CS 6750: Human-Computer Interaction
Georgia Tech College of Computing
Project

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***Abstract*—In OMSCS and other online education programs, the only form of communication among students is via forums or emails. This paper describes how a personalized study room can make these programs more interactive by having virtual group study sessions provided by Ed Study Groups, an extension of Ed Discussion and provide a social learning environment for students to help keep each other motivated by using different learning methods. It also comes with a Connect feature that allows a student to connect with a study partner from the same course or university.**

1 INTRODUCTION

Currently, the few study groups that exist are unofficial and not suitable for official education programs like OMSCS. These study groups exist as Discord servers or student communities on Reddit that make Zoom Links for group study. A large community with over 1 million students called Study Together (Appendix 9.1) is a website allows a user to join existing study sessions or create a new one. These study sessions can use different learning methods like Feynman Technique or Pomodoro Technique. Students can simultaneously take breaks and update their progress.

Students on this website can choose to keep their video call on or screenshare. They can have their own aesthetic background and Lofi music and practice mindfulness during study breaks. For the same, a section of mindful exercise have already been provided. There is also a solo study room. As soon as you join it, a timer for 50 minutes starts. This is based on the Pomodoro Technique, a technique where one studies for 25-5 or 50-10, that is, 25 minutes of studying and 5-minute break, or 50 minutes of studying and 10-minute break. One session is called a pom.

There are also studying rooms where you can use your mic. This is to use the Feynman technique, a technique where you understand more by explaining a topic you learnt to someone else.

The website records your daily hours of study and helps you unlock different levels with higher productivity. These levels are used to motivate a user to come back to the study room and achieve their goals. The website also offers different chat options for different subjects along with chat sections for motivational and inspiring speeches.

While giving peer feedback on assignment P5 in the HCI class, the question about the OMSCS prompt asked to list the negative repercussions of the program, and two peers stated that the program can be lonely sometimes. Many students learning online are also working full-time. Studying on the weekends affects their social life. When you see your peers studying in the same program, it makes studying more interactive.

Ed Discussion is a platform for university students to ask questions about the course curriculum or doubts regarding a certain topic. This platform can be authenticated by all universities for each class. Similarly, this paper suggests a redesign of the Study Together website called Ed Study Groups, a platform for virtual classrooms and personalized study groups. Students can share screen what they are studying and have synchronized timers. There can be different rooms for video lectures based on different time zones. Students can join these rooms and watch video lectures for that week with their peers according to the time that fits them. There can also be a virtual room for weekly group discussions or activities for students. Every student's profile information can display the courses they completed, their specializations, and the year they are planning to graduate. This way you can even meet the peers you have been studying with on graduation day.

2 INITIAL NEEDFINDING

2.1 Interview

I interviewed my online study friend with whom I have been studying since 2020

Her name is Caitlyn, and she is from Poland. We used to study using the Pomodoro Technique and do 50-10 poms and study for hours at a stretch. The interview questions I asked are provided in the Appendix 9.2.

I asked her questions about her motivation to join the study group and being consistent for two years. Her initial reason to join the group was because she was very determined to not let her grades get affected during the pandemic and since her friends were not as motivated as her, she wanted friends who were. She said that it helped her maintain consistency in her exam preparation, that she made sure to show up every day. It was similar to showing up for class lectures, only this is what you do more voluntarily since there is no attendance required but you do it for your personal growth. For her it was a platform full of positivity and with a mindset of growing and becoming more productive.

She agrees that the group would not have been well-maintained if there were no moderators taking care of reported profiles. She liked the fact that everybody was anonymous because it led to people being more expressive. She mentions that it also prevents stalking someone on Linkedin or Instagram, which she would be inclined to do out of curiosity if she knew her friends' real names. We added each other on Instagram after almost a year of studying together.

She says that sometimes studying in virtual classrooms can be distracting, especially if somebody is not motivated and vents a lot. In this case, she offers them inspiration and kindness the same way she receives from the seniors in the group.

When asked if she likes solo studying compared to one-on-one and group studying, she says that she likes to study solo by herself for the topics she is really interested in. Sometimes when she has a lot of reading to do, the process becomes slow and using timed sessions helps her read faster and continuously recall what she has read in every break. This helps her retain the things she has read, and she definitely would have not been so productive setting timers all by herself. As for one-on-one studying, it fits with her friends but almost all of them live in different time zones, so it clashes almost always. She finds one-on-one learning the best before exams. This also includes using the Feynman Technique to discuss last minute topics before exams.

When asked if the age criteria matters when studying with someone, she said it doesn't. She points out that the few school kids in the group are the most enthusiasm to talk to as they have interesting things to share during study breaks. Even professionals working full-time join the group on weekends when they are doing an online course.

I suggested the idea of Ed Study Groups and she said it would be a great idea. She suggested that when finding a study partner, it should not only be from the same course but also from the same university. This way students can meet new people. She also suggested that I design a class wise study group to imitate the classroom model of having a particular class in a specific classroom.

To summarize the interview, people from all age groups have benefitted from study groups as it provides consistency and a positive social environment. Anonymity proves to be a great factor; however, a supervision is required if users are supposed to remain anonymous. It proves to be a safe way at hiding privacy but at the same time might be a cause of concern because user also does not know the other user. It has its advantages and disadvantages. It is also helpful during last minute study before exams. Studying using different learning techniques has proved to be helpful. Last-minute study sessions with a friend before an exam proves to be very helpful. Time zone clashes can be avoided by adjusting to a set-time or finding more friends from the same time zone. It provides motivation and seeing other people working towards their goals makes the user also work towards their goals. A positive and friendly environment leads to a better student life.

The bias realized was that many users avoid using such groups because everybody remains anonymous, and it can lead to privacy concerns when switching on video camera. Therefore, there is a need for admins, moderators, and supervisors.

2.2 Evaluation of existing user interfaces

Currently, there are four existing applications through which OMSCS students communicate among themselves, Ed Discussions (official), Slack (official yet unofficial), Reddit (unofficial), and Discord (unofficial). Official here means authenticated with university.

Slack is considered unofficial as students interact among themselves but the option for video conferencing requires a paid subscription. Even after subscribing to a premium plan, only 14 people can join. Slack allows an access to messages that are a week old. To view messages before 7 days again requires a paid plan. Due to a better interface and the additional features of getting on a free call for group discussion, many students form a Discord group. However, this is an unofficial group and students mainly use this to talk among themselves regarding the coursework. Since it is not official, very few students use it.

Many students use Reddit and the biggest feature of it is anonymity. Students ask reviews and give reviews without any bias. For the same, many students connect via Reddit even though they don't really know each other in real lives. However, this interface only serves as a medium to ask questions to senior students about the courses they have taken and their guidance on it.

The Study Together website has some of the best features, but due to its poor design and lack in affiliated collaboration with universities, it does not serve as the ultimate user experience for virtual classrooms.

Ed Discussion is a tool used by many universities and it has proven to be a successful feature to ask doubts and reach the professor or TA through a private post. It serves to be a great platform for discussing doubts related to coursework or a certain topic. The only tedious thing about is that there can be long threads and it can be very time consuming to read all to just have one small doubt solved. Students studying on-campus usually have these doubts solved by just talking to a friend. However, since many people have no friends in OMSCS, sometimes it becomes difficult to ask for even the smallest help.

To summarize the evaluation of different existing user interfaces for group studying, many people study with their class friends online on Zoom, Discord, Google Meet, Whatsapp, etc. However, there seems to be a need of a platform that supported this for all students as it has a lot of advantages. There is no platform that serves to be a replica of a classroom. A virtual classroom where students study and also be able to see their friends study. The only time this happens is during Office Hours. Instead of using a third-party software like Teams or BlueJeans or Zoom to conduct office hours, all universities can have their personalized version of a virtual classroom. If an impromptu meeting is planned, there is no need to create a link and share it with students. The way it

is done in a university, the same students can just be asked to join the professor or TA in the classroom, only this classroom is virtual. The way a teacher uses whiteboard and shares notes, the same way the questions asked, and the white board drawings can be saved in the chat, which students can always access later. Currently, for each office hours, a different script has to be downloaded. This can be eliminated.

The bias here is that many people have found their own small way of studying with friends; therefore, they do not see the need and how this could be an official platform. Users are used to video calling their friends and having study discussions instead of realizing the need of a platform of its own.

2.3 Data Inventory

The users are students from university from all levels – undergraduate, graduate, PhD. The environment from where students use virtual classrooms could be from anywhere, from a garden, home, beach, etc. You can join a classroom where all users have their mic suppressed, that is they will always stay on mute. The priority for users is to have a good user experience of a virtual classroom and at the same time not being a victim of bullying, harassment, or plagiarism. The user's goal is to study with friends the way they do in a real classroom. The task is that in the process of being a part of a virtual classroom, users are continuously using their cognitive skills to study, read, and communicate with friends. The subtask is to acknowledge all users in the virtual classroom and make them feel welcomed.

3 HEURISTIC EVALUATION

Study Together is a website that allows people to create personalized virtual study rooms to achieve their goals. The website says it has students from all over the world including ivy league universities. Although 1 million users (Appendix 9.3) have signed up for this website, only about an average of 500 students study here daily. The data shows that 39050 people are currently online, however, people actively studying are only 401 (Appendix 9.4). Only 0.05% of the users make use of this feature (500 x 100/1 million).

