CritBoard: Reimagining Online WhiteBoard Tools for Diverse Personalities

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Abstract

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Design

Abstract

The purpose of this design thesis was to identify the challenges that design students face during in-person critiques, particularly related to providing constructive feedback to others. The study explored how different personality traits affect the ability to give feedback and how online whiteboard tools can help students and instructors overcome these challenges. The research methods included desktop research, literature review, surveys, and interviews. The findings revealed that there are five major pain points that prevent students from giving feedback, often due to subjective concerns related to their personality traits. While online whiteboard tools can help to some extent, they do not fully solve all the challenges. As a result, this thesis project includes an online whiteboard tool specifically tailored for design students with different personalities to facilitate critiques. This tool has the potential to reduce concerns and assist instructors in facilitating critiques and monitoring student participation. This design thesis also could provide valuable insights for design education practitioners to conduct more effective critiques based on pain points caused by students' personality traits that are identified in the research.

Keywords: interaction design, design education, critique, personality traits, feedback, participation, design instructors

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Introduction

Design education requires close collaboration and effective communication among all participants due to the nature of project-based assignments and studio-based class environments. In this kind of environment, students frequently exchange their ideas with fellow students to be inspired and improved; students and instructors have a back-and-forth process of introducing concepts and getting feedback. This mode is often seen in typical critiques of design classes (Dreamson, 2017).

However, due to the pandemic of Covid-19 in 2021 and 2022, many in-person design classes have been taken off as online classes format. Instructors began to be creative in finding a solution for students to collaborate and communicate in critiques online. Since then, many online real-time whiteboard tools, such as FigJam, Miro, and Slack, have been leveraged in design classes, even after everyone has returned to classrooms (Fleischmann, 2020).

After some experience using online whiteboard tools in face-to-face critiques, I noticed that some students who are usually quiet in traditional critiques were more active in giving feedback to their classmates through online whiteboard tools. It raises the question of why people choose to remain silent in critique and why people have chosen to speak up more after using online whiteboard tools. Therefore, I decided to study how people's personality traits affect their performance in design critiques and to design an online whiteboard tool that could facilitate more effective participation in critiques.

Background

Design Critique

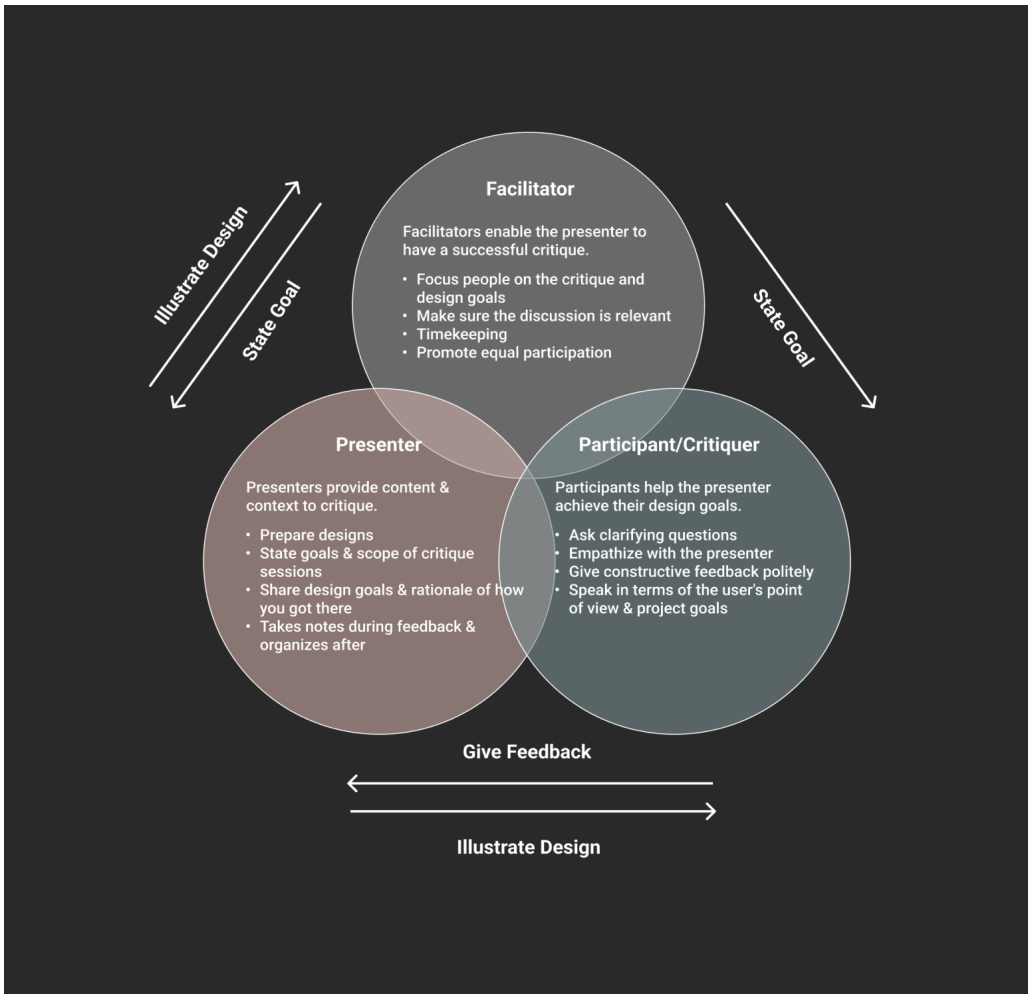
Design critique involves evaluating and analyzing design work to offer feedback, insights, and suggestions for improvement. It is a structured discussion and evaluation of design projects conducted by peers, instructors, or professionals in the field (Milovanovic & Gero, 2018). The purpose of design critique is to help designers gain a deeper understanding of their work, identify strengths and weaknesses, and make informed decisions to enhance the quality of their designs (Conrad, 2020). During critiques, designers present design artifacts, such as sketches, prototypes, or final designs, and engage in discussions that address aspects like aesthetics, usability, functionality, and concept alignment. The process of design critique encourages critical thinking, collaboration, and communication and plays a crucial role in the iterative design process (Milovanovic & Gero, 2018).

In design education, critique is a practice of conducting structured evaluations and discussions of student design work. It is an essential component of design education as it provides students with valuable feedback, fosters critical thinking skills, and helps them develop their design abilities (Yuan et al., 2016). In a design education setting, critiques are typically conducted in group settings, where students present their work to their peers and instructors. Participants offer constructive criticism, suggestions, and insights to help the student improve their designs. Critiques in design education encourage students to articulate their design decisions, consider multiple perspectives, and engage in collaborative problem-solving. Through critiques, students develop their design thinking processes, refine their work iteratively, and gain valuable insights from peers and instructors, ultimately enhancing their design skills and abilities. Successful critique sessions in design education involve three roles: facilitator, presenter, and participant (Milovanovic & Gero, 2018). As Figure 1 shows, effective interactions and active participation

from everyone are key to a successful critique session. Although there are studies about how personalities relate to design classes, there is not a lot of research about how personalities affect students' behavior in a critique context, nor online whiteboard tools designed for critiques in design education.

Figure 1

Roles and Interactions in Design Critiques



Online Whiteboard Tools

Online whiteboard tools are digital platforms that replicate the functionality of physical whiteboards, allowing users to create and collaborate on a virtual canvas. These tools offer a range of features, such as drawing tools, sticky notes, shapes, text boxes, and the ability to add images or documents. Users can work together in real-time, making them particularly valuable for remote collaboration and distance learning scenarios (Chan, Ho & Tom, 2023).

