education contexts are discussed.

KEYWORDS

Peer Tutoring, Informal Learning, Collaborative Learning Community, Learning Environments, ICTs

1. INTRODUCTION

The Computer Information Systems Learning and Information Technology Sandbox (CIS Sandbox) opened as a collaborative computer lab during the fall 2011 semester at Bentley University, a business university in the United States. Staffed by 24 undergraduate and graduate student assistants, also referred to as tutors, the facility since has become a valuable campus destination for learning about and with new technology, through the in-person peer tutoring services and online resources it provides. In that context, peer tutors are student tutors who have taken courses in which they tutor other students. Most of the tutors receive compensation through federal work-study or the university's student work program for their services. Undergraduate tutors work approximately 7 hours per week; graduate tutors work approximately 20 hours per week.

Results from the initial phase of this research (Frydenberg, 2013) showed that students from IT 101 (Introduction to Information Technology and Computer Concepts), a course required of all first-year students at the university, were consistently the largest cohort using the CIS Sandbox in any given semester. As a result, many students had developed relationships with some of the tutors, who provided assistance on homework assignments and clarification of course concepts. Tutors recognized an opportunity to leverage students' comfort in the CIS-Sandbox to provide them with an informal experience to prepare for their final exam (common across all sections of IT 101), and in turn, improve the impact of peer tutoring services offered by the CIS Sandbox on student learning outcomes.

As part of ongoing efforts to create a collaborative learning community in the CIS Sandbox, this paper reports on a student-created and student-facilitated peer-tutoring activity called a Crunch Session to assist first-year students in preparing for their IT 101 final exam. Many students who visit the CIS Sandbox during the semester seek tutoring assistance from their peers, so a student-driven end-of-semester review session was a natural extension of the collaborative pedagogic approach that is a guiding principle of the CIS Sandbox and its tutors. Three Crunch Sessions took place during the final night of the fall 2011 semester, when students begin studying for final exams. With 14 sections of the course offered to approximately 691 students, and a facility with a capacity of 50 students in person, the tutors and the author discussed ways to create a student-centered learning experience that relied on Internet-based collaboration tools (ICTs) in order to enable students to attend and participate in person and online.

This practitioner study reports on a second phase in the evolution of the CIS Sandbox, describes a peer-tutoring activity, presents a model for its implementation, and qualitative evaluation results that indicate its effectiveness in promoting student learning.

2. SOCIAL MEDIA AND PEER TUTORING

Peer tutoring and other aspects of peer learning have shown to be effective model for learning and engagement (Jackson & Bruegmann, 2009), (Topping K., 2005). Distinctions among styles and implementations of peer learning exist in the literature. Peer tutoring is an approach in which one student instructs another on material in which the first is an expert and the second is a novice (Topping, 2005).

Most peer educational techniques are structured around carefully defined social roles and procedures (Damon & Phelps, 1989, p. 10). While Damon and Phelps recognized this was the case for primary school learning environments in an age where Internet access in classrooms was unlikely and online social networks were not invented yet, their observation that peer learning has a social component can be extended to incorporating social media and collaboration tools in higher education learning spaces as is evident today. Previous practitioner studies have investigated peer tutoring and instruction through video podcasting (Frydenberg M. , 2008), blogs (Davi, Frydenberg, & Gulati, 2007) and collaboration tools and social media (McLoughlin & Lee, 2007), (Rourke & Anderson, 2002), (Wheeler, 2009). Approaches to peer learning in the CIS Sandbox build upon these techniques.

"Peer tutoring emulates the traditional teacher-student relationship in which one party transmits expertise to another. The teaching party knows the answers and, through explanation and drill, tries to communicate them to the learning party." (Damon & Phelps, p. 11)

Peer tutoring is beneficial to those who are tutored as well as to the tutors themselves. (Topping K. J., 1996) Entrusting tutors to work with students "imparts to them a message that is likely to bolster their enduring confidence in themselves and interest in intellectual achievement." (Damon & Phelps, p. 17) Jackson and Bruegmann (2009) found that knowledgeable and skilled individuals increase the skill and knowledge of those with whom they interact.

With the introduction of distance education and online communities, software for managing peer learning, and intelligent tutoring systems, "…information technology has begun to permeate peer learning" (Topping K. , 2005, p. 642). Research in higher education contexts shows that contributing to learning communities through social media tools such as collaborative editing is becoming "a 'new' learner-centered pedagogy" that promotes learner-driven content creation and collaborative knowledge building (McLoughlin & Lee, 2008).