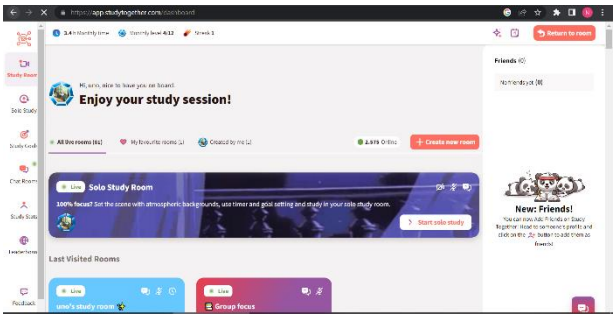


Figure 3.1 Dashboard of Study Together Website

Unit 2.1.5 mentions that the two main goals of HCI are usefulness and usability. The professor mentions that if people would have focused on designing a better map, they wouldn't have ended up with a navigation app. In the same way, instead of spending a lot of time and money in forming classrooms, more thinking should be done in designing virtual classrooms and study spaces. Even though Study Together is useful, a 0.05 percentage of active users shows it has very less usability. With better design and clarity, it is possible to offload a lot of the cognition load of classrooms onto the interface, closing the loop between the student and the task of studying in a classroom.

One of the main cognitions that takes place in classrooms is visual perception. Seeing people around you studying gives you a sense of belonging. The reason to keep video cameras on is because when you see people doing their work around you, you automatically are motivated to do your work too. If we take the processor or predictor view of the user, they will just be able to physically use the system and know how to use it. A participant view shows how students and virtual classrooms fit practically in the real world.

As explained in the lectures (2.1.2), Nest is a good example because it automatically adjusts the temperature based on your preferences. It understands the user and adapts accordingly. The website, however, lacks a participant view. It gathers so much data of students' studying patterns and habits but fails to provide a suggestion to study in a group with students who have similar interests and study goals to increase productivity. For example, it could segregate students based on computer science and form a group and suggest the user to study with people who are also in the same field.

The website does not have a sign-up option. It directly has a sign in option through third party apps using Google, Discord, Facebook, Twitter, and Unidays (Appendix 9.5). This is a good design principle as it does not require one to enter a new password, check if it fits the password constraint, and then have a

confirmation link sent to the email to verify your account. However, once you sign-in and are landed on the dashboard, you realize there is no profile settings option. Generally, the settings option provides features to change your display picture, language, appearance (dark/light), log out option, name, etc. This increases the gulf of execution to a huge extent. If I want to change my name or profile picture, I have to go all the way back to the third-party app I used to login into my account. For example, if I used the Discord Sign In option, I have to go back to Discord application and change my profile picture and name. This is a major inconvenience. Another huge gulf of execution is there is no log-out option. The site will always keep you logged-in unless you delete the history of the browser.

The principle of consistency is not followed when it comes to switching the interface. If I use the Discord application, I have the option of changing my username within the server, but no such option is provided on the website.

The principle of discoverability is followed by highlighting all the major buttons in the same color – orangish red (Appendix 9.6). These major buttons are related to the study groups you want to join and whether you want to create a new room or return to the last accessed room. The design principle of flexibility is followed by allowing two ways to access the chats with your friends, one is through the left side on the navigation bar and the other is by providing a chat box at the bottom right of the screen. However, for a new user, this can be initially misleading as generally, in accordance with the principle of consistency, a chat box at the bottom right of the screen relates to a chatbot for Q and A. There is no option to minimize this chat box since no settings exist anywhere on the website. This shows that even though the user can personalize their study rooms, they cannot personalize how they arrange their home screen.

Another error in following the consistency design principle is not providing the three lines for navigation bar at the top left corner to minimize it (Appendix 9.7). The navigation bar always remain fixed and its cannot even be adjusted. This affects the simplicity of the dashboard as everything appears too cluttered.

Mapping is efficiently used to convey information about the study groups. Every study group has small icons in the top right corner to show its requirements (Appendix 9.8). For example, if one group has a requirement of keeping video camera on and using timers, it shows the icons video and timers. If the group

allows chatting and keeping mic on, it shows the chat and mic icons. If the mic is supposed to stay off, it shows a muted mic icon.

The website follows the design of perceptibility and to some extent the principle of documentation by providing a feature guide for new users. As soon as a new user registers, they are provided with a guide that highlights a feature and displays information about it (Appendix 9.9). The principle of perceptibility states that user should be informed at all times and receive immediate feedback. The step-by-step guide keeps the user informed about the different features by providing helpful guidance. However, the drawback to this feature is that the guide has eight steps and a 'Next' button attached to it. It is continuous and only once you complete clicking 'Next' eight times can you start exploring the website on your own. Users generally like to explore a new interface on their own and require guidance when they get stuck. However, there is no option to go back and review this set up guide. This again increases the gulf of execution as the user might have to try out different things to achieve their goal or Google about it, even though initially they were provided guidance about the same feature. This also show that the design is not invisible, that is, it does not naturally teach the user how to use it, not through the set-up guide nor features that explain their functions unless used a few times, by which case it becomes invisible by learning.

The website follows the principle of equity by providing a studying atmosphere for both novice as well as experienced users. When a user creates a new study room, they are provided samples of aesthetic background images and music along with videos on mindful exercises. It is a good start for a novice user who did not know where to find good instrumental study music. An experienced user can add their own music and background images.

The dashboard consists of all the live rooms active, which generally range from 80 to 00 (Appendix 9.10). There is no search bar given to browse a study group, one has to manually scroll down and scan all the study rooms.

Another bad design is that when you join a solo study room, the timer starts as soon as you join it. The user should be given time to set up their goals and adjust their surroundings and be able to manually start the timer.

The website follows the principle of affordance by changing the cursor from the click shape to hand shape when hovering over a section that takes the user to another section. For example, when the user hovers over the sections Monthly Time, Monthly Level, and Streak, the cursor changes its shapes and provides a small note of information below it. The user can determine there is more to this and automatically knows that they should select it. However, the same principle is violated when you scroll down below and hover over a profile who created a study group. When you select their display picture, it provides a small note on who created it (Appendix 9.11). Even though the cursor does not change its shape, the user initially still clicks on it to know more about the user. This is also considered a design slip, since the user feels it is the right thing to do to know more about the user only to find out it isn't.

Virtual classrooms should be close to the mental representation of an actual classroom. A mental representation of a classroom is where students study together, help each other when they get stuck, have discussions related and not related to coursework, make friends, stress over exam deadlines, etc. The Study Together website provides most of these features. It provides a communication platform with different conversation channels related to motivation, study inspiration, healthy food, help and discussions in several subjects of all levels from pre-graduate to post graduate courses, aesthetic study designs to create a studying environment, etc. Thus, it provides a great user experience for studying and makes excellent use of social cognition by providing a studious social environment.

Apart from the good and bad design characteristics stated above, a key factor missing in this mental model is studying with people from your own class and college. The website connects people from all over the world, but it misses out the factor of constructing a classroom with known people. This is where the expert blind spot occurs. Even though students from a course can individually sign up and create their own study group and send invite links to their peers, this has to be done for every single course. Moreover, it can raise concerns like bullying and sharing answers since users are anonymous and it would take university moderators a lot of time to go into the depth of the matter if such an issue occurs.

To summarize the heuristic evaluation, the good design principles including ease of access, discoverability, mapping, flexibility, perceptibility, affordance, and equity along with the cognition of visual perception and social cognition are explained. Some of these design principles prove to be counter-intuitive and are violated in some way in another part of the website. The principle of consistency is not followed in more than one area and design slip and expert blind spot are explained. This provides a huge gulf of execution and proves how the application lacks a participant view and even though the website is useful, it lacks usability.

4 INTERFACE REDESIGN

I have used the card-based prototype to redesign the Study Together website. These have been designed using Figma. To access them, the link has been provided in Appendix 9.12. The solutions this prototype addresses are:

(i) Authentication to university to increase usability and preventing issues like bullying and sharing exam answers,

(ii) Increasing social cognition by studying with friends from the same course and university

(iii) Maintaining consistency in design features by building a smartphone prototype app for the website

(iv) Allowing students to customize their profiles and have personalized study rooms (Study Together website allowed personalized rooms but not customized profiles while the Study Together Discord Server allowed customized profiles but not personalized study rooms)

(v) A connect feature to immediately connect with someone to study with

(vi) A separate chat interface to talk to friends

(vii) If a user allows profile information to be visible, you can learn about the other user by seeing their specialization, courses completed, and expected graduation date (Profile information could be seen on the Study Together Discord Server but not on the Study Together website)

(viii) An additional feature to Ed Discussion and a design similar to it so that it is more intuitive and invisible for users to quickly learn

(ix) An in-built internal transition feature to switch to Ed Discussion to access recently asked questions instead of using another app or website

(x) Office hours can take place on Ed Study Groups, eliminating the need to download separate .txt files as chat history will be saved

The following are the 8 screens of the prototype.

