

An Online Team Interactive Communication Platform for Undergraduate Design Students

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Abstract: The purpose of the present project is to design a virtual platform for team members to communicate with each other. It targets the design undergraduate students to facilitate communication. It has proposed various activities and functions in this platform which could facilitate the team working. The design concept has been employed for this project. The outcome of this project is a platform which helps undergraduate design students to move from the storming stage to norming and performing stage in an easier manner. The evaluation of the project has been done through interview and it is concluded that it is a feasible project which can solve the pain point of the group members working online. It provides a platform for continuous interaction and developing bonding with online members.

Keywords: Virtual Platform; Undergraduate Design Students; Online Team Communication; Online Teamwork; Team Interaction.

1. Background

The present project is about designing the platform for teams which will be used for communication. The undergraduate design students do have many such instances where they have to work in a team form, but there are not any proper means available for their communication. Due to the outbreak of the epidemic, design teams in many universities are communicating online. It is not easier for everyone to communicate effectively where there is no face-to-face interaction. Learning atmosphere is not easier to be built in online group communication. Many students encounter problems due to a lack of direct interaction, and there is poor mutual assistance also. These challenges often reduce participation; hence group cooperation is also reduced. It is difficult for individuals to find a sense of belonging. In most group interactions, a few people move, and most people do not move; they interact in form, but the nature of the interaction is not obvious; the interaction is disordered and inefficient. Every step of the project is pushed slowly, increasing the operational burden of the entire project. Once the feedback is not received timely, it is difficult to effectively complete and evaluate the project. Therefore, the main goal of this project is to design a communication platform suitable for the discussion and interaction of the teamwork project of design majors, which is used to improve the team's sense of belonging during the online education period, and enhance the student's participation and interaction to complete the project work. Usually, in online courses, the participation level of students is not higher; so this discussion at platform will enable to foster the participation.

According to Tuckman's team development model, there are four stages of team development, and these are forming, storming, norming and performing [1]. It is important for every group to go through these stages to reach the performing stage. This model of team development is helpful for this design project.

The forming stage occurs when team members are asked to start working together. This stage involves the mild behaviour of team members where there are no controversies, and everyone demonstrates politeness and courtesy for each other.

Everyone is optimistic and excited at this stage [2]. In the case of undergraduate design students, this is the stage when it is announced by the module leader that they have to work in one team. So, the group is formed, and everyone is excited to work on the project they have been assigned by the module leader.

Once the forming stage is over, the storming stage starts, where there are more interpersonal conflicts also. Group members do not clearly understand what they have to do, they argue with each other, and there is power struggle and clashes also [3]. The storming stage is not good, as it does not involve any progress towards the work, and there are various concerns of team members which need attention. The team members also feel defensive and are confused also. They resist the tasks which are performed. This is the stage that needs continuous communication, but online group work has diminished this aspect [4]. The team needs to have inter and intra-personal relationships, but due to a lack of direct interaction, these relationships are harder to develop. Due to online problems, group members were unable to meet. Everyone is unfamiliar with each other, shy, inner excitement and reluctant to communicate [5].

This stage needs effective listening where feedback has to be given and received also. The prevailing conflicts have to be resolved, but without communication, this cannot happen. The team purpose needs to be developed, and when there are hesitations in terms of communication, this cannot happen [6]. The conflicts keep occurring, and if these are not resolved, the storming stage is prolonged. This is the stage that needs to re-establish roles and ground rules also. There is also an important role of leadership at this stage as a leader has to guide and acknowledge the conflicts. The consensus has to be developed by the leader, but this does not happen if all team members are not on one page for communication [7]. The project leader has to assign the responsibilities also, and the prevailing conflicts have to be resolved also. The leader has to provide adequate support also so that members can get out of these conflicts and could move towards the other stage [8]. So basically, the members at the storming stage need to have a 'testing and proving' mentality for problem-solving so that they can identify the problem on which they are working and could provide the solution also [9]. This stage needs effective

communication between all group members and leaders, and if the communication does not work, the storming stage is prolonged [10]. This project is designed to target the needs of team members at the storming stage; there are not any new studies conducted up till now that could tell the solution for reducing the length of this stage. So, the present design project is targeted toward it.