In the design industry, online whiteboard tools are increasingly used for various purposes:

1. Ideation and brainstorming: Designers can use online whiteboards to generate and capture ideas during brainstorming sessions. They can sketch, write, and visually organize their thoughts, encouraging creative thinking and collaboration among team members (Ozturk, Avci, & Kaya, 2021).
2. Concept development and iteration: Designers can use whiteboard tools to visually explore and refine design concepts. They can create wireframes, prototypes, or visual representations of their ideas, enabling quick iterations and gathering feedback from stakeholders or clients (Ozturk, Avci, & Kaya, 2021).
3. Collaboration and feedback: Online whiteboards facilitate collaborative design reviews and feedback sessions. Multiple stakeholders can annotate, comment, or provide feedback directly on the virtual canvas, fostering effective communication and reducing the need for lengthy email threads (Chan, Ho & Tom, 2023).
4. Design presentations: Whiteboard tools can serve as a digital presentation medium, allowing designers to showcase their work to clients or team members. They can present design concepts, user flows, or interactive prototypes, enhancing the visual communication of design ideas (Chan, Ho & Tom, 2023).

In design education, online whiteboard tools have become increasingly valuable:

1. Virtual classrooms: Design educators can utilize whiteboard tools as virtual teaching aids. They can deliver lectures, illustrate design concepts, and engage students in interactive exercises or group activities (Campbell, Detres & Lucio, 2019).
2. Collaborative projects: Online whiteboards enable students to collaborate on design projects regardless of their physical location. They can work together on assignments, share ideas, and provide feedback to one another, fostering a sense of community and teamwork (Chan, Ho & Tom, 2023).
3. Critique and feedback: Whiteboard tools facilitate design critiques and feedback sessions in a virtual setting. Students can present their work, receive comments from peers or instructors, and make iterative improvements to their designs (Campbell, Detres & Lucio, 2019).

There are already whiteboard tools available that assist users in collaborating and creating. However, these online whiteboard tools are not specifically designed for design education critiques, so many of their features are not applicable in a classroom setting. Additionally, they do not address the subjective concerns of design students caused by their personality traits.

The Big Five Personality Traits

Nowadays, there are two dominant personality models: The Big Five Personality Models and The VIA Classification of Character Strength (Niemiec, 2020). I choose to leverage The Big Five Personality Models to study the relationship between personality traits and design critiques since it is a basic classification of broad domains in personality rather than a detailed classification of the strength of personality.

The five personality traits is a theory developed in 1949 by D. W. Fiske (1949) and later improved by other researchers. It is a psychological classification method that includes five personality traits: extraversion (also often spelled extroversion), agreeableness, openness, conscientiousness, and neuroticism (Cherry, 2022). Since my research question is to find out what the challenges are that design students face in terms of providing constructive feedback to others in in-person critiques and how different personality traits make them face different challenges, an analysis of the five personality traits is necessary.

Openness is a personality trait characterized by a willingness to experience new things and a curiosity about the world (Cherry, 2022). Design students who are high in openness may be more willing to take risks and explore new ideas during design critiques. They may be open to feedback and willing to try new approaches to design.

Conscientiousness is a personality trait characterized by organization, responsibility, and attention to detail (Cherry, 2022). Design students who are high in conscientiousness may be more organized and detail-oriented in their approach to design critiques. They may be more likely to carefully consider feedback and incorporate it into their work.

Extraversion is a personality trait characterized by sociability, assertiveness, and a desire for social interaction (Cherry, 2022). Design students who are high in extraversion may be more outgoing and assertive in design critiques. They may be more likely to speak up and share their ideas with their peers.

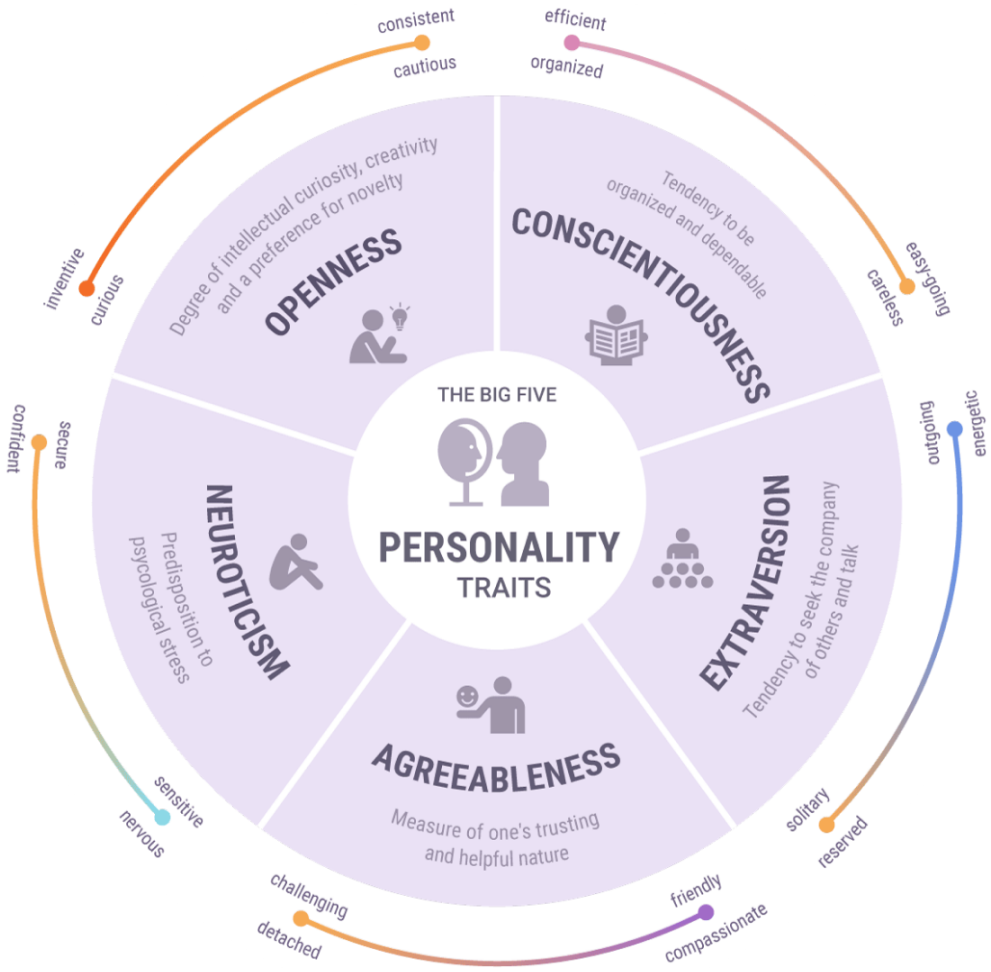
Agreeableness is a personality trait characterized by friendliness, cooperativeness, and empathy (Cherry, 2022). Design students who are high in agreeableness may be more likely to

work well with others in design critiques. They may be more willing to listen to feedback and consider the perspectives of their peers.

Neuroticism is a personality trait characterized by a tendency to experience negative emotions such as anxiety and insecurity (Cherry, 2022). Design students who are high in neuroticism may be more sensitive to criticism in design critiques. They may be more likely to become anxious or upset when receiving negative feedback.

Figure 2

Characteristics of the Big Five Personality Traits (Vital, 2018)



Existing studies show that personalities affect people's emotions, stress levels, academic performance, social activities, and communication in the education context (Saklofske et al., 2012). As mentioned above, design critiques in education is a social activity that requires multiple roles to collaborate and communicate. It includes activities such as verbal presentations, providing feedback, answering questions, etc. Therefore, I propose the hypothesis that each personality type could affect students' behavior and mental state and cause different challenges in in-person critique sessions. Thus, a research plan has been developed.

