

Remote Collaborative Presentations;
A Tool to Bridge the Gap

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Abstract

With the rise of online education and remote professional work, it is important that tools be developed that facilitate efficient team collaboration among remote team members. In this research, the researcher designed a Remote Collaborative Presentation Tool (RCPT) that would allow multiple presenters to control the flow of a remote presentation (move forward/backward slides) without the need for awkward transitions among remote group members. 10 users participated in 1 hour-long session aimed at assessing both user needs/past experiences with various web conferencing and presentation tools, as well as testing the user-friendliness of a RCPT prototype. Overall, the RCPT was received very positively by all participants, and all participants successfully completed the seven tasks that they were asked to perform in order to test the most important features of the RCPT. Participants generally thought that the RCPT was a useful tool, although many suggested design updates. Data was also collected around the context of participants' past experience using a variety of web conferencing and presentation tools in both educational and professional settings. Though this research yielded much useful data for the future of this tool, it is important that additional research be performed to test the usability and functionality of the RCPT with the design updates made in this round of research, as well as research to assess the feasibility of how this tool might integrate with current web conferencing and presentation tools.

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Chapter 1: Introduction

In order to address the growing landscape of online education and remote professional work, it is important that application developers continue to develop tools that facilitate seamless remote collaboration among remote team members. Since the invention of web conferencing and presentation software, there has been a massive movement toward higher rates of remote working and online education. Almost half of professionals endorse working remotely, and online education enrollment has continued to grow despite the fact that overall post-secondary education enrollment has flatlined in past years (Chokshi, 2017 and Lederman, 2018, respectively). The need for software that facilitates remote collaboration has become an increasingly growing market, producing many products/applications so that remote teams are able to efficiently and effectively work with other team members across great distances. While web conferencing tools (e.g. GoToMeeting, Zoom, Skype, etc.) and Presentation tools (e.g. Google Slides, Microsoft PowerPoint, Apple Keynote, etc.) continue to become more sophisticated to address the needs of remote teams, there seems to be a distinct lack of available applications that facilitate collaborative remote group presentation control.

Compared to in-person presentations, remote presentations offer their own set of advantages and disadvantages. While remote presentations offer presenters the opportunity to share information with larger groups of viewers, they also offer new challenges, such as a lack of nonverbal communication and awkward transitions between slides. With multiple remote presenters, smooth slide transitions are imperative for making connections with the audience and the content in the presentation. Currently, remote group presentations continue to rely on one member of the remote team to control the flow of the slides in a remote presentation, making transitions between presenters awkward. The goal of this research is to assess the feasibility of a new Remote Collaborative Presentation Control Tool (RCPT) that was developed in the hopes of addressing the needs of remote group presenters.

For this analysis, I have developed a tech-based prototype of a tool that would allow multiple presenters to control the flow of a remote presentation seamlessly. In this study, 10 users participated in one hour-long session aimed at assessing both user needs/past experiences with various web conferencing and presentation tools, as well as testing the user-friendliness of a RCPT prototype. In this latter usability testing portion of each user session, participants were asked to perform seven simple tasks in the RCPT prototype to test the user-friendliness of the current prototype designs. Design updates were made based on participant feedback during user sessions. Through the collection of user feedback and design validation, I hope that this research results in a more user-friendly and effective tool for giving remote group presentations for its users.

Chapter 2: Literature Review

Remote collaboration has become an unexceptional norm for many American students and professionals. Due to the changing structure for how both school and professional work is being performed, it is important to consider not only why so many groups/organizations are opting to collaborate remotely and how it has affected the lives of workers/students, but we must also discuss how successful remote teams are leveraging the use of a wide array of technologies in order to work efficiently when separated by geography. One aspect of remote collaboration that has not been addressed is the development of technology fostering remote group presentations. Presentation tools like Google Slides and web conferencing tools like GoToMeeting/Zoom have revolutionized the way that students and professionals can present information to large audiences across wide geographical distances, but neither of these tools have addressed the needs of remote group presentations.

Group presenters continue to rely on one member of the remote team to control the flow of the slides in a remote presentation, making transitions between presenters awkward. I plan on addressing this concern by developing a remote collaborative presentation control tool that will allow co-presenters to collaboratively control presentations; never again will co-presenters need to utter the phrase “Next slide please.” Distance will no longer be a stumbling block for group professional or educational presentations.