The next stage is norming, where team members find ways to do work together. Group cohesion is developed at this stage, team members start to trust each other, and shared leadership start to emerge also [11]. At this stage, all team members agree upon the commonly decided procedures and processes which are followed. They also become comfortable with each other, and they start to focus on the main goal of the team also. Team members also find ways to resolve the conflicts which may occur [12]. Every team member puts effort into making consensual decisions. There is a balanced influence of all team members, and they solve every problem collaboratively [13]. The routines are developed, and the task milestones are set. At the norming stage, all team members develop a sense of belonging to each other. The confidence level of all team members enhance. They are able to express the criticism in a constructive manner, and others also accept the feedback [14]. There is a general sense of trust among all team members. All team members are confident that teamwork will work and that their plan of tasks will also deliver results. There exists freedom of expression also [15]. This stage also needs to have a decision-making process where they offer their ideas and suggestions, and there is problem-solving. At this stage, leaders also collaborate and guide other team members and keep giving feedback [16]. They are able to provide the vision also, which has to be followed. The group norms are specified by the leaders and other team members also, and basically, everything about working is decided at this stage [17]. In the present pandemic era, where online education has become the more dominant form of education, there is a need to have the tools which could facilitate the norming stage of team development, but there exists a research gap in the literature. The present project is targeted toward facilitating this stage. Because of online reasons, the group cannot meet and work together, and there is no team consciousness.

The performing stage is where the actual tasks are actually performed. Now, the team starts becoming functional, where the roles become clearer. The team organises itself, and after understanding the strengths and weaknesses, the work is actually done [11]. Group members work demonstrating the tight bonds with each other along with the fun and excitement. This stage also involves the flow of information where team members have to give and take information for performing the task [18]. Continuous dialogue is also an important need at this stage. In the scenario where there is no direct face-to-face interaction among team members, the flow of information becomes tougher [16]. There is a need for such solutions, which could facilitate the flow of information among members and could promote continuous communication also. In the case of other online platforms like video calling, this is not considered as effective as needed because group members feel more bored. There is a lack of interest from them due to such tools. So, this project targets the need of the students to communicate with each other in such a manner that there are no hurdles or glitches for them to perform the work effectively.

2. Methods

2.1. Design concept

This platform is a multi-user environment which has been specifically designed for the group working for design students. Currently, design students encounter extensive problems due to a lack of their motivation, sense of belongingness, emotional attachment, hesitation, conflicts, lack of availability of physical space, problems with existing meeting software, and are not able to work in group environments without making any errors. Therefore, this platform is designed to keep them and their work-related issues in one place. They will be able to do real-time interaction on this platform.

Due to online problems, group members were unable to meet. Everyone is unfamiliar with each other, shy, and reluctant to communicate. Therefore, we will introduce each other to help everyone get to know each other and help to start active communication. Online communication needs the understanding of each person's professional ability, so, through this platform, members will determine the leader and assign everyone's work. In this platform, we have designed the professional discussion process where group members discuss with each other and summarise the discussion results. Because of online reasons, the group cannot meet and work together, and there is no team consciousness. Therefore, the cohesion of the team and the online work together help to communicate immediately and complete the assigned homework. So, in summary, the design concept which is to be studied in this project is explained in four stages.

1) Due to online problems, group members were unable to meet. Everyone is unfamiliar with each other, shy, and reluctant to communicate. Therefore, we will introduce each other to help everyone get to know each other and help to start active communication.

2) Online communication will be fostered for developing an understanding of each person's professional ability. It will also determine the leader, assign everyone's work.

3) Design the professional discussion process, discuss with each other, and summarize the discussion results.

4) Because of online reasons, the group cannot meet and work together, and there is no team consciousness. Therefore, the cohesion of the team and the online work together help to communicate immediately and complete the assigned homework.

2.2. The Stages of Design Development

2.2.1. Market Research

It mainly investigates the interactive functions of four leading platforms currently used by college students, namely zoom, Microsoft Team, Skype and Webex Video. For zoom, it is mainly used in multi-person mobile phone cloud video conferencing software. Users can use it to conduct high-definition video conferences and include free cloud conference functions. While Microsoft Team is a chat-based intelligent team collaboration work, members can use it to communicate in video and voice conferences, and can also synchronize document sharing [19]. In addition, Skype is an instant messaging software, which has the functions required by IM, such as video chat, multi-person voice conference, multi-person chat, file transfer, text chat and other functions. Finally, Webex video conferencing is also a professional network video conferencing solution optimized to provide customers with business functions. However, the project

research found that these softwares are competitors of this project, but their main functions are only focused on video communication, lack of professional communication for design students, too basic, lack of enhancing team communication interactivity and team engagement.