Milne (2007) claims that from the ubiquity of social media, the Internet, and other technology developments has emerged an "interaction age" where collaboration is expected, and both formal and informal learning spaces must be designed to support these interactions. Such collaborative peer learning extends outside the classroom using ICTs to enhance dynamic peer-peer interactions in addition to peer-tutor interactions. These increased personal and virtual interactions can sustain and nurture a learning community (Nunes, McPherson, Firth, & Gilchrist, 2002).

Taking these prior research findings forward, the integration of social media and ICTs in a CIS Sandbox-sponsored Crunch Session prior to final exam week would contribute to refining our pedagogic possibilities and help sustain a collaborative learning community.

Given alternatives in peer tutoring techniques and approaches, and student desires to be active participants in their own learning, these questions emerged as part of this study to design, implement and evaluate a student-facilitated peer-learning session:

- Will attending a student-centered, peer-tutor facilitated Crunch Session help to prepare students for their final exam?
- How can the use of Internet-based collaboration tools create a virtual collaborative learning space to support an in-person peer-facilitated learning session?
- How will tutors and attendees react to such a student-centered, peer-facilitated learning session?

3. CREATING AN IT 101 CRUNCH SESSION IN THE CIS SANDBOX

IT 101 (Introduction to Information Technology and Computing Systems) is a first-year required course for all students at Bentley University, in Waltham, MA. The course introduces students to technology concepts such as using the World Wide Web, hardware and software, operating systems, storage, creating web pages, wireless networking, multimedia, and problem solving skills using Excel. Bentley University offered 14 sections of IT 101 during the Fall 2012 semester to approximately 691 students, as evidenced by the number of final exam scores on record.. This is the number of students for whom a final exam score is on record. In addition to specific assignments created by their instructors, students across all sections complete ten standard assignments during the semester and take a common final exam.

The CIS Sandbox is a computer lab aligned with an online presence. Prior research focused on its physical renovation and use of social media tools to create an open, social, and collaborative learning space (Frydenberg M. , Aligning Open, Physical, and Virtual Spaces in the CIS Sandbox, 2013). The facility features several collaborative work areas, a lounge area with soft seating for informal conversation, a wall-mounted Google TV and gaming equipment, an interactive whiteboard, a large projector to facilitate group-learning activities, and bright colors painted on the walls that create a warm atmosphere. This facility replaced a traditional computer lab, whose layout included dozens of computers flanked around the perimeter of a dark room in a basement corner of an academic classroom building (Frydenberg, 2013).

During a brainstorming conversation about ways the CIS Sandbox tutors might assist IT 101 students in their final exam preparation, one tutor proposed holding three one-hour long, back-to-back Crunch Sessions in the CIS Sandbox. Figure 1 shows a Crunch Session process in progress. Students gather at collaborative stations to view the student facilitator's screen also displayed on the interactive whiteboard, on each monitor in the room, and on some student laptops. The facilitators projected additional images, such as the Crunch Session logo, on the back wall, to create an immersive experience.
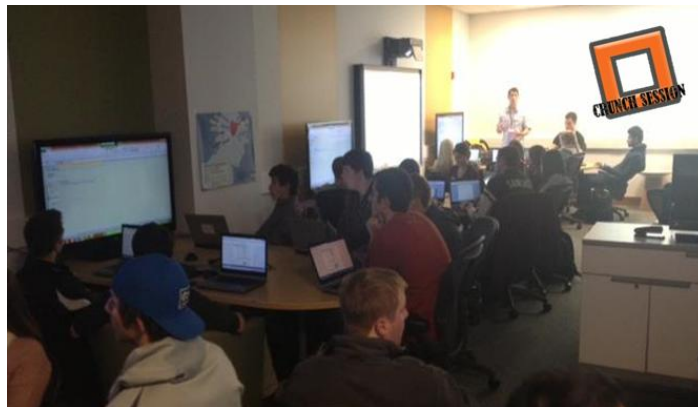

Figure 1. An IT 101 Crunch Session in progress.

In an interview after the Crunch Sessions took place, a student facilitator and organizer reflected on his pedagogic vision for this event that builds on the core tutoring services of the CIS Sandbox:

"A first for the CIS department, and most likely the university, this session would be run entirely by undergraduate tutors and graduate students in the CIS Sandbox. Students often came to us during the semester to explain concepts that they do not quite understand. We wanted to conduct our review session for the final exam the same way. We want the session to be entirely question driven and will advertise it as such. We will prepare a series of documents to reference when answering questions as well as a reserve bank of questions in case the session goes silent."

