CROWDCLASS: RESEARCH REPORT

Social Setting

Our team decided to observe four different UCSD classes and a seminar in order to gain insight on how students interact and collaborate with peers, the Professor and the Teaching Assistants before, during and after class. The classes that we observed were: COGS 230, COGS 107A ,VIS 152D Discussion, LTWR 100, Design @ Large/DSGN119. From observing these classes, we noticed that there are mainly two types of classrooms at UCSD:

1. Large Theater-Style Classroom

These are classes that take place in big lecture halls with more than 200+ students. Typically in these type of classes, the Professor stands at the front and gives the lecture to the class. There is little interaction amongst peers in this setting as most of the times, it is the Professor that does all the talking. The students in these lecture halls sit at desks facing the professor. With the way the desks are arranged, the students are able to interact only with other students that are sitting near them.

Figure 1. Peterson Hall

2. Small Discussion/Workshop Classroom

These classes take place in smaller rooms and are more intimate with fewer students. There are typically around 5-30 students in such classes. As the class size is much smaller than the lecture classes, there is more room for interaction amongst peers as well as with the Professor. In the picture below, the desks in the class are arranged so that everyone will be able to see each other. This type of arrangement facilitates interaction amongst peers and the Professor.

Figure 2. Cognitive Science Building 118

Field Research

When conducting interviews, we noticed that the experiences of the students heavily depended on the type of classroom setting they were in. Our interview questions mainly focused on:

- Finding out what platforms students used to collaborate with peers during/after class.
- Whether the students actively participated in the class discussion by asking questions
- Whether the students took notes during class and if they wrote down the questions they or another peer asked during class
- Their strategy for compiling information from lecture for a midterm/quiz
- Whether they had ever reached out to another peer who said something interesting during class. Whether students interact with peers outside the classroom environment to engage in conversations about the content taught in class.

a. Large Theater-Style Classroom

Many large lecture classes use Piazza - a platform where students can ask questions about class content. These lecture classes also use TritonEd, where students can post in the discussion forums about any questions they have about a topic. These platforms are mostly used by students before a quiz/midterm as that is the time when most students engage with the material that is being taught in the class.

The students we interviewed informed us that they were often hesitant to raise their hand to ask questions during class. They claimed that they did not want 'to waste' everyone else's time with their questions, or that they were too shy and uncomfortable to speak out in front of so many people. Furthermore, there was no incentive for students to ask questions in class as big lecture style classes seldom have grades for participation in class.

Students in big lecture classes typically take notes by either writing them down or by typing them onto a document. However, none of the students we interviewed would ever write down a question a peer asked during class.

Depending on their study style, students in these classes either collaborate with their friends that are taking the same class, or they study by themselves. In some classes, one student might email out a collaborative google doc where all the students can compile all important information for that class.

It is quite difficult for students in big lecture classes to reach out to another peer, especially if they do not know their name. Only two of the students we interviewed actually met

up with peers outside the classroom environment to engage in conversations about content. They claimed they only did so if there was a project or an upcoming midterm.

b. Small Discussion/Workshop Classroom

In smaller discussion/workshop style classes, the students we interviewed said if needed for the class, they interacted with their peers via email or exchanged phone numbers with peers.

In many of these smaller classes, participation in class is a factor for the student's overall grade. As a result, students are more likely to ask questions during class in order to get a good grade for participation. The students we interviewed mentioned that they were more comfortable asking questions in a smaller class.

Many of these smaller classes do not have midterms/quizzes. Most of them focus on group projects or a written assignment. As a result, many students do not take notes. The students who take notes mentioned they do not take detailed notes as they know they won't be tested on the material for a midterm.

In smaller classes, students are able to recognize the faces and sometimes even the names of all of the other students in the class. The students we interviewed mentioned they were more likely to interact with peers in a smaller class, than with students in a bigger lecture class.

Opportunity & Importance

After observing two different classroom environments, big and small, we identified several key elements that students need to improve their experience. In big theater style lecture halls, the biggest hurdles to student participation during class was embarrassment to ask questions in class because of fear of wasting others' time. Additionally, large classroom classes often have exams, which we have found put students in a different mindset regarding the importance of taking notes and maintaining fluidity throughout the whole quarter.

In smaller, discussion based classes, students are engaged during the course in inspirational content and are coming up with lots of new ideas and questions. They often take notes haphazardly and lose their notes later. Students in smaller classes need a way to record their contributions automatically while they are talking in discussion. They often don't write down others' ideas due to inconvenience or speed, and thus lose the inspiration over time. We have observed that it is not common for people to follow up on past activity in the commonly used platform Piazza. Additionally, even in small discussions, it may be difficult to learn everybody's names and create lasting social ties with potential collaborators. Notably, across both groups, students report frustration with having to have multiple platforms to collaborate on class assignments and to get in touch with classmates. Nobody we interviewed reported their personal hacks or workarounds, suggesting that most students don't know about the advanced features of their commonly used platforms.

Although we explored both environments, for our project we are focusing on the small class setting. Thus, our challenge is: how can we design a collaborative, socially translucent, communication environment that facilitates both sharing of information and starting of social relationships during small classroom discussion based classes. This is important because if students in a class can collaboratively communicate on a digital artifact synchronously when they are co-located in the classroom, they may have more incentive to follow up on the ideas their friends generate in class. Additionally, as we have learned from Erickson & Kellogg (2000), if we are able to create a socially translucent environment, we can establish more trust between classmates and facilitate organic social processes in a digital environment. By

facilitating peer to peer interactions and also peer to group interactions, we hope to create better social relationships between students, a more collaborative academic environment, and more engagement in classes.