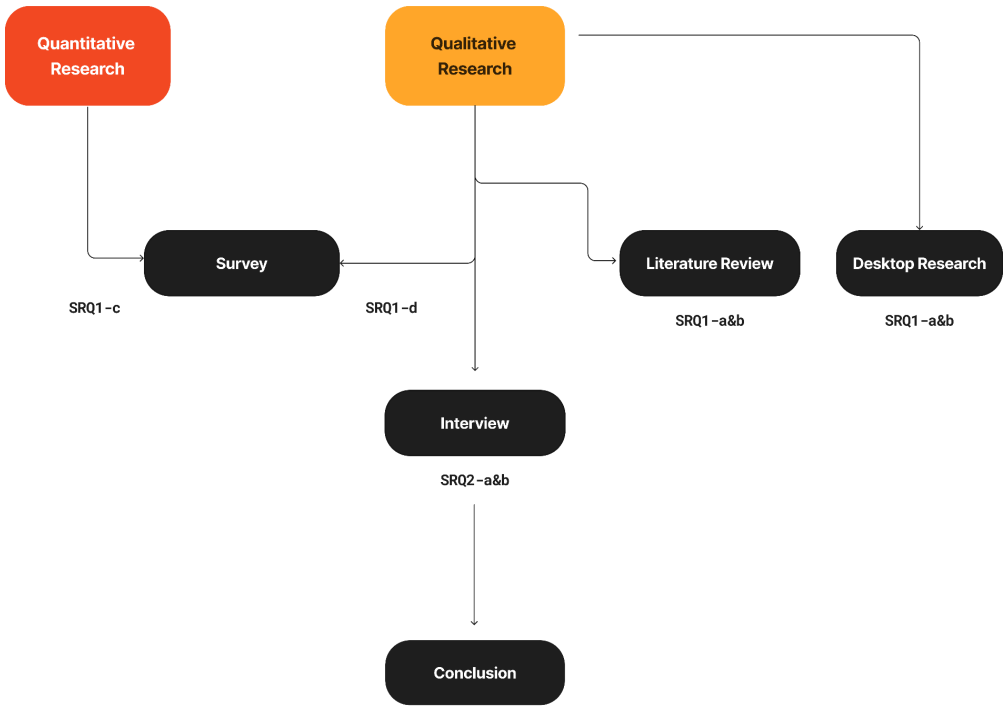
Process

Research Methodology

The study plan includes a research plan that includes both qualitative and quantitative research methods. The whole research process will be taken in two stages, including stage 1: literature review, desktop research, and survey, and stage 2: interview. Below are the research questions to determine the goal and content of each research approach and a diagram (Figure 3) to visualize the plan.

Figure 3

Research Framework



Research Question 1 (RQ1):

What challenges do design students face when providing constructive feedback to others in in-person critiques, and how do different personality traits make them face different challenges?

SubResearch Question 1 (SRQ1):

1-a. What personality traits model is there in psychology studies? What specific characteristics do particular personality traits have?

1-b. What are the roles and duties in design education critiques?

1-c. What specific personality trait impacts the students' specific pain points in critiques?

1-d. How relevant between certain personality traits and certain activities in critiques?

Research Question 2 (RQ2):

How could online whiteboard tools help students and instructors conquer the challenges caused by different personalities and promote more effective in-person design critiques?

SubResearch Question 2 (SRQ2):

2-a. How do students and instructors feel when facing challenges in critiques?

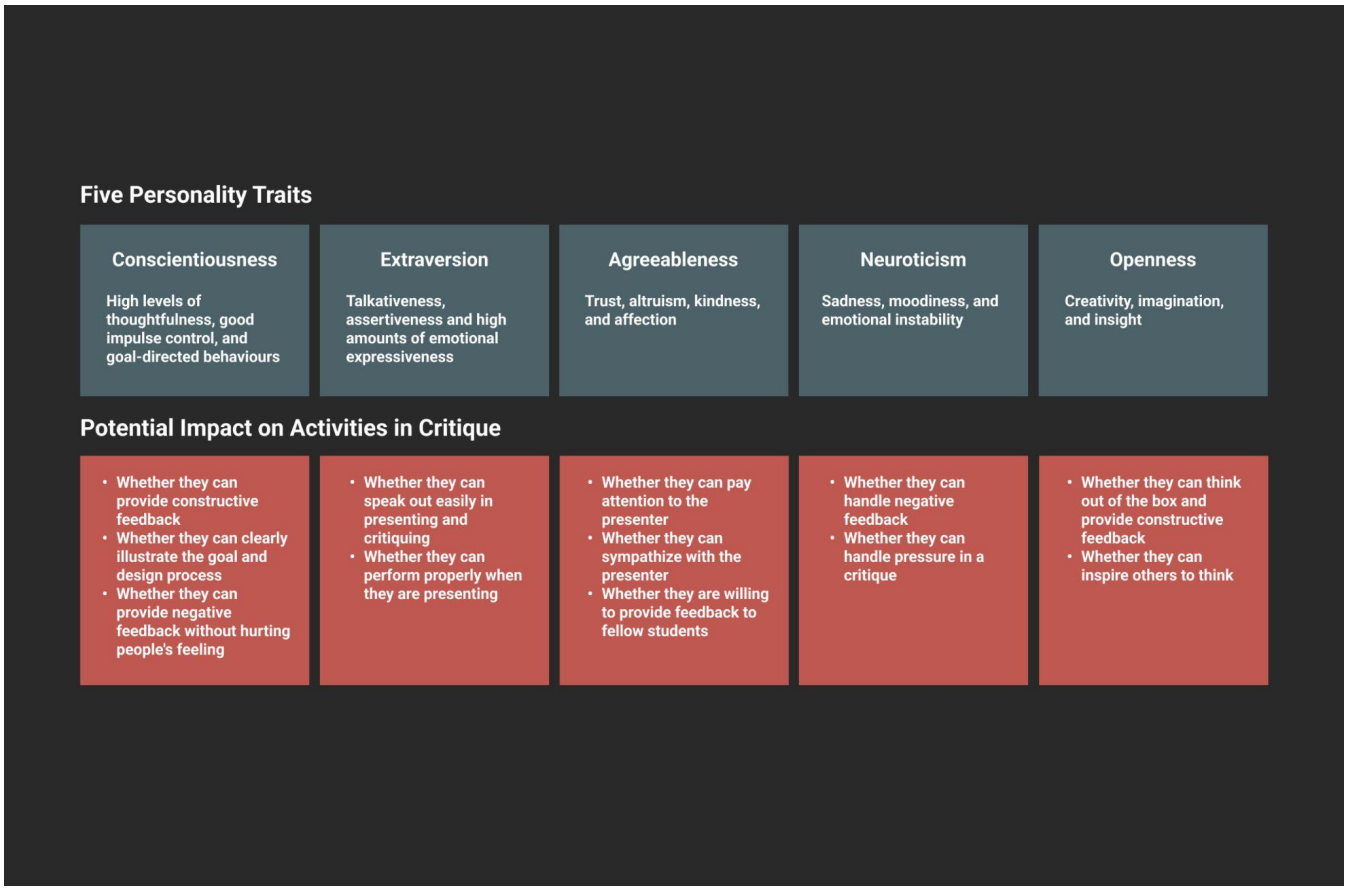
2-b. What features of online whiteboard tools could help students avoid these pain points in critiques? How could they help the students and instructor?

Research Insights

After obtaining basic information about online whiteboard tools, personality traits, and critique in design education, I made an analysis and assumptions about how students' personalities affect their performance in critiques (Figure 4). Later on, surveys and interviews were conducted to test these conjectures of mine.