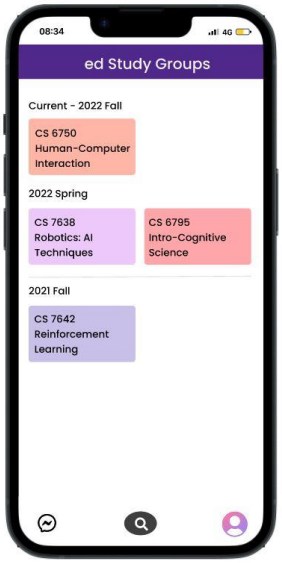


Fig 4.1 Dashboard

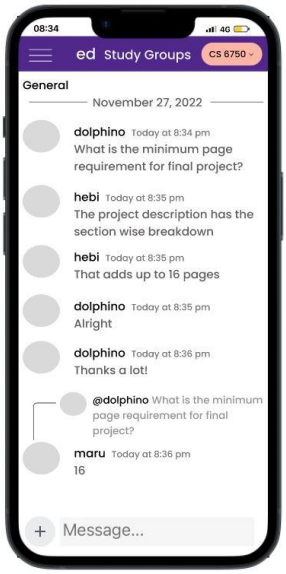


Fig 4.2 CS 6750 Class

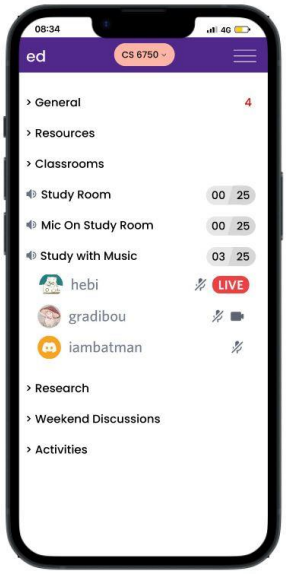
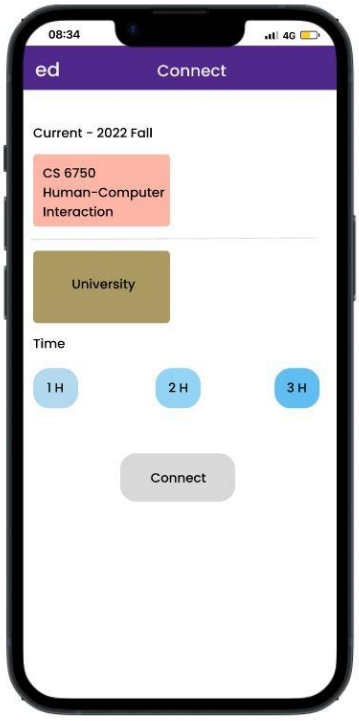
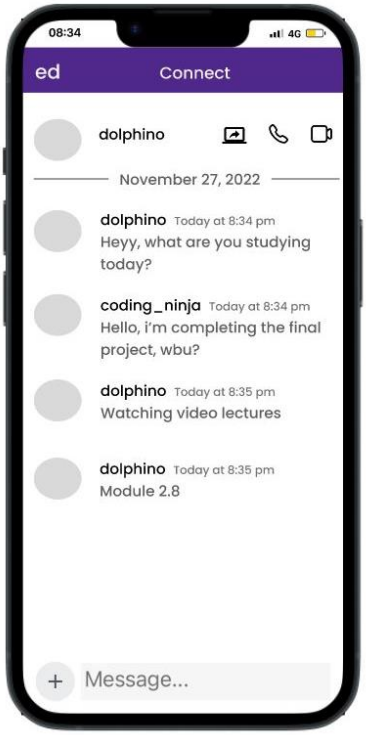


Fig 4.3 Navigation Bar





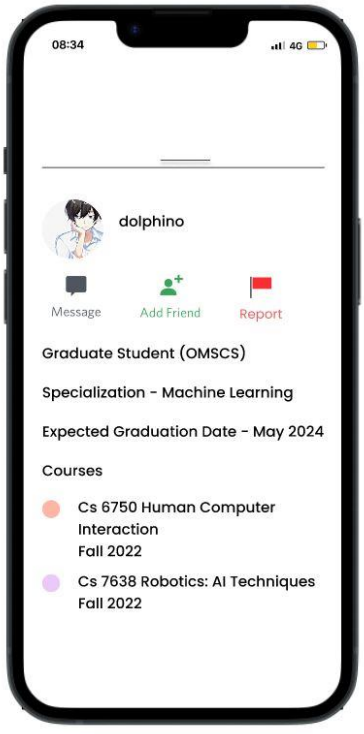
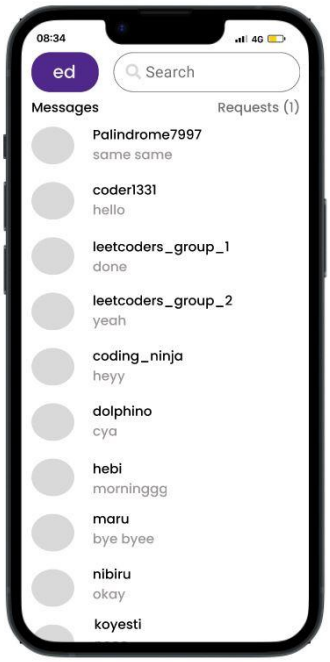


Fig 4.4 Connect feature

Fig 4.5 Connected with someone from CS 6750

Fig 4.6 Profile Information



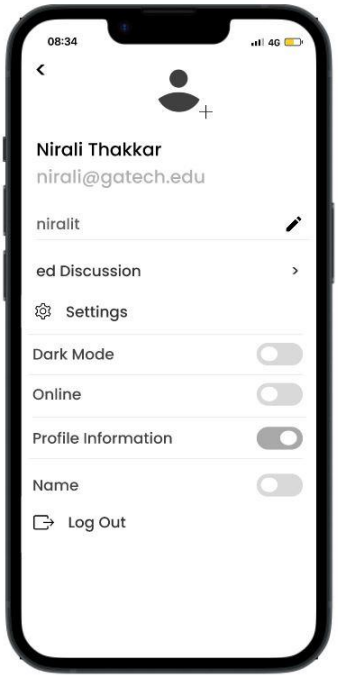


Fig 4.7 Chat Screen

Fig 4.8 Profile Settings

5 INTERFACE JUSTIFICATION

5.1 Justification: Redesign and Resolving Weaknesses

The redesign shows a prototype of a smartphone app. It provides many solutions to the principles it violated which were mentioned in the heuristic evaluation.

The first redesign is providing a smooth interface to switch from one study room to another without having to visit the home page/dashboard again. The Study Together requires the user to exit a group, which takes you to the home page, and then selecting a group from there to join again. This adds additional steps. Along with that, there was no search button or categorization to find a study group you are interested in. For the same, the dashboard of Ed Study Groups has a section to show different courses from different semesters. This follows the principle of structure. When you visit your college portal or when you see the

Ed Discussion Dashboard, they follow a structure by showing you courses from different semesters in descending order (current to when you started). The same way, the courses are listed in a descending order for easier navigation, unlike the trouble caused in the Study Together website.

The second design principle used is affordance. The principle of affordance (Fig 4.2 and 4.3) is used to show the course number along with a drop-down arrow. The user easily understands that this refers to the different courses and can easily select from the drop-down menu. This provides simplicity and avoids the user having to go back to the homepage/dashboard to select another course. The principle of affordance as well as consistency is also used to show the navigation bar with three lines at the top left corner (Fig 4.2 and 4.3). In the Study Together website, this feature was missing. A navigation bar is a consistent design as all websites and applications use it to show a menu that can be minimized.

The third principle is also affordance. Unlike the Study Together design where you cannot view the profile information of another user, in this case you can. It shows a pop-up feature and displays information about the user (Figure 4.6). You do not have to go to another screen and return again. You can view another user's information by staying on the same screen. Figure 4.6 shows a line and a shadow just above the profile information of the user dolphino, which indicates it is a screen that can be swiped down after viewing.

The main weakness of the Study Together website was that it did not accommodate students from the same course and university to provide a better user experience and increase usability. To eliminate this weakness, the sign-in option of the Study Together website has been redesigned to authenticate with university credentials.

Ed Study Groups is officially authenticated with the university. This reduces the expert blind spot mentioned in the heuristic evaluation, that authentication makes it easier for students to study online together. Even though a user can have a customized profile with an avatar as a display picture and a different username such as coding_ninja, it still is affiliated with the university and serious action can be taken if the person is reported. The profile settings (Figure 4.8) shows settings to change username, show profile information, switch to Ed Discussion, show name, and show online status. If the profile information is enabled, it shows a profile as shown in Figure 4.6. It shows the program you are

enrolled in, what level of student you are (graduate, undergraduate, Phd), and the courses you have taken in different semesters. It also displays your graduation date. This is an important feature for OMSCS students as they can get to meet their friends on graduation day.

5.2 Preserving Strengths and Improvement Principles

The redesign maintains the important factors of cognition such as visual perception and social cognition. Students can share their computer screen or keep their video camera on by showing themselves or their study desks. The prototype of the navigation bar (Fig 4.3) shows 9 different sections – General, Resources, Classrooms, Study Room, Mic On Study Room, Study With Music, Research, Weekend Discussions, Activities.