These sentiments form the basis of the first phase (needs analysis and goal-setting) of a three-phase model for designing, implementing, and evaluating a Crunch Session process as shown in Figure 2.
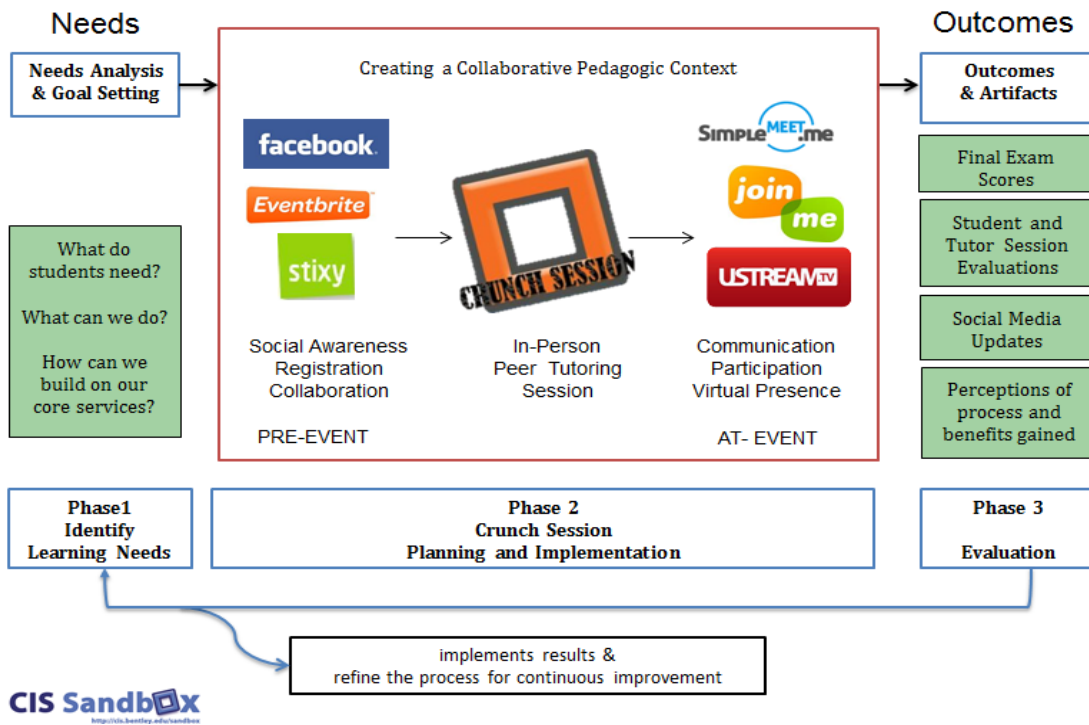
Figure 2. A Model for Planning Peer-Facilitated Crunch Sessions.

Because the tutors are students themselves, they know what types of review opportunities their peers will find most beneficial. Marketing and publicizing the sessions to generate interest was equally as important as planning their content. Promoting, facilitating, and supporting the Crunch Sessions relied on a variety of collaborative and social networking tools to engage students online and in person, before, during, and after the event. Phase 2 (planning and implementation) involved determining Internet-based collaborative and social media technologies that would raise social awareness about the event, allow students to register, and collaborate to create learning artifacts through the form of sharing questions, even before the event began. Phase 3 of the model urges students and their tutors to reflect on outcomes and artifacts of learning in order to determine the success of the Crunch Sessions. After the sessions, student tutors posted additional questions asked at the session, and photos of attendees on the CIS Sandbox blog and Facebook page.

The use of social media and Internet-based collaboration tools in peer learning situations can help to define social roles and procedures for creating and sharing knowledge. The use of social media technologies for peer tutoring extends Damon and Phelps 1980's observation that "such interactions encourage .... active involvement in reasoning, problem solving, and the social exchange of ideas" (Damon & Phelps, p. 17) into a context of socially connected networked learners. Prior to the event, student tutors promoted the event on the CIS Sandbox blog, and on Facebook. The blog linked to an events page on Facebook, where students could inform their peers that they were attending. Eventbrite, an event management service, allowed students to reigster, and managed a waiting list. The student organizers recognized the need for these sessions to be student-driven, and made these intentions clear on the Crunch Session Eventbrite page, shown in Figure 3(a), where they admonished their peers, "No Questions = Lame Session." When students registered, the Facebook and Eventbrite sites invited them to submit questions on Stixy. Stixy is a popular ICT for sharing documents, photos, links, and notes with a group. Students could review the Stixy board, see questions posted by their peers, add comments, or post their own questions anonymously before the session started. The online sticky board created a forum for students who might otherwise be intimidated about asking questions in person during the session. This also allowed the student facilitators to prepare to provide review materials related to these questions. Figure 3(b) shows a section of the Stixy board containing student questions.