Figure 4

Hypothesis on How Personalities Affect Behaviors of Students



Survey

As part of my work, surveys were created for both design students and faculty members to gather a range of perspectives (links to the surveys are in the appendix at the end of this article). The surveys aimed to identify the challenges students faced during critiques and how their personalities affected them.

Each survey contained four types of questions. Firstly, demographic questions helped ensure a diverse sample. Secondly, a personality test was included to identify participants' personality traits. Thirdly, participants were asked about their behavior and obstacles during critiques. Finally, questions about online whiteboard tools helped determine the popularity of different tools and participants' satisfaction with the features they used most frequently.

The survey for design students received 87 responses, while the survey for faculty received 12. Survey respondents are from different educational institutions and have different levels of design backgrounds. Some of them are not design practitioners currently, but they have received a bachelor's degree in design. Out of 87 responses to the survey for students, 36.23% of respondents are male, 57.97% of respondents are female, and 5.8% of respondents are either unknown gender or non-binary gender. Out of 12 responses to the survey for faculty, 27.27% of respondents are male, 63.64% of respondents are female, and 9.09% of respondents are either unknown gender or non-binary gender. In terms of age, most of the respondents to the survey for students are from 18 to 34 years old. Most of the respondents to the survey for faculty are from 35–54 years old.

The goal of the student survey was to gather information and screen interviewees for later stages. The faculty survey aimed to provide a different perspective to prevent bias and uncover additional design opportunities. As a result, I only analyzed and organized the results of the student survey. Below are the diagrams (Figures 5 and 6) that display the demographic information of the student survey respondents.

Figure 5

Gender Distribution of the Survey Respondents

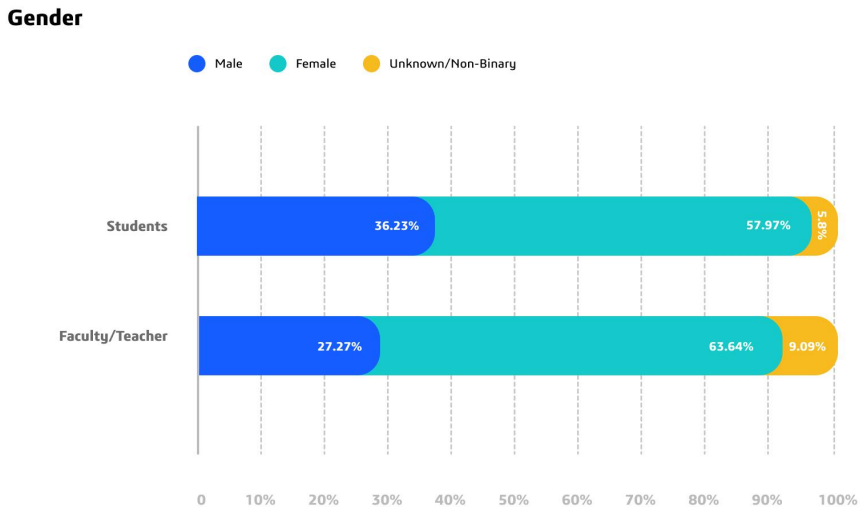
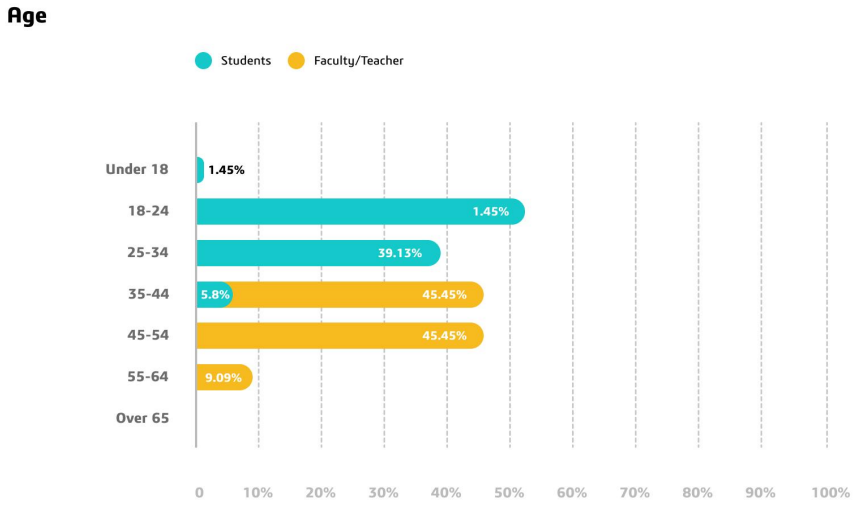


Figure 6

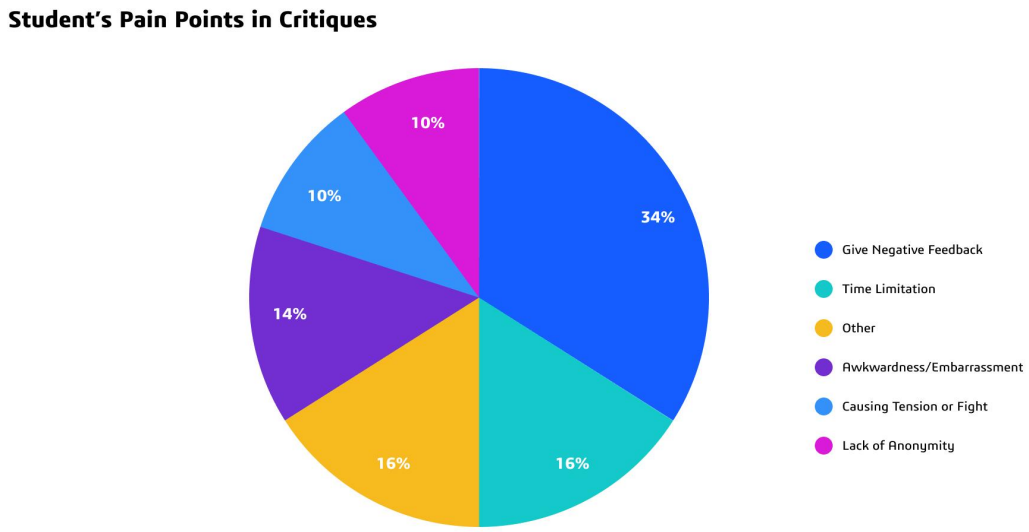
Age Distribution of the Survey Respondents



After compiling the qualitative data from the survey responses, I found several pain points that were brought up many times when I asked them what stopped them from giving feedback to others in critique. The most cited pain point was when they have negative feedback on someone else's work and are concerned that it will hurt the presenter of that work or that the presenter will take it personally. 34% of respondents cited this as the biggest challenge they encounter when giving feedback to others, followed by 16% of respondents who cited time constraints as their biggest challenge. Due to the limited time available in the class, students needed to understand others' work and put their own perspectives on it, so some of them could not do this in the time frame they were given. 14% of respondents cited embarrassment as the reason they don't give feedback in critique. Some of them felt embarrassed to speak in front of many people, while others were concerned that the situation would become awkward when people had different opinions. 10% of respondents would prefer a more private conversation when giving feedback. They either want to remain anonymous when commenting or hope the other students don't know what they said to the presenter. Another 10% of respondents thought the worry of causing tension or fighting was their biggest challenge. The following diagram (Figure 7) shows the percentage of respondents who mentioned specific problems out of all respondents.