The General section chat screen is shown in Fig 4.2. Students are discussing with each other about the minimum page requirement of the final project for class CS 6750. It shows that the discussion is general. Resources section shows important resources for this class. Classrooms is for discussing doubts related to a topic and live streaming video lectures the same way you do in a classroom. Study Room is for students who want to study individually but at the same time have people around them studying to give a feel of a social environment. Once they join the call with a limited number of 25 participants, they can enable the chat screen associated with the call too. Students can be studying different topics of the same course and at the same time have someone to talk to. The limited number of participants can be changed by the admin (TA). Similarly, Mic On Group Study rooms can allow people to talk for discussions or to use the Feynman Studying Technique and explain in short what they have studied. Study with music room is where students can listen to music together and complete their assignments. Research section provides helpful research papers or tips for students interested in research and can also find a friend to collaborate on a side project. Weekend Discussions is to discuss anything related to or not related to the course. Activities is having movie nights and watching tech documentaries or playing games. Thus, the mental model of the classroom is preserved.

The Connect feature showed in Figure 4.4 helps you connect with someone the same way you would approach someone to study with in a live classroom. It provides an option of selecting someone from your current course or from the university along with the number of hours you want to study – 1, 2, or 3 hours.

Based on that, you connect with someone and can set a timer or use the Pomodoro Technique to study with them. Figure 4.5 shows how the screen will look when you connect with someone. The Study Together website records the number of hours a student has studied. However, it does not provide any suggestions for a user to study with similar motivated friends or does not provide a group which you can join where people have similar interests. This Connect feature provides a way to interact with someone with similar interests and therefore, provides an overall participant model view for the user.

Figure 4.5 shows the screen where user has connected with a study friend. Next to the user, you can see the icons to screen share, phone call, and video call. Thus, the principle of mapping has been preserved the same way it was used to show study group requirements on the Study Together website, as mentioned in the heuristic evaluation. Similarly, mapping is used in Fig. 4.3 to show the three users in the Study with Music group that one is 'LIVE' and sharing their screen, the other one has video call, and third user is just on call. For all three users you can also see their mic is on mute.

An improvement to the website design is that consistency has been maintained throughout the prototype by using the same color schema. The color used for CS 6750 in Figure 4.1 is the same to show the course number in Figure 4.2 and Figure 4.3. Similarly, in Figure 4.4, the connect feature shows the current course and again the same color has been used. In the same way, the color code for Georgia Tech is a color similar to olive green. You see the same color when you use Canvas to sign-in. If you use Canvas to sign in as a Stanford student, the dashboard will be red in color. Therefore, to maintain the color of the university, in Figure 4.4, university has been placed in a box with a color that represents Georgia Tech. The canvas image to show the color representing Georgia Tech has been referenced in Appendix 9.13.

Another improvement feature is that since Ed Study Groups is designed to be an extension of Ed Discussion, there should be a way to connect directly with Ed Discussion. This in-built feature is provided in the account settings shown in Figure 4.8. It follows the principle of flexibility allowing users to directly access the forum from the Study Groups. Since Ed Discussion is an official forum to discuss doubts and contact the TA and professor regarding grading, it will have different settings from Ed Discussion where customized profile will be disabled.

Another improvement feature is that Office hours can take place on Ed Study Groups, eliminating the need to download separate .txt files as chat history will be saved. Canvas has a section for Media Gallery where it saves all the office hours. When someone wants to review the questions asked during the call, they have to download the .txt file for all the office hours. However, Study Groups provides an interface where one can scroll back through the chat and review the questions.

To summarize interface justification, the design principles structure, affordance, consistency, and flexibility were used to redesign the Study Together website. To provide authentication and integrity, the sign-in option was redesigned to be authenticated with university credentials and the expert blind spot was eliminated. The mental model of classrooms along with cognition of visual perception and social cognition was preserved and a new feature called Connect is used to provide a participant model view to the user.

6 EVALUATION PLAN

I will be conducting qualitative evaluation through a survey. My prototype is card-based, and I will be adding the prototype screenshots in the survey for the user to interpret the interface. The survey will be conducted by creating the form on http://peersurvey.cc.gatech.edu. I have chosen qualitative evaluation because a new feature called Connect is added to the prototype that helps you connect with friends to study with. It adds a new mode for interaction and a qualitative evaluation works best to see how welcoming users are to this idea and how open they are to try it. I will be asking a total of 19 questions out of which 8 questions will contain the prototype image and how easy it is for the participant to follow the interface. The rest of the 11 questions will be based to evaluate their mindset and perception on the overall idea of Ed Study Groups.

The link will be open to all people in this course as well as outside. This is because I will be sharing the survey link with friends not in this program. This will help me understand if students or teachers in my country are willing to try this feature. I will also be sharing the link to my friends not currently studying but still self-learning from YouTube and other educational courses. This will help me understand if they would want to connect with someone who is taking the same

Coursera or Edx course as them and be able to study with them for 1, 2, or 3 hours.

Apart from the 8 prototype image questions that will ask if the interface is easy to navigate, the following are the rest of the 11 questions that will help me fulfill my requirement for data inventory.

I will be asking two questions related to Ed Discussion, whether they have used it before and whether they have played the Type Fast Game that is integrated on the Ed Discussion Dashboard and is represented as a small keyboard on the top right corner of the screen. Since users outside this course will also be taking this survey, they might not have used Ed Discussion before, and they may not find the prototype design easy to understand. The multiplayer game feature question will help me know how many users have played it and based on that how willing they are to connect with someone similarly and study with them. The bias is here that if people have played the multiplayer feature game, then they will be more willing to find a person to study with. However, this may not be true, and I have asked the question to find a connection here. If most users are still willing to find a study partner despite having never played the game before, there is no connection, and my bias does not hold true.

I will be asking three questions based on how willing users are to study online and if they have studied online before with friends. I will provide them with option to select the interface they have used to study online with friends. These options will be multiple choice and users can select one or more options. The options are – Discord, Zoom/Google Meet/Whatsapp, the Study Together website, and other. If someone marks other, they will have to describe the interface in the next question. Another bias that I have is that people who do not study online with friends may not at all like the overall concept. However, if they still find the prototypes interesting and easy to follow, they might be eager to use and prove my bias to be wrong.

I will also be asking the participants if they would like to use customized profiles and keep a different avatar as they profile picture and have a different username. In the same question, I will be mentioning that the account is linked with your university, thus suggesting that complete anonymity will not be provided. The prototypes currently show customized profile names such as palindrome7997 and coding_ninja. Along with that, the sample profile also shows a report

feature, thus the participant will understand that a user cannot remain completely anonymous.

The next three questions will be based on the Pomodoro Studying Technique and the Connect feature. The Connect feature screen (Fig 4.4) shows the option to select 1,2, or 3 hours to study with a friend. If the person has used Pomodoro Studying Technique before, they have certainly used timers and would like the idea of having someone to study with the selected number of hours. If not, I can conduct an evaluation if they are still willing to study for the selected number of hours. The first I will be adding is what application they use to set poms/time the study session. The options I will be providing are – Forest, Mobile Timer, I do not use Pomodoro technique, and Other. If the person selects other, they can mention the interface they use. This serves to be important as I want to link the timers to the third-party app to set the timer. For example, if most users say they use the Forest app, the Connect feature can be linked with Forest to start a timer for the selected number of hours. The bias here is to use the timer for the Connect feature that most users are already familiar with to provide ease of access. This can be evaluated by first understanding if the participants are at all willing to use the timer in the first place.

The last two questions will be if they are willing to try this idea of Ed Study Groups and if they have any feedback or suggestions, they can kindly provide. If the answers are mostly yes, it means many people would be willing to use this feature. If most answers are yes for the prototype, it means the participants can visualize to operate the application.

Thus, this qualitative evaluation will address the requirements I need to determine the improvements of the prototype and evaluating the biases to limit their effect during the evaluation.

7 EVALUATION EXECUTION

A total of 29 participants took the survey on Ed Study Groups. The raw results along with the survey link have been added in Appendix 9.14. The survey successfully received these responses over a time period of 72 hours. The participants who took this survey are mostly students in this class and my friends

who are also studying in another Master's program. Three of the participants, with whom I shared the link, do not currently study but work full-time. Since the survey does not record the time of the responses, I could not track what exactly they responded. However, I individually asked them about the Connect feature out of which two of them said yes, and one didn't really get the concept. She was also someone who has never studied with friends online before and back in college she always liked studying on her own. However, she did read up about the Pomodoro Technique and said she would be willing to try that individually first, that is, doing her office work or self-learning by setting 50-10 timers.

The survey responses show that four out of 29 participants are not willing to try the Connect feature. Only one of the users out of these have studied using timers, that is, they are aware about the Pomodoro Technique. The feedback received from this user was that they found the design very complicated. A major reason could be that the same user has not used Ed Discussion before. (For reference, this is participant number 14). This can be termed as a bias for now unless I am able to recruit more participants who have never used Ed Discussion before.

The other three participants who did not like the Connect feature have never before used the Pomodoro Technique (For reference, these participants are numbers 25, 27, and 29). For participant 27, the prototype for the same was not easy to follow. For participant 25 and 29, even though the prototype was easy to follow, since they were not familiar with using timers while studying, they were not willing to use it.