2.2.2. Interview

In this research, the proposed online platform has been designed after conducting interviews. The interview method is selected because it has the capacity to provide in-depth insights into the research issue which is under investigation. The interviewees were design students of undergraduate level, and they were asked about their problems and pain points.

The overview of the interview questions is listed below:

- 1) What status do you generally belong to when communicating with online group projects?
- 2) What problems do you think exist in the online group discussion work process?
- 3) What circumstances would you be more likely to speak up in an online group inquiry?
- 4) Will you try to work and communicate with your project team in an online studio on an interesting interactive platform to complete everyone's design project faster?
- 5) Do you think that by joining the online studio, everyone can complete projects together, and they will also be rewarded according to the working timely and efficiency?
- 6) Do you think, it will increase the enthusiasm of the team?
- 7) Do you think that adding the team game ranking reward from will make you feel more competitive and improve everyone's active participation in work?

8) Do you have any other suggestions to improve the group's interaction and participating in completing work projects?

2.2.3. Design

The platform has been designed to provide a platform which could be used for online group interaction. As soon the students will enter this website, they will land on the home page, which will have the options of my groups which may further have the group discussion and group studios. During the discussion, group members will first introduce themselves for a limited time to get to know each other. After that, everyone will choose a leader based on the understanding of each other's personality and professional functions, and the leader will help everyone discuss and communicate. In design discussions, people can discuss design concepts here, and it is up to the leader to assign work to everyone. Everyone can effectively divide and cooperate, and finally can comment on each other's work in the discussion. And also joined in group studios, where everyone can work together via video to complete a divided project. If group members have any questions, you can communicate immediately. These are the different group studios that individuals are in. People can click on the group to work together on video. There will also be a timely reminder sheet for work, and it will have a section also where people can communicate with your teacher or group members. The group studio will also present the progress of the work that everyone has completed, the time, and the rewards for everyone.

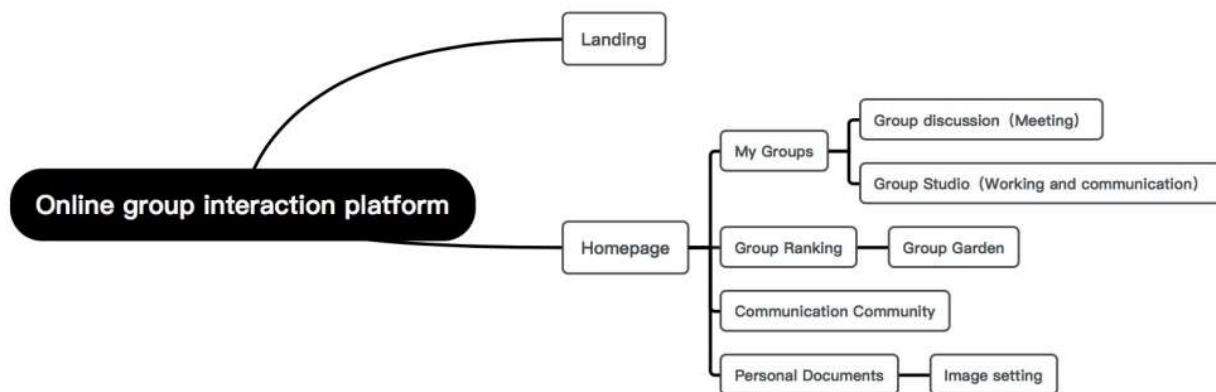


Figure 1. Online group interaction platform design architecture

The home page will also have the group ranking section, which will lead students toward the group garden. This is each group's garden, and they can use their bonus points to grow these flowers, and this is added to keep group members engaged in this learning platform.

The communication community will also be on the main home page. This is a place where everyone can communicate; group members can share and communicate here.

The personal documents section will also be on the main home page. This is mainly where files are kept after student group discussions or work.