Figure 7

The Most Citated Problems by the Respondents



To find out where the respondents fell on the five personality trait criteria, a series of questions were asked in the survey, and I used three levels to measure each trait. The students would answer either agree, disagree, or neutral in each criterion, which means they rated high, low, or neutral in certain personality traits. After counting the data of all valid responses, in order to find the relationship between each personality trait and each pain point that the students have in critique sessions, a series of diagrams have been generated (Figures 8, 9, 10, 11 &12). Each diagram focuses on a problem that the participants met the most. The x-axis shows the five personality traits, and the y-axis represents all the participants who brought up the issue in the survey. Thus different columns represent the proportion of participants with a particular personality trait among all participants who mentioned that question in the survey. And the different colors represent whether the participant is strong or weak in that personality trait. The bigger the difference between people who are high in certain traits and those who are low in the traits, the stronger the connection between the specific trait and pain point in critiques.

Figure 8

The Level of Impact of Personality Traits on the Problem of Giving Negative Feedback

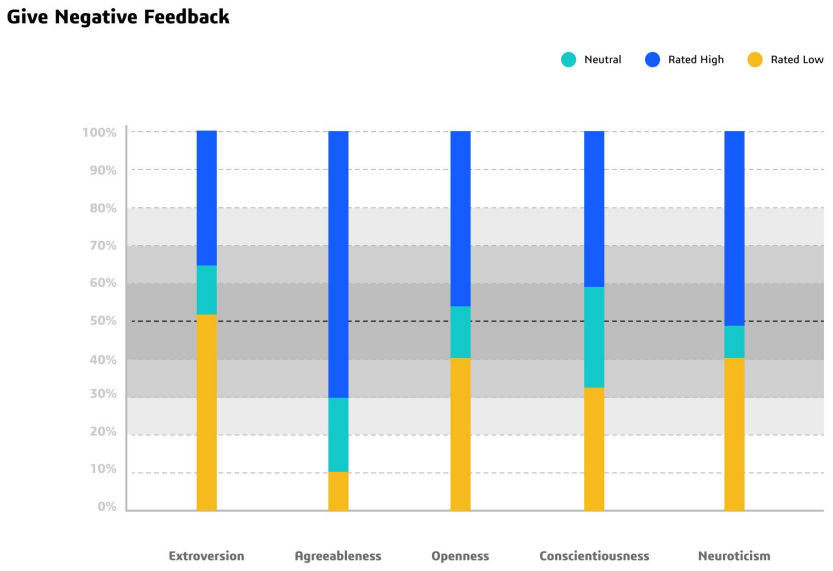


Figure 9

The Level of Impact of Personality Traits on the Problem of Embarrassment

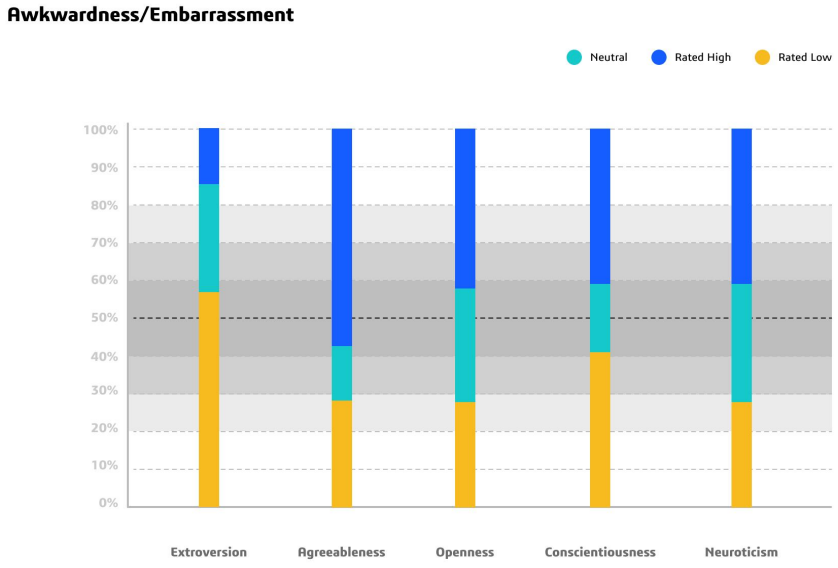


Figure 10

The Level of Impact of Personality Traits on the Problem of Fear of Causing Tension