In this review of current literature, I will discuss a variety of topics related to remote collaboration, including: why so many organizations are choosing to work remotely, how remote work has changed the structure of the business activities, the effects of remote collaboration on group presentations, as well as design inspirations for my remote collaborative presentation control tool. The goal of this comprehensive literature review is to show how my remote collaborative presentation tool is one of the

next steps in making remote collaboration between group members seamless in order to promote a more straightforward transfer of information, regardless of distance.

In this first portion of this literature review, I would like to explore the changing landscape of remote work and education while showing how remote collaboration software enables individuals to continue to achieve more in the comfort of their own homes, rather than in schools or offices. According to Stone (2018), half the meetings [workers] attend are considered a waste of time (according to the workers), and employees spend about 31 hours in unproductive meetings a month. With the invention and optimization of virtual meeting technologies, it is no longer necessary to meet face-to-face in order to exchange critical or helpful information among colleagues and business associates. According to Abamu (2018), between 2016 and 2017, there was a 17.1% rise in online education enrollment, while higher-education enrollment overall decreased; in addition, Chokshi (2017) states that over 43% of employed Americans stated that they worked from home in the past year; the need for quality remote collaboration software has increased drastically.

Since the invention of the telephone and conference calling software, the landscape of remote work has grown by leaps and bounds. As stated above, almost half of the American professional workforce (43%) today state that they have worked remotely (Chokshi, 2017), compared to just 9% in 1995 (Carlos, 2018). This massive change in how professionals complete their work highlights the ever-growing demand for remote collaboration tools. Remote work is not only changing how businesses operate, but it is also changing how employees complete their work. According to Chokshi (2018), not only are more American employees working off-site, they are working off-site more often than ever too; employees who endorsed working remotely four to five days a week grew from 24% (in 2012) to 31% (in 2016). In order to keep up with the ever-expanding landscape of remote work, it is important for the development of remote collaboration software to keep up with the increasing numbers of remote workers. Before we discuss the types of tools that facilitate remote collaboration among professionals, it is

also important to discuss another area where remote collaboration has been quickly growing in the past 10 years, online education.

In a time where getting an undergraduate degree can be costly and time-consuming, many students are opting to take online coursework. According to Lederman (2018), the percent of students who were enrolled in at least one online course jumped from 25% to over 31% from 2012 to 2016, respectively; during this same time period, post-secondary education enrollment stayed the same. With rising numbers of online students, it is important to ask, are there any benefits to online education? According to Oanca (2018), online education has three main advantages for contemporary students. First, online education is easily accessible; students are no longer bound by time and location. Now students can get a post-secondary education regardless of their busy schedule or geographic locations; all they need is an internet connection. Another benefit of online education is its emphasis on flexibility. Students can continue to receive education even if they have busy work schedules or other personal obligations. Lastly, online education is often more affordable than in-person classes, thus widening the learning opportunities of those who would “otherwise cannot cover the cost of a degree course” (Oanca, 2018). Similar to the shift from in-person business practices to remote work, this massive shift from in-person education to online education online course highlights an ever-growing need for seamless group collaboration software. Without a shared physical environment or in-person interaction, students who choose remote/online education need a way to connect with their instructors and colleagues; how can technology meet this need? Car et al. (1999) believe that technology can work to provide students with ‘shared space.’ When geography and lack of face-to-face interaction become barriers to innovative educational frameworks, technology can help to bring students and instructors together in a virtual ‘shared space’. In order to produce effective software, the goal of this research is to gather user feedback and use participants responses to build a tool that further gives users the ability to join a ‘shared presentation

space' so that presentation groups can collaborate seamlessly. Next, I will discuss the main types of technology that support online collaborative work and education.