Apart from these 4 participants, all participants were willing to use this feature. This results in 86% acceptance. For all these users, most of the prototypes were easy to follow. I had included the question of the Type Fast multiplayer game feature to bring out a connection showing that people not willing to play this game would also not be willing to connect with someone to study with. However, it has shown opposite results and proved the bias to be false. Even

though 21 out of 29 participants have never played the game, 19 of these participants are still willing to have a social environment and study with friends. The two participants who are not willing to do this are the same participants discussed before.

Everybody except one participant does not like the idea of having a virtual classroom and studying online with friends. This proves the bias stated in the evaluation plan that a participant who has never before studied online is mostly not willing to use this prototype. Even though they easily follow most of the prototypes, they do not find the overall concept of studying online interesting. However, more data can cause this bias to be termed as an outlier.

6 out of 29 participants did not like the idea of having customized profiles with avatars and usernames.

Based on the feedback received, 12 participants have used positive words like 'great, good, amazing, like, superb, fun, and awesome'. One feedback from a participant states they don't find the time limit useful. Another participant has provided an important feedback related to friends list. They have mentioned that I have not added a prototype to show the friends list and I can only send a friend request to someone once I connect with them. That should not be the case, a user should be able to connect with someone by looking them up. The same user (For reference, participant number 17) was one of the five participants who have used the Study Together website and found the same problem on the website too.

The qualitative evaluation successfully shows that a positive response has been received.

8 NEXT STEPS

The next step is to improve the connect feature by not having the time fixed. One can change it in settings whether they want the option to select a time or just find someone to connect with. Most of the students use mobile timers for timed study

sessions. The next step would be to integrate a timer along with the connect feature for the selected number of hours.

I will also be making prototypes on viewing friends list and how to add a user by searching them. Another design feature I would be adding is a way to show to how students will search up old chat history. Even though I have added the settings of showing a user online, I haven't indicated how this will be communicated. I will probably add a green dot next to the avatar to show a person is currently online or remove the online feature altogether. I will also be accommodating time zone to the profile information.

I will also be designing how a user can react to messages with emojis, that is, what the message information will show and if I am able to edit or unsend messages, and if so, how will it show if I have edited or deleted. I will also be designing how to access gallery/media in a friend's conversation and design an option to save or pin important messages. I also want to design a website prototype for the same.

Additionally, I would like to recruit more participants who have not used the Pomodoro studying technique and conduct an empirical evaluation. I have made these prototypes using Figma and I will be simulating the buttons so that participants can use the working prototype. Thus, I will be changing the level of current design to a higher fidelity. This shows that by the next evaluation, the prototype would have reached the beta stage.

9 APPENDICES

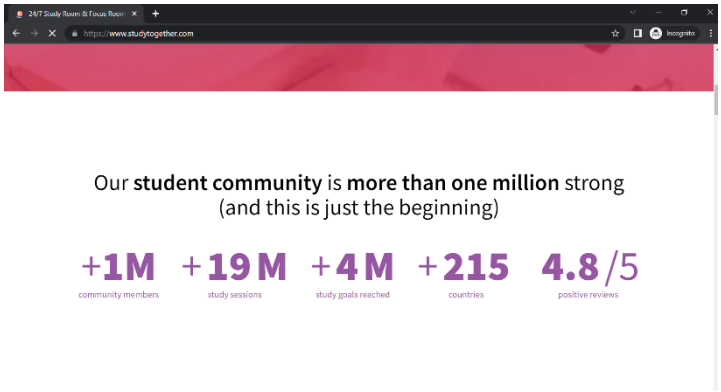
9.1 Study Together Website Link

https://www.studytogether.com/

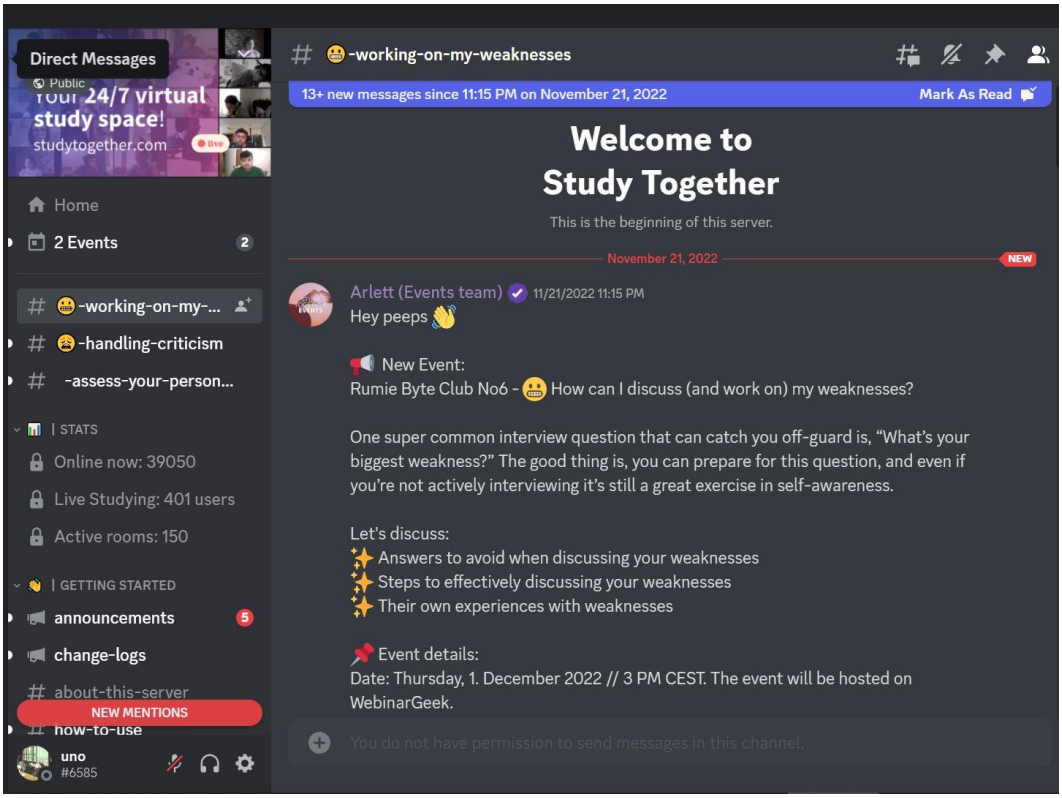
9.2 Interview Raw Notes and Questions

Would you like a study app for your university? Why? What was your motivation when you first joined the Discord study group? What made you stay? Was it the friends or the positivity or the consistency? Did seeing your friends study also make you want to get work done? Did you feel unsafe as everybody was anonymous initially? At what point did you feel okay switching on your video cam? Did it help you in any other way other than studying? What other features of the group do you use? Did you join any other study groups? Did you like them? Why or why not? Did you see any improvements in yourself? Why haven't friends from your university joined? What do you do if you don't find anybody online to study with? Has it in anyway affected your solo studying? Does it ever distract you when others in the group are talking? Have you ever used the Feynman Technique and improved your understanding by explaining it to someone else? Would you like to meet your friends in real life? (When are you meeting me?) Do you think you will join this group after you start working? Did you bond with everybody, or did you bond more with people who are of your age or people who studied the same thing as you? What is the best part you like about the group? What is something you don't like about the group and wish was better? Do you think the group would have been well-maintained if there were no moderators? Do you like one-on-one studying more or group studying? Would you like to connect with somebody from your university you may or may not know and study with them for a few hours?