Figure 3. (a) Eventbrite promotes the student-driven session and encourages students to submit questions.
(b) Students contribute questions on Stixy prior to the Crunch Sessions.

At the event, participants communicated with the student facilitators via simplemeet.me, a browser-based chat room. The student facilitators chose this tool because students can easily connect without needing to create an account on another messaging service. The student facilitators discussed having students submit questions and comments via Twitter using a common event hashtag, but were concerned that some of their peers might not have an account on that online social service.

To ensure that participants could see the presenter's screen throughout the session, the student organizers configured join.me, a free screen-sharing application, to share the presenter's screen on each of the large screen monitors, interactive whiteboards, and Google TV in the CIS Sandbox. They also provided the access code for students to be able to view the presenter's screen on their own laptops, tablets, and smart phones.

For the benefit of those who could not attend in person, one of the Crunch Sessions was recorded and streamed over the Internet using UStream.TV, a free web-based video streaming service.

4. PRELIMINARY FINDINGS

This section highlights preliminary findings from the evaluation, which offer an initial snapshot of the effectiveness of this approach. In reflecting on qualitative and quantitative data related to the IT 101 Crunch Sessions and CIS Sandbox usage during the fall 2012 semester, the discussion considers the following artifacts:

- a voluntary online survey, offered at the end of the semester, to all IT 101 students after completing their final exam
- attendance information obtained from student "swipe-ins" throughout the semester,
- interviews with students who attended the review sessions and tutors who planned them
- final exam grades from students in all sections of the course

This data offers a preliminary understanding of student experiences at the CIS Sandbox and during the Crunch Sessions. Students who visit the CIS Sandbox swipe in with their ID cards; 4082 swipes from 1415 unique visitors were recorded during the fall 2012 semester. Based on forms that tutors complete logging their tutoring activities, it was determined that approximately half of the tutoring that takes place is with first year students seeking assistance in their IT 101 classes.

4.1 Quantitative Reflection

The following discussion summarizes findings from student surveys. 302 IT 101 students (132 female, 170 male) completed an end-of-semester survey asking about their use of the CIS Sandbox during the Fall 2012 semester. Of those, 200 students came to the CIS Sandbox seeking help with IT 101. 82 students said they never went to the CIS Sandbox, citing the most common reason that "I didn't need help, I knew what I was doing" (61 students) or they got help from classmates or friends.

116 of the students who responded revealed that they sought help on their Excel exercises; 89 students sought tutoring on their web assignment. 120 students say they visit once or twice a semester; 56 students visit at least monthly; 18 students visit at least weekly.

Online registrations from Eventbrite showed that 120 students enrolled in IT 101 signed up to attend a Crunch Session in person. Usage stats showed that the video received 40 views. Of those who attended the Crunch Sessions, all students who responded to a survey strongly agreed that they attended because they thought doing so might help them get a better grade on the final exam. 83% said they brought their computers to work through the problems that the peer tutors presented.

A first examination of final exam scores of students who attended the Crunch Sessions compared to those who did not shows that students who attended had a slightly higher average and median score over those who did not attend. 75.68% of session attendees scored in the 80% to 100% grade range on the final exam, compared with 66.23% of those who did not attend, whose final exam scores were in that grade range. 67.25% of all students who took the exam scored 80% or higher. It is important to note this difference is not statistically significant for a variety of reasons: Students self-selected to attend or not to attend the Crunch Sessions based on their subjective perceptions of whether or not attending would be useful to them. Some did not attend because they felt they were good students and did not need additional help. Others who considered themselves "good" students may have chosen to attend for more social than academic reasons. Finally, the capacity of the physical space in the CIS Sandbox could not accommodate all students to attend in person, even if they wanted to, creating unequal review experiences for various groups.

4.2 Qualitative Reflection

Student tutors and student participants participated in interviews regarding their experiences as facilitators and attendees of the Crunch Sessions shortly after the sessions were held. One tutor described how he prepared to facilitate a Crunch Session, citing how he researched the most commonly asked questions from reports of peer tutoring sessions in the CIS Sandbox that tutors complete throughout the semester:

"In preparation for the session, we carefully observed trends in tutor reports that were submitted throughout the year to see what concepts most students were coming in for. In the case of Excel, we would start with explaining the concept of a VLookup function, which often was difficult for students to grasp. We reviewed the example that they were used to from their classroom experience and also created an entirely new example and walked through it until there were no more questions."