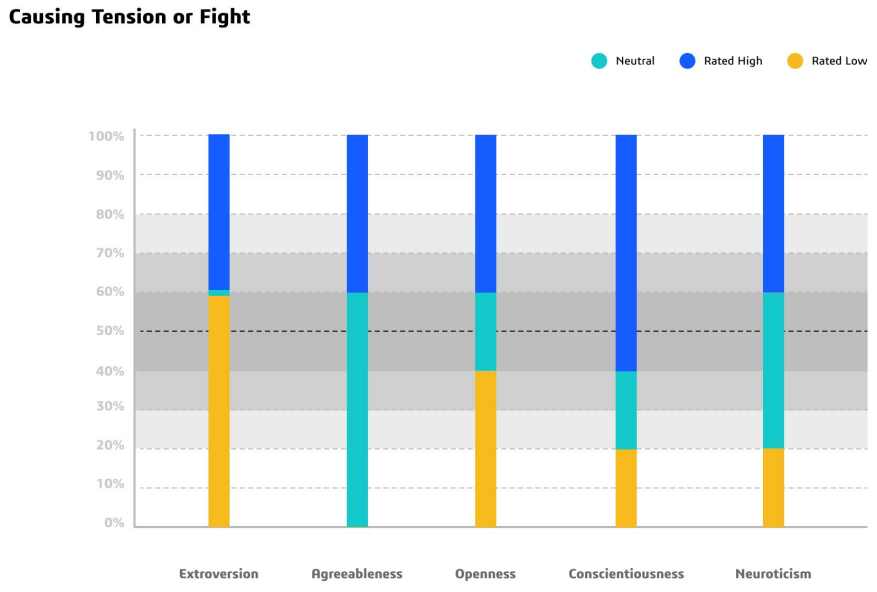


Figure 11

The Level of Impact of Personality Traits on the Problem of Time Limitation

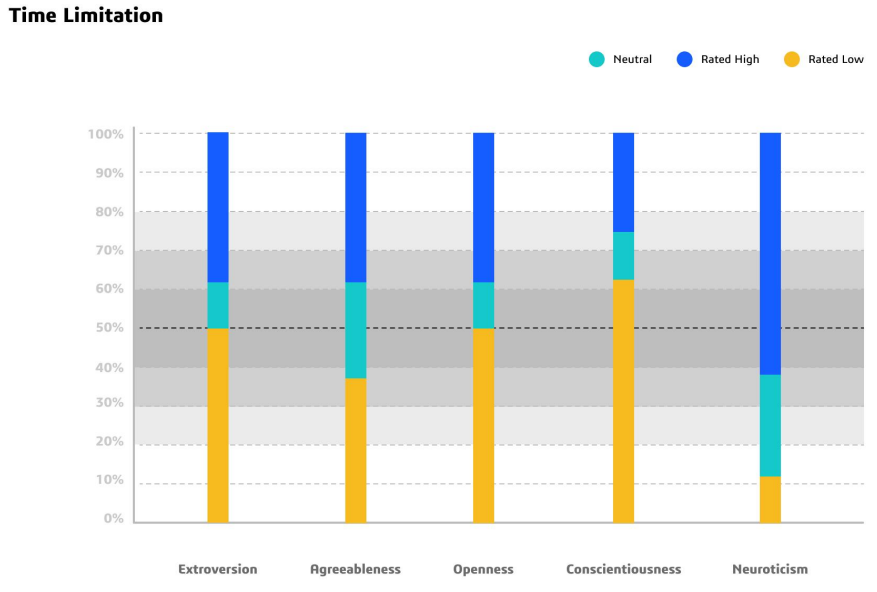
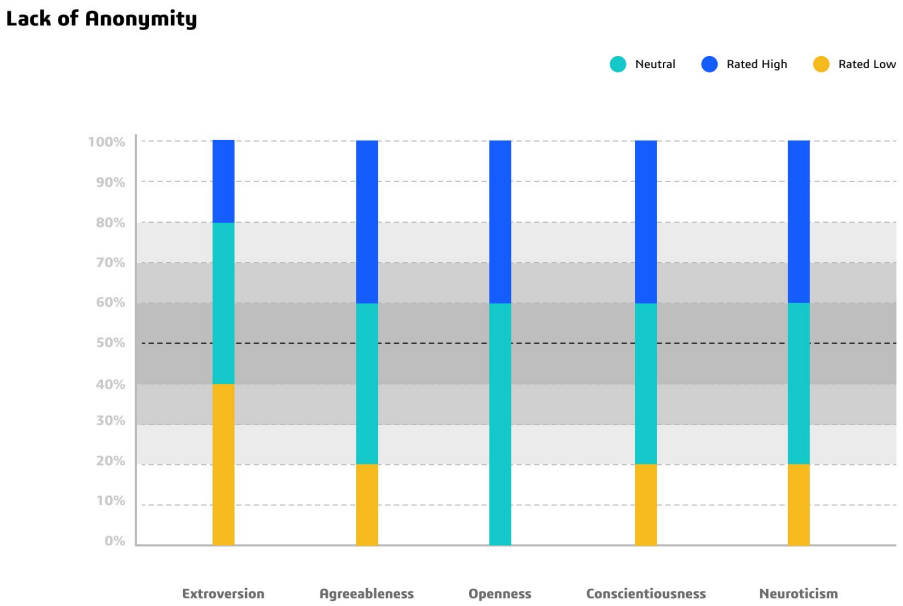


Figure 12

The Level of Impact of Personality Traits on the Problem of Lack of Anonymity



Interview

After recruiting interviewees through surveys by ensuring the diversity of interviewees in terms of demography, online whiteboard tools using experience, personality traits, and problems encountered in critiques, I conducted interviews as planned to understand how students' personalities cause critique problems and how online whiteboard tools might help solve these problems. I interviewed 12 students and 3 instructors with different backgrounds, and each interview lasted about 20-30 minutes. Based on the interviews, their pain points can be categorized into objective and subjective reasons. Objective reasons include: 1) limited time to provide feedback, 2) others already said what they wanted to say, 3) difficulty seeing the design, and 4) difficulty hearing the presentation. Subjective reasons include 1) fear of hurting others with feedback, 2) concern about having a different view from others, and 3) difficulty accurately

delivering the message. The objective reason is that the respondents mentioned and believed that they could not change even if they were completely different personalities. The subjective reason is that the respondents hypothesized that they might feel and do differently when they have different personality traits. Therefore, the subjective reasons are more likely caused by personality traits, according to the interview findings. Additionally, some instructors expressed interest in leveraging online whiteboard tools to better facilitate in-class activities and monitor student participation.

Desktop Research

As I understood deeper how students feel when they meet problems or challenges in critiques, what could be helpful to them, and how instructors envision critique sessions and students, I began to analyze the popular online whiteboard tools that are already available online for everyone. I explored every feature and interface on FigJam, Mural, Miro, and InvisionApp and studied their target users, use cases, layout, and UI elements (Figure 13 & 14). In conclusion, based on that, these platforms are either targeting user groups of professional UI/UX designers or enterprises with the use case of designing new interfaces or meeting within the company, which is quite different from my target users and scenarios. Therefore I organized the information hierarchy based on these platforms and added my own creation and modification (Figure 15). All of the features that I plan to include in my design are categorized into 3 tiers. The first tier is features and pieces of information that are indispensable for an online whiteboard tool to be able to operate. The second tier is features and pieces of information that support multi-users collaboration and make the tool applicable for more use cases; The third tier is the features that increase the usability and accessibility of the tools.