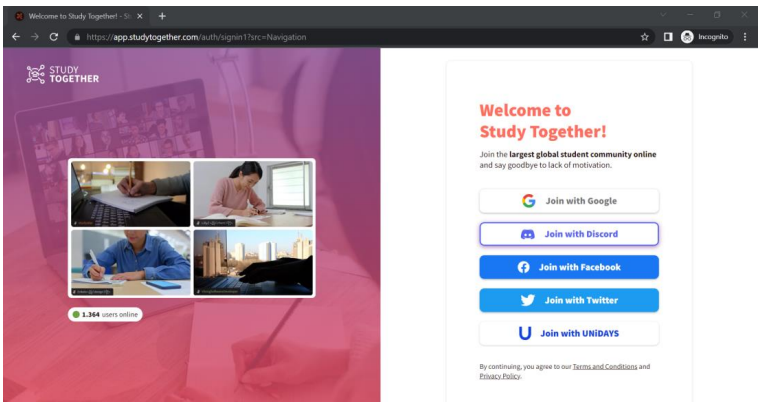
9.3 1 million Users Data Image



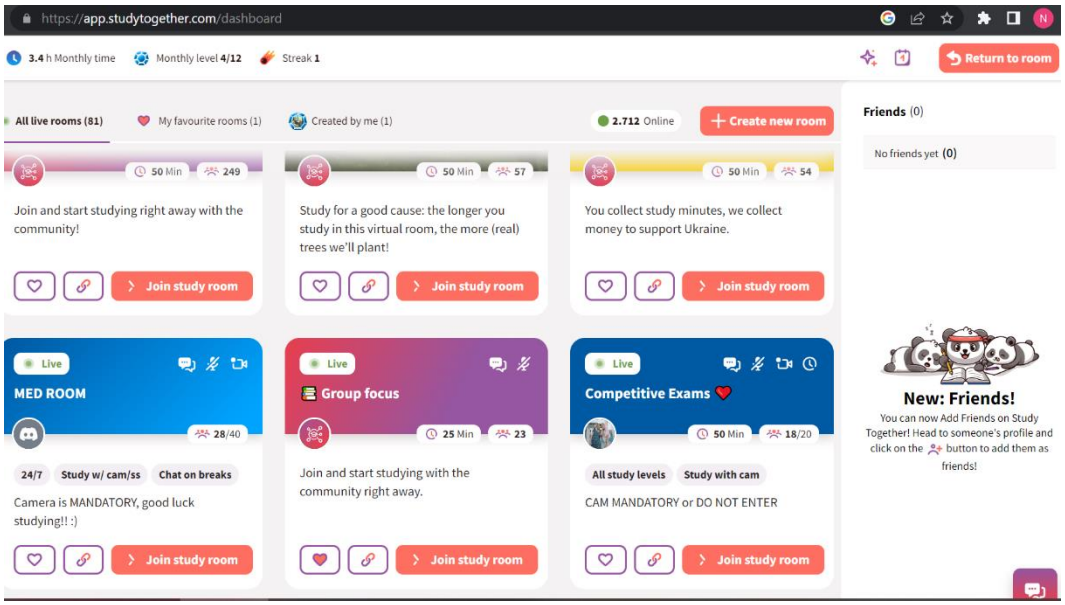
9.4 Image to show data on number of students online now and number of students studying live (shown on the left side)



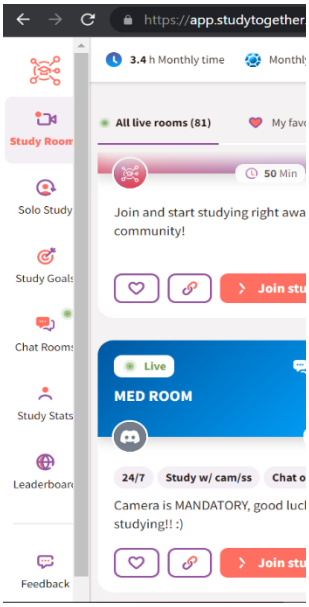
9.5 Image to show sign-in option for Study Together Website



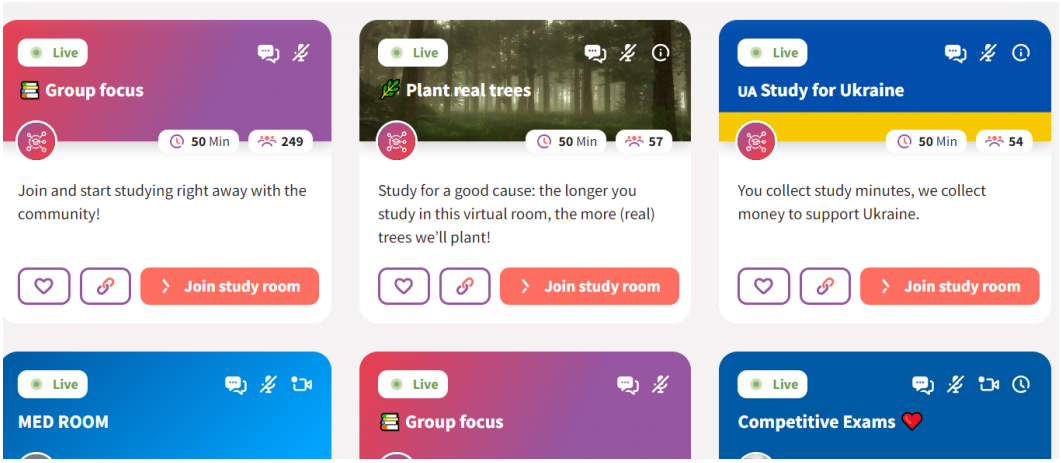
9.6 Image to show Principle of discoverability – same orangish color buttons



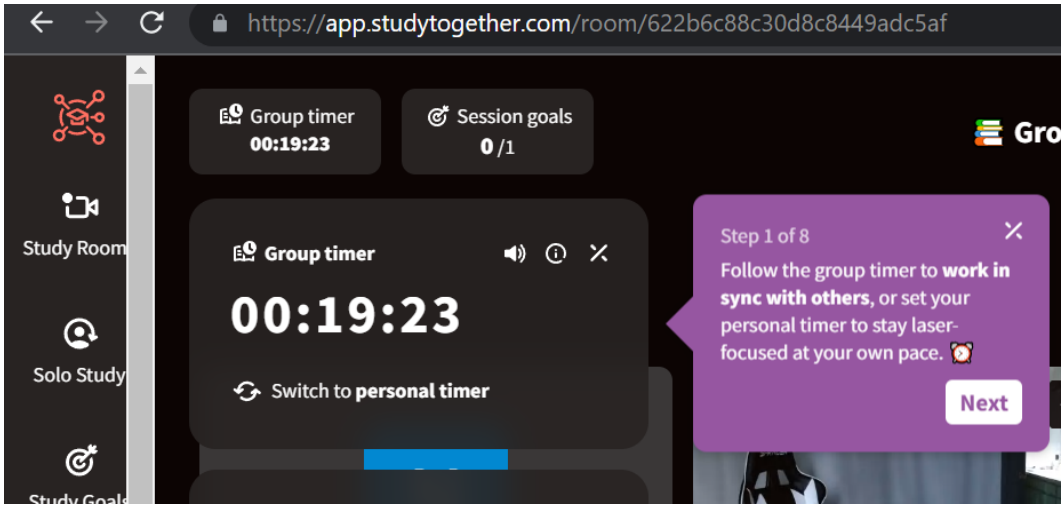
9.7 Image to show no navigation bar is used which leads to a cluttered design as it cannot be minimized



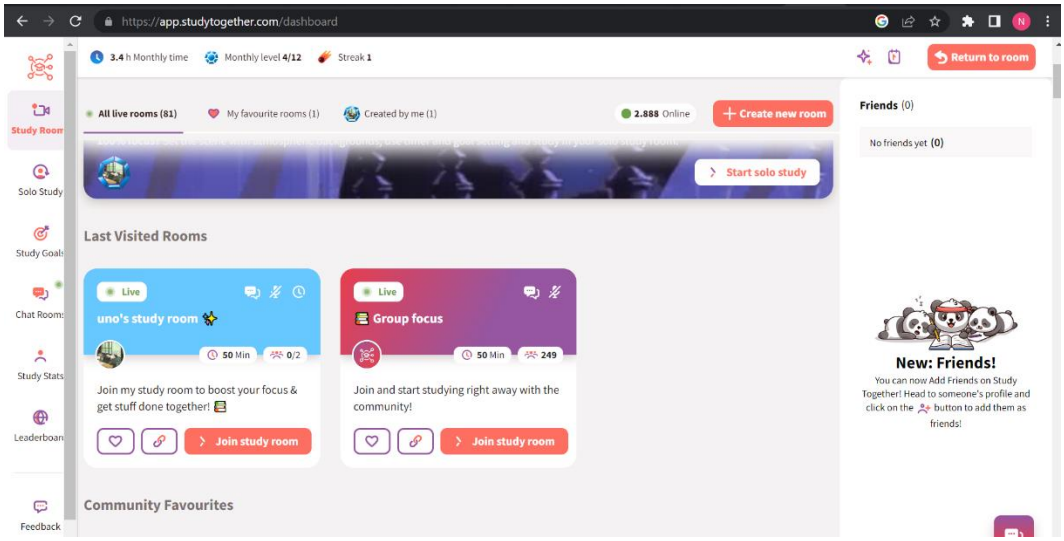
9.8 Image to show Principle of mapping to show study group requirements using message, mic, timer, video icons



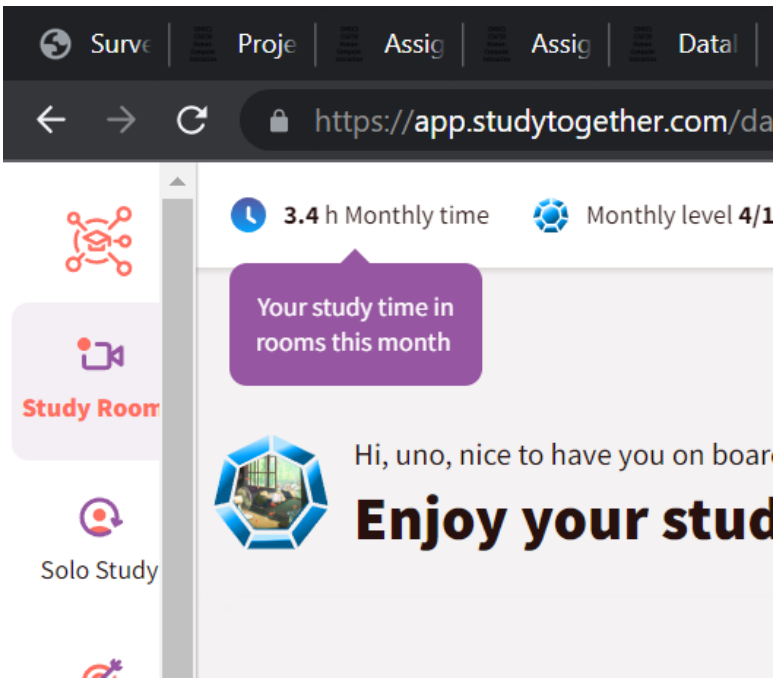
9.9 Image to show set-up guide that follows principle of perceptibility and to some extent principle of documentation