Stone (2018) identifies three main types of remote collaboration software that are necessary for any type of remote professional work: chatting tools, “internal document sharing/content management tools”, and project management software. Each of these three types of remote collaboration tools plays a crucial part in facilitating remote team work. Chat tools keep the remote team in sync with each other by messaging or virtually meeting with other team members; “Being able to reach your team at any time in any place is hugely valuable for getting stuff done and essential for virtual collaboration” (Stone, 2018). Internal content management systems allow groups to keep shared documentation or other information sources that may be important to the team’s overall goal. Lastly, project management software is incredibly important in allowing teams to assign tasks to group members and tracking group workflows. Stone (2018) argues that these three tools will allow professional teams to have a clear roadmap for a healthy virtual collaboration culture, [thus] freeing your team up to get more work done from anywhere. In an age of remote work culture, the more that software can support collaboration among group members, the better. My remote collaborative presentation control tool represents an innovative addition to remote chatting software branch of the virtual collaboration ecosystem; it will allow groups to collaborate even further by presenting information seamlessly (without messy transitions) to other group members or stakeholders.

While the growth of remote education and remote professional work has spurred the creation of many different types of remote collaboration software, it is important to discuss strategies for successful remote collaboration beyond the use of technological tools. Tools can help you share documentation, chat with your colleagues/associates remotely, but how can you change the actual structure of remote collaboration in order to leverage its benefits? According to Theifels (2017), establishing routines can be a great way to ensure that groups collaborate regularly. Routines can make sure that all team

members are available to collaborate at the same time. Required working hours can also be a great way to ensure that team members are available at predictable times during the normal work day. By requiring remote teams to be available at the same time during the day, remote teams are able to have easy, fast digital communication in order to solve problems efficiently; “There’s nothing more frustrating than needing the answer to something you’re working on, only to find the person who has the answer isn’t available” (Theifels, 2017). Remote collaboration can change the tone and pace of work-related conversations, and according to Chamorro-Premuzic et al. (2018), one of the most important ways that remote teams can succeed is to establish communication norms. Deciding on what technological medium team members are supposed to share their concerns (Slack, email, etc....), as well as an appropriate response time, writing style, and tone are great ways to leverage the power of remote collaboration (Chamorro-Premuzic et al, 2018). By forming communication norms, team members are able to create a sense of predictability within their virtual workspace. When discussing remote collaboration, predictability is a highly sought-after trait so that team members can anticipate other members work style and needs in advance. According to Hatem et al. (2012), effective coordination and collaboration between different project members is of paramount importance when trying to find solutions to the project issues. The need for remote collaborative software is imperative to address the rising amounts of remote employees and students.

Throughout this portion of the literature review, I have shown that the nature of how employees work and how students learn has changed drastically in the past 5-10 years. The development of virtual collaboration software such as GoToMeeting and Google slides has been critical to helping group members collaborate to find solutions to their problems. In the next section, I will describe advantages and strategies related to co-presenting and presenting remotely in order to show how my remote collaborative presentation control tool addresses the needs of remote groups and aids in the information presentation process.

I will now discuss the advantages, disadvantages, and strategies related to successful co-presenting and remote information presentations. According to Harvard Business Publishing Staff (2018), 80% of professional presentations are now being performed remotely; because there has been a rise in the number of remote workers and students in America (discussed above), skills related to presenting information remotely in a group has become more important than ever before. Compared to in-person presentations, presenting information remotely offers its own advantages and disadvantages. For example, remote presentations give speakers the ability to reach a larger audience through web conferencing tools as well as allowing presenters to interact with their audiences in new ways (polling, answering presentations via chat, etc....) (Harvard Business Publishing Staff, 2018). According to the GoToMeeting blog, however, despite the advantages that remote technology has given users, it has yet to truly bridge the gap between human beings (Mathews, 2017). One of the main issues with presenting information remotely is establishing a connection with your viewers; how can presenters overcome this chasm created by technology and make connections with their audience? Morris (2017) cautions against presenting without listening to the audience. You have to make sure to check in with your audience during your presentation to see if there are any questions and make sure that your audience remains engaged with your presented information. In addition to creating a connection with your audience, it is also important to include other visual media, including short videos, graphics, and demonstrations (Kulasegaram, 2017). Next, I will discuss the challenges and advantages of presenting information with a group, rather than just a solo presenter.