Rourke and Anderson (2002) have identified roles for establishing a teaching presence in peer-led online discussions, including instructional design, facilitating discourse, and direct instruction. Comments from a student facilitator sharing his sense of the room as the sessions began recognized these roles:

"The room was packed and it definitely had the feeling of an informal learning session. With the chat widget on the white board and not a professor in sight, students were relaxed and more prone to ask questions that they might have thought someone would ridicule them for in a classroom environment. Often times you could see students move forward in their seats during certain questions as if they were waiting for someone else to ask it, and not a single student snickered or laughed; there were no wrong questions here. Everyone was in the room to learn from students who were currently in the class or who had already taken the class.

The sessions all began awkwardly, with moments of silence. Because we were students ourselves we knew what it was like to be at a review session, not wanting to appear 'stupid' for asking a question that was probably covered in class... After the first example, however, students were much more apt to ask a question or look for a clarification. The remainder of the session ran quite smoothly until there were no more questions. Usually as time went on students became more focused and attentive. As students see the value that their tutors bring, they are much more likely to treat us as a resource as well as a peer, unlike

the student-professor relationship. Also, because there is the mentality that 'we're all in this together,' students felt like they were being fed secret details or inside information because they were learning from other students like themselves."

Finally, tutors reflected on how they might know if the sessions were successful: "We weren't looking to teach new concepts or to make students unlearn something and relearn it a different way. We were looking to clarify areas where students had a small gap in their knowledge, or needed something explained again. There were very few questions at the conclusion of the event. We saw students work through problems and obtain the correct answers. We were satisfied."

5. DISCUSSION AND NEXT STEPS

ICTs played a role in all aspects of the Crunch Sessions. The Crunch Sessions' success relied on motivated and tech-savvy tutors who were able to introduce the use of ICTs to facilitate interaction among participants before, during, and after the sessions.

Prior to the in-person session, students relied on social networking applications to get information and sign up. They prepared by taking online quizzes, reviewing resources on the CIS Sandbox blog, and submitting questions anonymously to an online sticky board.

During the sessions, to accommodate a large number of students in a small space, students entered their questions in the chat window as demos took place. Presenters returned to those questions to ensure they answered them adequately. The chat window served as a "parking space" for students to ask questions as they thought of them, without disrupting or interrupting the demonstration in progress. The use of web-based communication tools helped to create an in-person environment that was immersive, inviting, and conducive to learning.

After the sessions, a video posted online allowed students who wanted additional review, or who were unable to attend in person, the opportunity to learn at their own pace.

While designed for technology-based courses, the Crunch Session approach extends to other areas such as mathematics, where problem solving in small groups is beneficial. Screen sharing technology is beneficial in courses that rely on students gaining proficiency in software applications, while the use of chat, and ICTs for promoting the sessions and gathering questions ahead of time are applicable across several disciplines.

The success of the first IT 101 Crunch Session inspired other tutors to offer similar review sessions to their peers for additional courses in future semesters. After hearing about the sessions, CIS instructors weighed in on ways to improve them, and tutoring in general, in order to promote critical thinking and problem solving. One instructor commented on the potential value of frequent review sessions:

"I've heard about the IT101 review session and I'm very happy for student-led efforts in learning. We have to be careful though not to reduce it to 'here's how you do your next homework' type sessions. There are several practice problems that we do in class, sometimes quite a few students don't manage to finish those…What if the [tutors] ran regular sessions helping students either finish the practice problems from class, or even doing another practice problem?"

6. CONCLUSION

Students found the format, timing, and ICTs used in the Crunch Sessions to be helpful and engaging, and that the use of social media and Internet-based collaboration tools contributed to the learning experience. These students' remarks were typical: "the IT 101 Crunch Sessions really helped. I liked the idea of chatting, where people could ask questions to assistants." Said another student, "The review session was really helpful and went over the things I didn't know how to do."

The IT 101 Crunch Sessions met an identified student need, and aligned a three-phase participatory research process model with the goal of building a collaborative learning community in the CIS Sandbox by involving students as co-designers of pedagogic practices. Students worked to create a peer-facilitated learning environment that extends their roles as peer tutors. Based on these encouraging early results, it appears that the model works. Further research will be necessary to ascertain the impact of peer tutoring combined with the use of ICTs at future Crunch Sessions for information technology students.

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