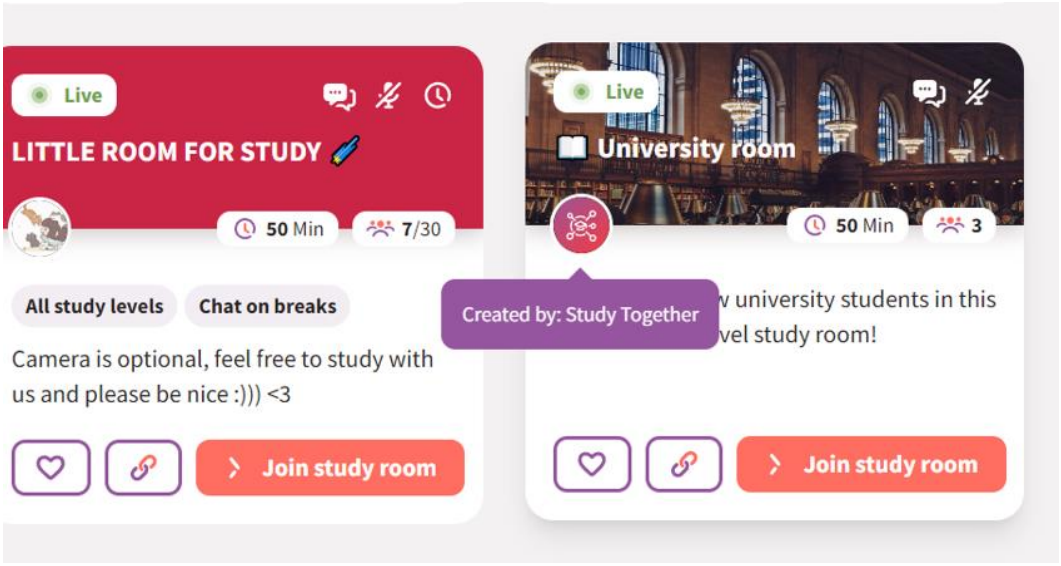


9.10 Image to show all live rooms (top left side)



9.11 Principle of affordance followed in the first image but not followed in the second image leading to design slip

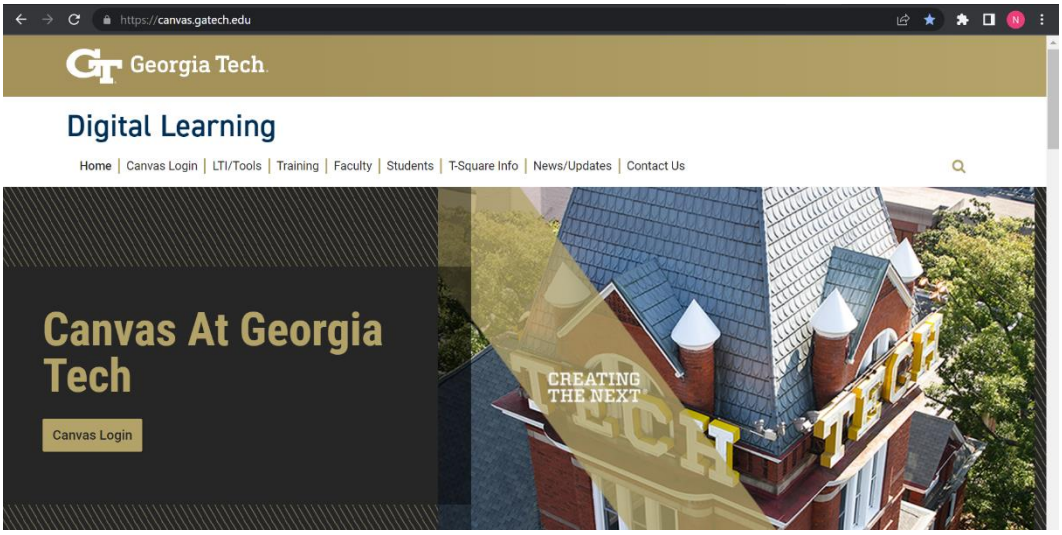


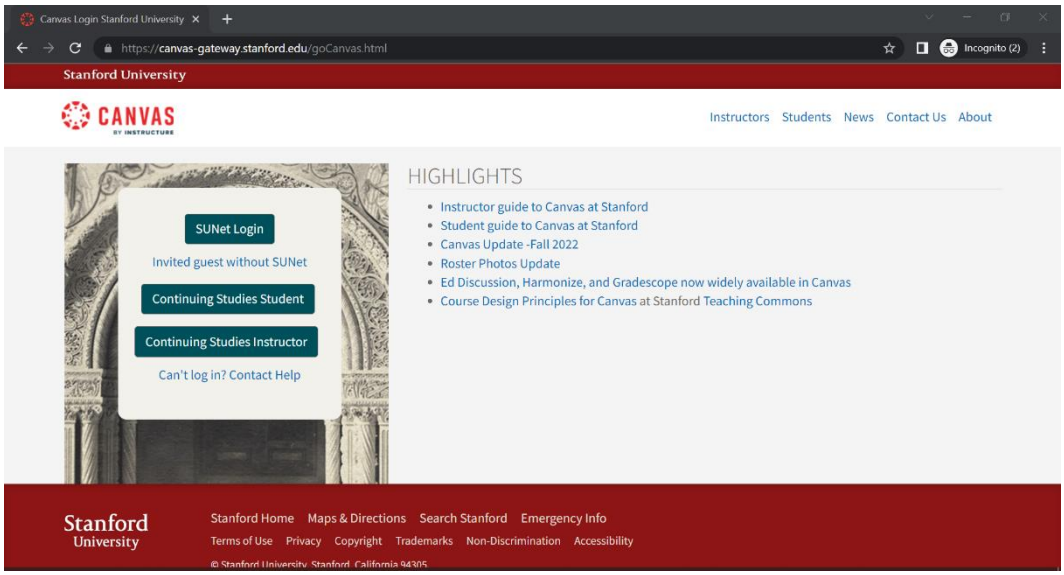


9.12 Figma Link to access prototypes

https://www.figma.com/file/TnBoyilf0dGD16Sn8StutG/HCI-FInal-Project?node-id=3%3A8&t=mc4RW7OdBV2kjtac-1

9.13 Principle of consistency maintained by maintaining the color scheme to show Georgia Tech – Canvas has respective color for each university first image shows Georgia Tech, second image shows red color scheme for Stanford University





9.14 Survey link and Raw Results of survey for qualitative evaluation

Survey Link –

http://peersurvey.cc.gatech.edu/s/edced395ccf94c7b83f6bcaa89f2c129

Raw Results

Have you used Ed Discussion before?

1. No
2. Yes
3. Yes
4. No
5. Yes
6. Yes
7. Yes
8. No
9. Yes
10. Yes
11. Yes
12. Yes
13. Yes
14. No
15. Yes
16. Yes
17. Yes
18. Yes
19. Yes

20. Yes
21. Yes
22. Yes
23. Yes
24. Yes
25. Yes
26. Yes
27. Yes
28. Yes
29. Yes

Have you played the Typefast multiplayer game feature on the Ed Discussion Dashboard?

1. No
2. Yes
3. Yes
4. I haven't used Ed Discussion
5. No
6. No
7. No
8. No
9. No
10. No
11. No
12. No
13. No
14. Yes
15. No
16. No
17. No
18. No
19. Yes
20. No
21. Yes
22. No
23. No
24. No
25. No
26. Yes
27. No
28. Yes
29. No

Do you like the idea of studying online with friends from the same course or university?