Figure 13

Desktop Research of InvisionApp

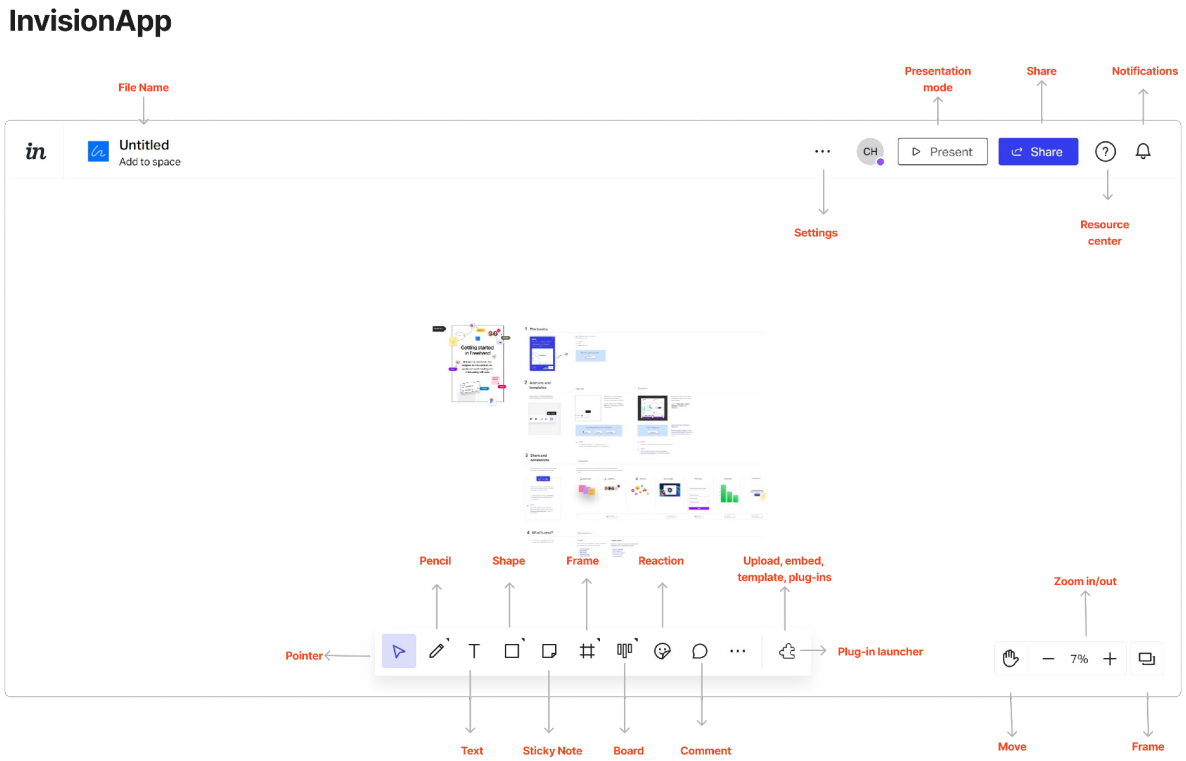


Figure 14

Desktop Research of Miro

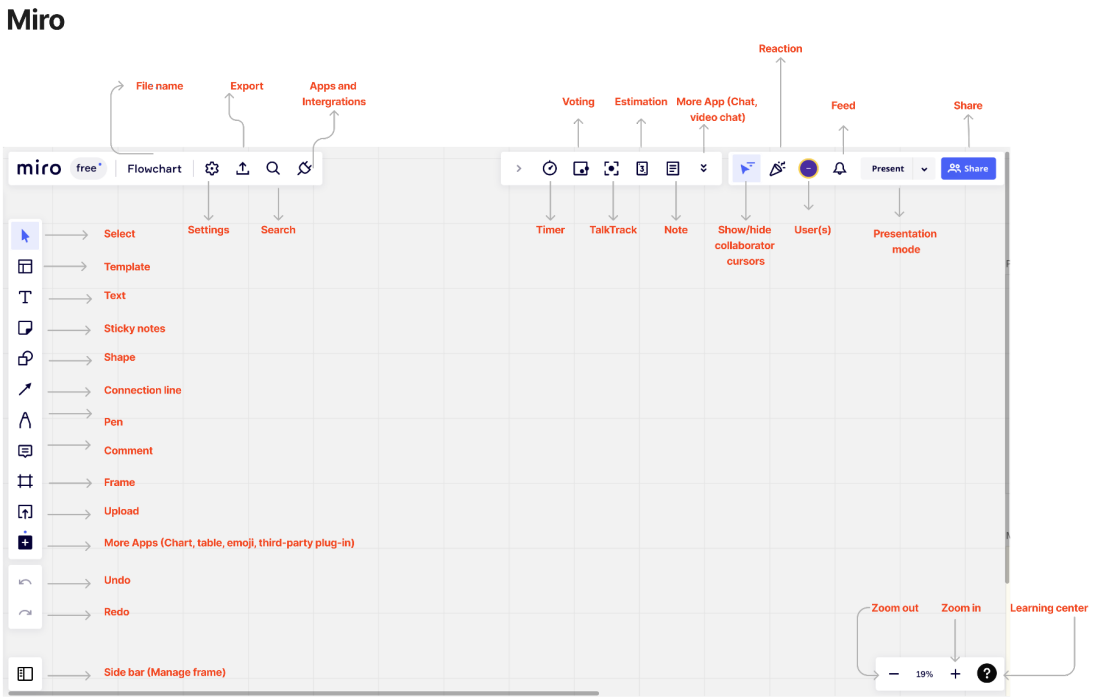


Figure 15

Information Hierarchy

1st tier	Comment	Upload/ download file	Timer	Notes taking	Zoom in/out	Undo/redo	Draw	Profile
2nd tier	Share	Vote/rate	Reaction in emojis	Participation Analysis	Post Announcement	Note	Font	Version History
3rd tier	Speaker's notes	Template	Onboarding	Integrations/Plug-in	Table/diagrams	Search	Grid/Align	

Therefore, I conclude the following design opportunities based on the insights I gained from the surveys and interviews. First, design classes could leverage online whiteboard tools to enhance students' participation in in-person classes because the use of this tool itself may, to some extent, solve the objective pain points of students in critique. For example, students cannot

come up with feedback in the limited time available in the traditional critique format, and using the online whiteboard tool allows students to continue adding feedback after the class. It also could be suitable for other situations like brainstorming, group project, etc. It could increase students' willingness to interact with others in critiques by offering more communication format. It could decrease the concerns of students with different personalities by offering more privacy. It might work as an assistant for instructors to facilitate and monitor students by providing relevant features. Lastly, It could provide better accessibility by utilizing online whiteboard tools in in-person critiques. Therefore instead of redesigning certain features that are missing in the existing tools, I chose to redesign the complete tool to redefine the user flow for using it in design critiques.

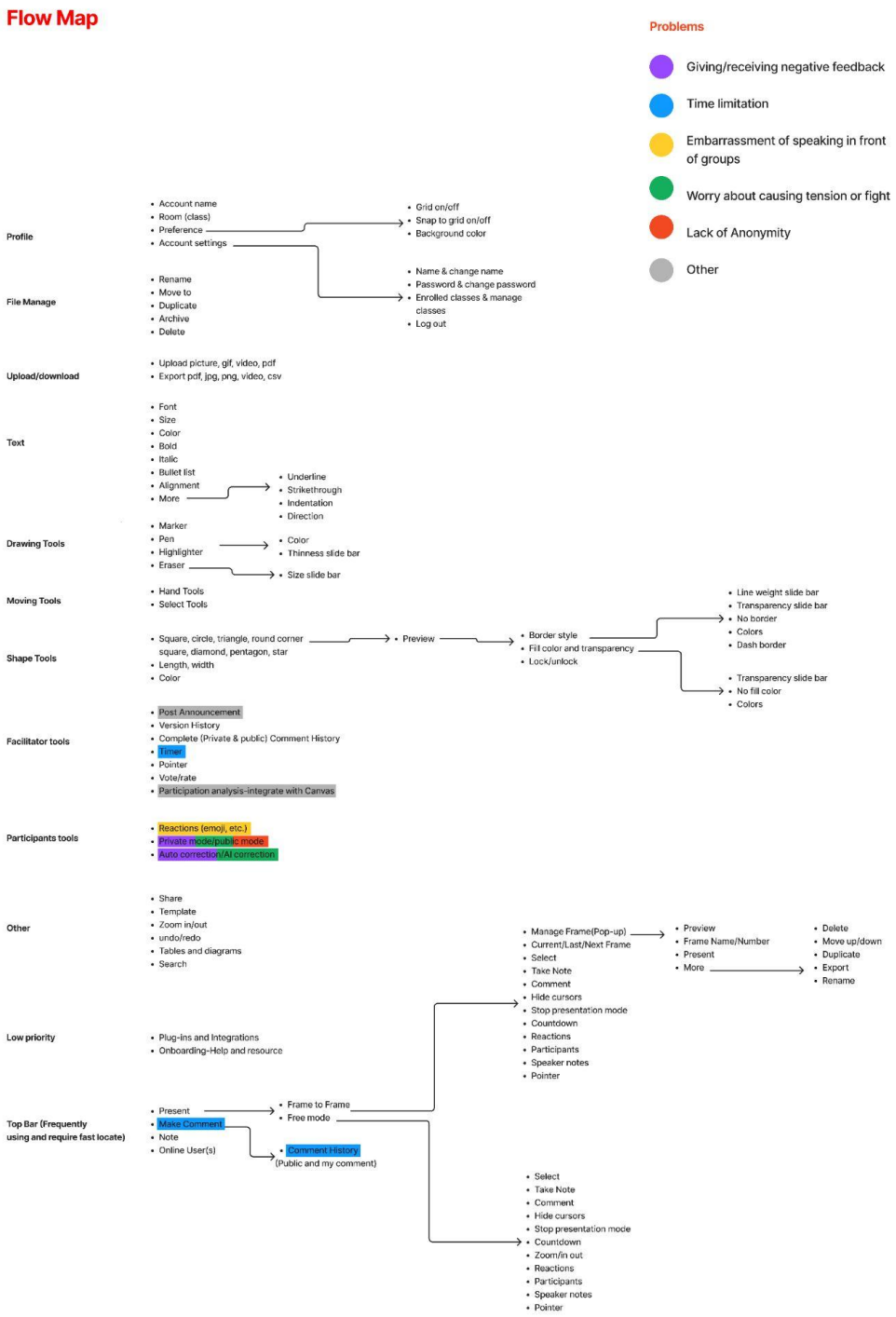
Design Process

Defining the User Flows

Since I have determined the priorities of information, I was able to create a flow map that lays the foundation for wireframes and high-fidelity prototypes that will be done afterward. The information and features in wireframes or even the final design will be organized exactly the same as the flow map. As the diagram shows (Figure 16), I categorized all the features into 12 criteria by roles in critiques and the nature of those functions so that it targets this specific context and group of target users and allows them to locate and access easily and quickly. Furthermore, something worth mentioning is that I place the feature that the students use frequently and need to access in a short time in the top bar of the interfaces. I also use color code to match each problem and its solution.