2.2.4. Design Style

In terms of sketches to effectively design the platform, the project developed a wireframe that tells various details of the platform such as space allocation, functionality, expected behavior and prioritization of content. In the final product, the

project mainly adopts a simple design style, and adds 3d character design. Because after interviews, many students suggested choosing a simple design style, which can be more concise in use. As for 3D character designs, many respondents believe they have a sense of reality and are more realistic. Respondents also mentioned that they like to use the simple and easy-to-use software design style. Most of the respondents said that this online communication platform is also very user-friendly, and it is easier to use without any difficulty.

2.2.5. Avatar Creation

The multi-user virtual environment can be designed in numerous manners with the purpose of providing an engaging experience to its users. One of the dominant features of such virtual environments is their avatar [20]. Users can choose their own physical experience through the avatar, where they

can customise their minute details, which are linked with their race and gender [21]. It is always considered helpful in traditional educational environments to provide the ability to choose racial and gender characteristics, and these may have an impact on the traditional classroom settings also. Using virtual avatars in video communication can also reduce their tension and make it easier to enter video communication discussions. So, this platform also provides the feature to customise their avatar. The examples of these avatars are presented below.

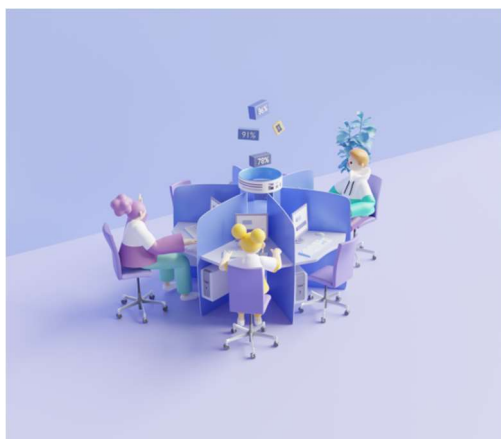


Figure 2. Example of online interaction of avatar teams

2.2.6. Usability Testing

The second interview is mainly about the design content where usability test is performed. The example questions that were asked were:

- 1) Do you think the current problem has been solved?
- 2) Do you have any suggestions?
- 3) What character and interactive environment design style do you think to choose: 2D, 3D, real person
- 4) Which software design style do you prefer?

2.2.7. Iterative Evaluation

For evaluation purposes, an informal test was run for this platform on a group, and they were asked to work on it as a group on some imaginary group work. Their feedback was obtained for this work. The criteria for this evaluation were the insights and opinions of the group discussion. They were asking about their experience on using this platform.

3. Results and Discussion

3.1. Results

In the pre-design stage, there were eight students who participated in the pre-design concept stage, and they were asked about their feedback on the problems they faced when they worked in the group.

The findings of this stage showed that most students listen silently, and a small number of students will actively speak. One of the interviewees said:

'When we worked on online projects, I feel confused. Many times, I had no motivation to participate also.'

The most popular problems in the online group discussions are that they have no sense of belonging with each other and their appeal is not strong, and it is difficult for them to gather together in one place and work. Many times, group members also encounter a problem because other classmates/group members do not actively participate. Participants said:

'You know, online courses have changed a lot for us. We feel no bonding with each other. Neither with teachers nor

with our other group members. We stay strangers and project ends'

'I do not enjoy working online for the assigned course works. I want something interesting for the online coursework.'

From this, it could be observed that the pain point for students is that the online group works are no more interesting for them. They are not able to have any sense of bonding and belongingness with other group members. From the pre-design stage, it was found that as also said by majority of participants that they would be more interested in participating if there were good relations among them and if there was also a sense of belongingness among all group members.

When it was asked that will you try to work and communicate with your project team in an online studio on an interesting interactive platform to complete everyone's design projects faster? As per findings, it was found that 90% of students will try, and 10% were not sure. When it was asked that do you think that by joining the online studio, everyone can complete projects together, and they will also be rewarded according to working time and efficiency, and if you think it will increase the enthusiasm of the team, it was found that 80% of students think they will, 10% of students think they may, and 10% of students are not sure. The usability test also found that 70% think that adding the team game ranking reward form will make them feel more competitive and improve everyone's active participation in work, while 10% think maybe, and 20% were not sure.

The results show that from the usability test interview results, as shown by interview results that most design students like 3D characters because they have a sense of reality and are more realistic, and most students choose this concise and easy-to-understand software style. The interviewee participants also mentioned that they like to use the software design style which is simple and easier to use and majority of them reported that this platform for online communication is quite user friendly also and they do not find any difficulty in using it. One participant said:

'It was easy to use. I did not have to ask for any help.'