Competitive Analysis & Uniqueness

In order to solve the challenge above, our team would like to create a collaborative platform, **CrowdClass**. There are four current platforms that are related to our idea, including Piazza, Google Classroom, Quizlet, and PeerStudio.

Piazza is a collaborative question and answer web platform. Students can ask, answer, and explore questions and post notes at any time under the guidance of their instructors. Piazza allows students to ask or answer questions anonymously and their identities can only be viewed by instructors or no one. Even though shy people are more willing to ask questions under such circumstance, the communication among students is hindered because the connection is broken due to the anonymity. In contrast to Piazza, CrowdClass allows students to see each other's name in order to facilitate socialization. If students are interested in the questions from other students, they can chat with them by clicking their profile to get their contact information. In addition, for Piazza, each answer have a version history that shows what each user wrote. However, it does not show which exact part the student has changed. If students edit the answers by mistake, Piazza does not be able to reverse the results. At the same time, if multiple students edit one answer, it is hard to know which student edit which part. To avoid such kinds of problem, CrowdClass has version control that allows users to not only restore the previous version with a simple click but also learn the source of the contribution in detail.

Google Classroom is a collaborative web service for schools that aims to simplify creating, distributing and grading assignments. The primary purpose is to streamline the process of sharing files between teachers and students. One problem for the Google Classroom comes from the interface. It contains many functions and steps but the interface design is complex so that students find it hard to use and navigate among pages. If students would like to use it during the class, the complex interface will take them much time and efforts. In contrary, CrowdClass includes all the sections (discussion before class, in class, and after class) in one place. Students can locate desire information in a short time without navigating among pages.

Quizlet is a mobile and web study application, which trains students via flashcards and various games and tests. Students can create flashcards, games or tests about education content to facilitate learning and share them to the public. The communication on Quizlet is primary in one direction because students perceive concepts, definition and explanations but they do not have a place to ask questions and get answers. Discussion is missing in the Quizlet community. Unlike Quizlet, CrowdClass allows students to not only learn about the interpretation of their confusing terms but also be able to raise individualized questions regarding to those information and get answers from their peers or instructors. Therefore, Quizlet helps students get basic understanding of education concepts while CrowdClass encourages students to explore the topics they are interested in depth by discussing them with others.

PeerStudio is a collaborative platform that makes it easy for students in a class to give each other feedback on assignments. It is designed so students get feedback that is fast and helpful for revision. When students have done their works, they can turn in to the platform and have them assessed by peers. However, the feedback from the peer is only shared between the writer and the evaluator. The invisibility lowers the efficiency of education because some problems might occur in other students' assignments and some pieces of feedback are valuable

for them to correct their errors. To improve the efficiency of instruction, problems and answers on CrowdClass are visible to all users to help them get insights and various contributions.

In addition, CrowdClass leaves the traces that exist in physical world to facilitate social translucence. For example, it uses cursor location to reveal the location of the user and uses voice recording to reveal the identity of questioner and answerer. Additionally, students can have peer to peer interaction by adding comments and tagging others' gtags. For differentiation, each member in the community has its unique color representation, including all the instructors, teaching assistants, and students.

Prototype Blueprint

To test our solution and attempt to solve our problem statement we need to build a minimal viable prototype which allows students to communicate and answer questions synchronously during class and asynchronously before or after class. We believe that modifying a Google Doc page would be an effective way to prototype and test our solution. We would create Google Doc pages for the entire class and for each section within the class (this would be used likely for larger lecture style classes). Then we would assign each student/teacher a color and ask them to type out their notes/questions/answers in that color. Over the course of the class we believe that this page can become a living document that students can use to reinforce information and review before exams. On top of this document we believe we can introduce a few interesting features which will further help students learn the material and prepare for tests. One complaint we heard about Piazza and other collaborative sites was that it often took to long to ask or answer questions. However, on our platform we would request that users press - command shift S - to activate the voice talk command on Google Doc. This would allow users to speak to ask/answer questions thus removing one major barrier to interclass communication. Next we are also looking into a way to format the document so that questions relating to a certain topic would be grouped together. This categorization would allow TA's with expertise in that topic area to easily answer questions during class. Overall, with the color coded formating, voice talk feature and category based questions we believe that we will be able to build and successfully/thoroughly test our prototype.

Evaluation Guidelines

In order to justify if our new social experience is a viable solution for our problem statement, we will be comparing our prototype with different sources. Mainly from current academic discussion on collaborative spaces, definitions of success, and different methods of prototyping along with the feedback we receive from our participants to gauge user participation, satisfaction, and the prototype's potential growth. We also plan to track user entries and their uniqueness in the shared document. Thus, we will also take that in consideration when evaluating the statistical probability that our work is significant. The key questions we seek to answer are:

- Will students contribute to an open note taking platform?
- Will other students respond to posted questions?
    - Will they respond synchronously or asynchronously?
    - Will they follow up on responses over time?
- Will students come back to the document after class other than to answer questions?
- Will students use audio functionality?
- Within the survey we will ask:

- Other than your close friends (known before this class), how many new names did you know? (You may reference the document)
- Did you follow up with anyone offline?