1. Yes
2. Yes
3. Yes
4. Yes
5. Yes
6. Yes
7. Yes
8. Yes
9. Yes
10. Yes
11. Yes
12. Yes
13. Yes
14. Yes
15. Yes
16. Yes
17. Yes
18. Yes
19. Yes
20. Yes
21. Yes
22. Yes
23. Yes
24. Yes
25. Yes
26. Yes
27. Yes
28. Yes
29. No

Have you studied online before with friends? Select one or more

1. Discord;Zoom/Google Meet/Whatsapp
2. Discord
3. Discord;Zoom/Google Meet/Whatsapp;Study Together
4. Zoom/Google Meet/Whatsapp
5. Discord
6. Discord;Zoom/Google Meet/Whatsapp
7. Zoom/Google Meet/Whatsapp;Other
8. Zoom/Google Meet/Whatsapp
9. Discord;Zoom/Google Meet/Whatsapp
10. Zoom/Google Meet/Whatsapp;Other

11. Discord;Zoom/Google Meet/Whatsapp
12. Discord;Zoom/Google Meet/Whatsapp
13. I don't study online
14. Discord;Study Together
15. Zoom/Google Meet/Whatsapp
16. Study Together
17. Zoom/Google Meet/Whatsapp;Study Together
18. Discord;Zoom/Google Meet/Whatsapp;Other
19. Discord;Zoom/Google Meet/Whatsapp;Study Together
20. Discord;Zoom/Google Meet/Whatsapp
21. I don't study online
22. Discord;Zoom/Google Meet/Whatsapp
23. Zoom/Google Meet/Whatsapp
24. Discord
25. Other
26. Zoom/Google Meet/Whatsapp;Study Together;I don't study online
27. I don't study online
28. Discord;Zoom/Google Meet/Whatsapp;Study Together
29. I don't study online

If you selected 'Other' in the previous question, please mention the interface

1.
2. N/A
3. all of above
4. NA
5. N/A
6. Did not select other
7. Slack
8. NA
9. N/A
10. Slack
11. n/a
12. n/a
13. n/a
14. Huh
15. na
16. NA
17. NA
18. WeChat
19. N/A
20. -
21. N/A
22. N?A
23. na

24. N/A
25. Slack
26. na
27. No
28.
29. I didn't

Unlike Ed Discussion, would you like personalized usernames and display pictures to chat with friends? (Your account is still authenticated with the university)

1. Yes
2. Yes
3. Yes
4. Yes
5. Yes
6. Yes
7. Yes
8. Yes
9. Yes
10. Yes
11. No
12. Yes
13. Yes
14. No
15. Yes
16. No
17. Yes
18. Yes
19. Yes
20. Yes
21. No
22. No
23. Yes
24. Yes
25. Yes
26. Yes
27. No
28. Yes
29. Yes

The prototype shows the dashboard for Ed Study Groups. Is the Home Page easy to follow?

1. Yes
2. Yes
3. Yes
4. Yes
5. Yes
6. Yes
7. Yes
8. Yes
9. Yes
10. Yes
11. Yes
12. Yes
13. Yes
14. No
15. Yes
16. Yes
17. Yes
18. Yes
19. Yes
20. Yes
21. Yes
22. Yes
23. Yes
24. Yes
25. Yes
26. Yes
27. Yes
28. Yes
29. Yes

The prototype shows the interface when you selected the current course CS 6750. Is it easy to follow?

1. Yes
2. Yes
3. Yes
4. Yes
5. Yes
6. Yes
7. Yes
8. Yes
9. Yes
10. Yes
11. Yes

12. Yes
13. Yes
14. No
15. Yes
16. Yes
17. Yes
18. Yes
19. Yes
20. Yes
21. Yes
22. Yes
23. Yes
24. Yes
25. Yes
26. Yes
27. Yes
28. Yes
29. Yes

The prototype shows the navigation bar when you selected a course. Is it easy to follow?

1. Yes
2. Yes
3. Yes
4. Yes
5. Yes
6. Yes
7. Yes
8. Yes
9. Yes
10. Yes
11. No
12. Yes
13. Yes
14. No
15. Yes
16. Yes
17. Yes
18. Yes
19. Yes
20. No
21. Yes
22. Yes
23. Yes
24. Yes

25. Yes
26. Yes
27. Yes
28. Yes
29. Yes

Have you heard about the Pomodoro Studying Technique? If yes, what interface do you use to set timers?

1. I do not use Pomodoro Technique
2. I do not use Pomodoro Technique
3. Mobile Timer
4. I do not use Pomodoro Technique
5. Forest
6. Mobile Timer
7. Other
8. Mobile Timer
9. Other
10. Other
11. Other
12. Mobile Timer
13. I do not use Pomodoro Technique
14. Forest
15. Mobile Timer
16. Mobile Timer
17. Mobile Timer
18. Mobile Timer
19. I do not use Pomodoro Technique
20. I do not use Pomodoro Technique
21. Other
22. Mobile Timer
23. Mobile Timer
24. I do not use Pomodoro Technique
25. Other
26. Other
27. I do not use Pomodoro Technique
28. Other
29. I do not use Pomodoro Technique

If you mentioned 'Other' in the previous question, please mention the interface.

1. .
2. N/A

3. Mobile Timer
4. NA
5. N/A
6. No other selected
7. Tomato Clock (browser extension), Be Focused
8. NA
9. It's just an Android app called Pomodoro.
10. Not sure if Mobile Timer is a specfic app, I use my apple wacth to set timers
11. I have heard about it but do not use it. The question asks if I've heard about it.
12. na
13. n/a
14. Other
15. na
16. NA
17. NA
18. NA
19. N/A
20. -
21. LifeLine
22. N/A
23. na
24. N/A
25. Windows app
26. SELF TIMER
27. No
28. website
29. I haven't heard of it

Would you like to connect with somebody from your class or university and study together for 1/2/3 hours?

1. Yes
2. Yes
3. Yes
4. Yes
5. Yes
6. Yes
7. Yes
8. Yes
9. Yes
10. Yes
11. Yes
12. Yes
13. Yes

14. No
15. Yes
16. Yes
17. Yes
18. Yes
19. Yes
20. Yes
21. Yes
22. Yes
23. Yes
24. Yes
25. No
26. Yes
27. No
28. Yes
29. No

The prototype shows the connect feature to connect with friends. Is it easy to follow?

1. Yes
2. Yes
3. Yes
4. Yes
5. Yes
6. No
7. Yes
8. Yes
9. No
10. Yes
11. Yes
12. Yes
13. Yes
14. Yes
15. Yes
16. Yes
17. Yes
18. Yes
19. Yes
20. No
21. Yes
22. Yes
23. Yes
24. Yes
25. Yes
26. Yes

27. No
28. Yes
29. Yes

The prototype shows the screen when you connect with somebody. Is it easy to follow?

1. Yes
2. Yes
3. Yes
4. Yes
5. Yes
6. Yes
7. Yes
8. Yes
9. Yes
10. Yes
11. Yes
12. Yes
13. Yes
14. No
15. Yes
16. Yes
17. Yes
18. Yes
19. Yes
20. Yes
21. Yes
22. Yes
23. Yes
24. Yes
25. Yes
26. Yes
27. No
28. Yes
29. Yes

The prototype shows the pop-up profile information when you select their name. Is it easy to follow?

1. Yes
2. Yes
3. Yes
4. Yes

5. Yes
6. Yes
7. Yes
8. Yes
9. Yes
10. Yes
11. Yes
12. Yes
13. Yes
14. No
15. Yes
16. Yes
17. Yes
18. Yes
19. Yes
20. Yes
21. Yes
22. Yes
23. Yes
24. Yes
25. Yes
26. Yes
27. No
28. Yes
29. Yes

The protoype shows the chat screen shown on the Home Page. Is it easy to follow?

1. Yes
2. Yes
3. Yes
4. Yes
5. Yes
6. Yes
7. Yes
8. Yes
9. Yes
10. Yes
11. Yes
12. Yes
13. Yes
14. No
15. Yes
16. Yes
17. Yes

18. Yes
19. Yes
20. No
21. Yes
22. Yes
23. Yes
24. Yes
25. Yes
26. Yes
27. No
28. Yes
29. Yes

The prototype shows the account settings shown on the Home Page. Is it easy to follow?

1. Yes
2. Yes
3. Yes
4. Yes
5. Yes
6. No
7. Yes
8. Yes
9. Yes
10. Yes
11. Yes
12. Yes
13. Yes
14. No
15. Yes
16. Yes
17. Yes
18. Yes
19. Yes
20. No
21. Yes
22. Yes
23. Yes
24. Yes
25. Yes
26. Yes
27. Yes
28. Yes
29. Yes

Overall, would you use this feature?

1. Yes
2. Yes
3. Yes
4. Yes
5. Yes
6. Yes
7. Yes
8. Yes
9. Yes
10. Yes
11. Yes
12. Yes
13. Yes
14. No
15. Yes
16. Yes
17. Yes
18. Yes
19. Yes
20. Yes
21. Yes
22. Yes
23. Yes
24. Yes
25. No
26. Yes
27. No
28. Yes
29. No

Please provide any feedback or suggestions. Thank you.

1. .
2. N/A
3. superb features
4. NA
5. Well done
6. Overall, good.
7. This is an amazing idea and the interface is clean and easy to learn because it is similar to other apps!
8. NA
9. N/A
10. Fun design. It would be cool to see this developed further!

11. I like the idea of personalized usernames and pictures, but the user's actual name should still be shown on the account. This would help prevent issues like student harassment.
12. this is awesome!
13. i like the idea of having a school run group chat for studying
14. This feture looks complicated
15. na
16. NA
17. I can see this feature being put to good use. If I can see on the interface people who are on the lookout for study buddies, there are more chances that I will connect with them (rather than going and seeking out study buddies). Maybe this can be a feature too.
18. I like your idea for adding a social feature just like iMessage in the Ed Discussion and I'll use it
19. Awesome prototypes!
20. -
21. No additional comments. Great job
22. Great Ideas
23. none
24. N/A
25. N/a
26. NA
27. None
28.
29. selecting the time (1h,2h,3h) to connect with someone doesn't really seem useful