And for the online studio work and communication of the project team, few of the participants said:

'It seems quite interesting platform for me.'

'The project platform seems to resolve our problems. Every thing in one place. Nothing is lost. So I might be using it in future also.'

The usability test has also provided suggestions to improve the group's interaction and participation in completing work projects, and participants suggested sharing work progress and issues in real-time with synced workbenches; getting to know each other more; bonus system where bonus points can be set team leader and a system to have strong emotional management skills. One of the participants said:

'I always believed that if there is some mechanism to manage the performance of all group members based on involvement and participation, it will be really good.'

Another participant said that:

'The real time synchronization is awesome and I believe it will help me a lot. I am really excited about it.'

During the discussion process, it was also found that many of the participants said that became able to have lesser conflicts through it. Previously, when they were working on other tools like Zoom, it was not easier for them to resolve the conflict and distance between them was not ending. This

project allowed all of them to have lesser conflicts. As one participant also said:

'The direct interaction and live communication over this platform helped all of us to solve our conflict so easily. I was amazed.'

The further testing with the group members provided results that all group files are at one place, so progress is easier to be traced. The leader selection was also easier and the work assignment process was also clear. One participant said;

'It was very easier to assign work for leader. It took 2-3 minutes in work assigning.'

'The good thing was that I knew who is performing which part as it was in front of me. So I was clear about the direction of work.'

From these views, it could be found that the testing the design concept has provided evidence that it may resolve the current problems of the group members who are working online.

And most respondents said they were satisfied with such a solution. Their main pain was about no belongingness and this design concept helped in solving it also. They believed that the use of this platform is able to solve the problem of lower interaction. One of the participants said that:

'There is continuous participation opportunity. We interacted through team garden, group studio and also called each other. It was interactive platform for us.'

The discussions which are managed through this platform has made them more enthusiastic about the group work also. They mentioned that now they do not hesitate to interact with each other and few also said that they do not feel less shy when they are participating in group project through this platform. One of the interviewees said;

'I felt less confused and shy when I used it. It was all easier to interact all group members. I could see status of work of all group members easily, which also provided me sense of satisfaction that everyone is on one page.'

3.2. Comparison with the Literature

As found from the literature also, this design platform is also helpful for reducing the interpersonal conflicts. Aligned with the Kur, it was found that this platform helped to have continuous interaction, so group members resolved their conflicts better which is basically helpful for reducing the storming stage duration also [3]. Hence, team members became clearer about the project and they could actually perform the tasks they were supposed to. There is also a need for continuous communication in group projects, and it is found that aligned with Stagers, Garcia and Nagelhout, continuous communication was assured which proved helpful for reduction of interpersonal conflicts [4]. The previous studies like Chang and Kang reported that online group working reduces the communication so members never feel confident to interact [5]. This project has found that this problem could be solved through this platform as shyness and reluctances of group members could be reduced when design students work on this project. This also resulted in enhancing the bonding between group members.

Further the norming stage of the team development is also important for every group project. This group design communication platform is helpful in facilitating this stage as work assignment could be done easily through it. So aligned with the views of Tuckman and Jensen, group members could come to the consensus in an easier manner through it [11]. Aligned with the arguments of Cresswell-Yeager, it was found

that group members also got clarity about task and vision when they worked through it [17]. Likewise, consistent with views of Tuckman and Jensen, team members also knew that who is performing which part of the group, so flow of information was easier and clear [11]. The need of continuous communication is also resolved well through it [16].

3.3. Conclusion and Limitations

From the results, it is concluded that this project introduced for design of the platform is a feasible project which is very useful and helpful for those students who are facing problems in the communication with their group members in the time period of pandemic. The pandemic has made many courses online where group members do not feel comfortable, so the solution presented here is a feasible plan which can solve the problem of the students. This project was about designing an online platform for group communication and results show that the group development stages of storming, norming, performing are facilitated through this platform. This platform helps to strengthen the cohesion of the team and also provides opportunities for the team to communicate continuously.

This project also has certain limitations which could not be overlooked. The interviews conducted in this project at various stages were done with a very small sample size. The findings based on the small sample size could not be generalized easily to all design students, therefore, this aspect should be considered. It is recommended that in future similar project should be conducted on the larger sample size so more generalized findings could be obtained.

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