Figure 16

Flow Map



Defining the User Interfaces

As the flow map was created, the user experience part of this design was defined. Thus, I determined the layout to define the user interface part. Integrating the layout with the flow map, a set of wireframes has been created. As the image shows (Figure 17), I divided all of the UI elements into three sections: the top menu, the side menu, and the bottom menu.

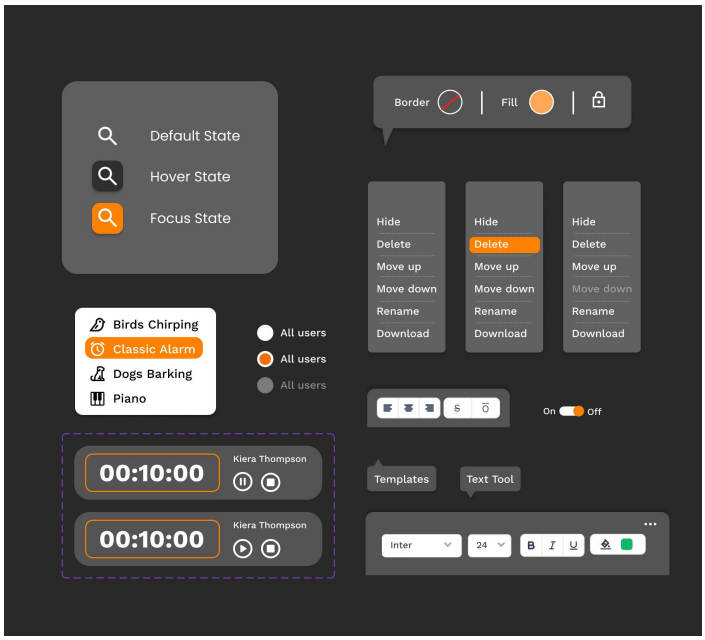
Figure 17

Partial Wireframes

As part of my process to create a high-fidelity prototype, I established a comprehensive design system that consisted of buttons in various states, fonts, colors, and icons. I opted to use grey as a primary color to minimize distractions when users need to concentrate on the white canvas. Additionally, I chose orange to signify the educational aspect of the tool and to evoke energy and optimism. Figure 18 highlights the buttons I designed, including the hover and focus states. To maintain a modern feel, I utilized the work sans font. Lastly, all the icons utilized in my design are sourced from the Google material design system.

Figure 18

Design System



Outcome

Figure 19

Hi-fi Prototype

The final outcome is an interactive prototype (refer to Appendix 3) with the information distributed by their functionality. I named it CritBoard to highlight its specialty that it is a design tailored for critiques in design education.

To ensure an online whiteboard tool is functional, I strategically placed the system UI on the left bar and essential features like text, shapes, and drawing tools on the bottom for easy navigation. I also incorporated familiar layout elements from existing online whiteboard products to expedite the learning process for users. During critiques, actions must be conducted quickly and efficiently. To achieve this, I placed the "presentation" and "take notes" features on the top menu for presenters to quickly begin presenting and taking notes while others can make comments. Additionally, "make a comment" is also located on the top for participants to comment right after presentations. Critboard also supports instructors by providing features such as comment history, participation analysis, timers, voting, and announcement functions to facilitate in-class activities. Instructors also have additional authorizations, such as managing files and viewing activity history.

As the main goal of this thesis project, I aim to encourage students with diverse personalities to participate more in critiques. The private mode provides anonymity for students with high agreeableness, high conscientiousness, low extraversion, and high openness. When students turn on private mode, their comments will be sent to the commentee anonymously, and their comments will not be displayed to other students in the comment history. However, the instructor of the file will still be able to see any comments made with private mode enabled. Auto-correction is also available for students who are high in agreeableness and low in extraversion, providing grammar corrections and tone adjustments for efficient and effective messaging. The AI-assisted auto-editing feature allows students to give negative feedback in a

more polite and euphemistic way. In addition, this feature also makes comments that lack logic and structure easier to understand.

At the Henry Art Gallery, I set up a series of installations as my thesis exhibition. The installation includes a Title and a subtitle of my thesis project; An illustration of critique to help guests understands what a design critique is and how's the environment looks like; a tablet playing an instructional video to introduce the context, and background information to explain the details of the CritBoard; a tablet for the interactive prototype so the guest can have hands-on experience and a set of prompt cards that guide the users to interact with the prototype by their personality traits.

Figure 20

Thesis Exhibition at the Henry Gallery

Discussion

The study aimed to identify the challenges that design students face during in-person critiques, specifically related to providing constructive feedback to others, and explore how different personality traits affect the ability to give feedback. Additionally, the study investigated how online whiteboard tools can help students and instructors overcome these challenges. The research findings revealed five major pain points that hinder students from giving feedback, often influenced by subjective concerns related to their personality traits. The online whiteboard tools partially address these challenges but do not fully solve all of them. Therefore, a new online whiteboard tool was developed specifically for design students with varying personalities to aid in critiques. The study's research questions were aligned with the findings, with the first question focused on identifying the difficulties design students face when providing constructive feedback during face-to-face critiques while taking different personality traits into account. The data collected from surveys and interviews provided insight into the specific issues participants encountered during critiques. Results indicated that students faced significant challenges such as time constraints, fear of causing tension or conflict, embarrassment, preference for privacy, and hurting the presenter's feelings. These difficulties were found to be influenced by different personality traits such as agreeableness, conscientiousness, extraversion, neuroticism, and openness.

The second research question aimed to investigate the effectiveness of online whiteboard tools in addressing challenges caused by different personalities during in-person design critiques. The study found that while these tools can help alleviate some difficulties, they cannot fully resolve all challenges. To address this, a new online whiteboard tool called CritBoard was designed specifically for design students with diverse personalities. This tool includes features such as anonymous commenting options to address concerns about privacy and features that

promote a more inclusive and collaborative critique environment. The CritBoard was designed to directly address the challenges identified in the study, with the potential to improve the overall critique experience for students with different personality traits. The tool can encourage greater engagement, facilitate constructive feedback, and enhance learning outcomes in design education. Additionally, it can assist instructors in monitoring student participation and facilitating critiques more effectively.

The research contribution of this study is twofold. Firstly, it provides valuable insights into the challenges design students face during in-person critiques and how different personality traits influence these challenges. By highlighting the subjective concerns that hinder students' participation and feedback-giving, the study brings attention to the importance of considering individual differences in critique settings. Secondly, the design of the CritBoard online whiteboard tool offers a practical solution to address these challenges, providing a platform that supports diverse personalities and promotes effective critique sessions.

As with any research, there are limitations to consider. One limitation of this study is the sample size of the surveys and interviews. While efforts were made to gather diverse perspectives, the number of participants was relatively small. A larger sample size could provide more robust insights and further validate the findings. Additionally, the study focused on design students in a specific educational context. The findings may not be generalizable to other disciplines or professional settings, warranting further exploration in different contexts.

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Appendix

Appendix 1: Survey for students

https://qfreeaccountssjc1.az1.qualtrics.com/jfe/form/SV_b2dYbKDS5IiXlk2

Appendix 2: Survey for instructors

https://qfreeaccountssjc1.az1.qualtrics.com/jfe/form/SV_42s2RwWVtWB7DoO

Appendix 3: Interactive prototype

https://www.figma.com/proto/ZN1QOpVaGaccBQdVkQmiRI/Interactive-Prototype?page-id=203%3A3535&node-id=510-11395&starting-point-node-id=510%3A11395