Remote group presentations also offer new challenges for multiple presenters, including the possibility of technical difficulties and the distinct lack of important nonverbal communication. Multiple presenters can often help solve the issue of making a connection with remote audiences by adding to the energy as well as allowing presenters to 'rescue' each other when necessary (LTConsulting, 2011). Multiple presenters do pose some issues compared to solo presenters, however, by increasing the amount of moving

parts within remote presentations. Teams have to come to a presentation-style agreement and must also commit to maintain a trusting and supporting atmosphere for the other presenters in the group, as well as the audience. Some research has supported the Pecha Kucha presentation style model as a way to force presenter groups to focus on presentation preparations (Oliver, 2013). In the Pecha Kucha model, presentations are limited to 20 slides, and presenters are only allowed 20 seconds to present each slide (Note: in the cited study, the Pecha Kucha model had to be revised for group presentations, allowing for variable slide presentation times, as long as the presentation time wholly did not exceed 6 minutes and 40 seconds). By forcing presentation groups to work collaboratively, this increased the quality of presentations by “[focusing] on developing a visually entertaining presentation...and to more critically think about the information that they are presentation” (Oliver, 2013). Despite increasing group presentation quality, this extra layer of strategic planning can add to the difficulty of presenting remotely; however, much literature agrees that the advantages here far outweigh the disadvantages of group presentations.

One last important thing to consider when presenting in a group are transitions. With multiple presenters, smooth transitions are imperative for an integrated delivery of information to the audience. Because physical signals to initiate transitions are not possible in remote presentations, the main goal is to verbally ‘tee-up’ your partners to indicate a change of slide or presenter is coming up (LTConsulting, 2011). A harmony amongst each group member’s information is important to coordinated transitions, but how many transitions should be made in a presentation? According to Ridgley (2018), too many speaker transitions can make group presentations seem disjointed or fragmented, thus confusing the audience. Ridgely suggests keeping group member transitions to a minimum in order to keep a strong relationship with the audience. One of the main goals of my collaborative remote presentation control tool is to make transitions in remote presentations even more seamless by allowing each presenter access to control

the flow of the slides themselves, rather than depending on one group member to control the entire presentation.

Compared to in-person group presentations, remote group presentations can pose different advantages and shortcomings to presenters. From keeping the remote audience engaged to avoiding technical difficulties with presentation/virtual meeting software, presenters are forced to consider and plan for these issues when giving remote group presentations. According to Marshall McLuhan's *Laws of New Media*, the effect of remote presenting is 4-fold; remote presentations simultaneously enhance global communication and voice, but they also obsolesce physical presence and increase audience disconnection (Duarte, 2018). Addressing these points can be difficult, and will undoubtedly require additional planning in order to make sure that the advantages of remote presenting are leveraged while the shortcomings are mitigated. As stated previously, strategies such as pausing for audience comments/questions and including many different media types can increase presenter/audience rapport, which will result in higher levels of audience engagement (Morris, 2017 and Kulasegaram, 2017). One of the main benefits of group presenting, however, is that group members can share the presentation load and also manage several different aspects of presenting the same time (e.g. managing audience questions, transitioning slides, etc.) (LTConsulting, 2011). It is important to consider all of these factors when developing an interface that will allow multiple presenters to control a presentation at the same time.

This final chapter of the literature review focuses on the tech-based prototype design inspirations by comparing and researching similar online collaborative tools and web conferencing products. In order to understand the need for collaborative remote presentation control, it is important to consider other similar products and how users review their most useful features. By citing other product examples, such as Google Slides, GoToMeeting, Microsoft PowerPoint, as well as many others, this section will attempt to show how no other product exists with this unique combination of features. I

will also show why a new form of collaborative remote presentation control would be useful for remote groups, both in the professional and educational setting.

Prototype Design Inspiration

With the rise in remote professional teams and the increase of online education, virtual meeting tools have become an important tool necessary for enhancing remote collaboration. One of the most-used and versatile virtual meeting platforms is GoToMeeting. According to their website, GoToMeeting.com, GoToMeeting describes their web-conferencing tool as “the professional video conferencing solution of choice for businesses worldwide” (GoToMeeting.com, 2018). With a wide variety of web-conferencing features, including real-time screen sharing capabilities, remote keyboard and mouse control, and “One Click Meeting invitations”, GoToMeeting’s parent company ‘LogMeIn’ has made grown to support two million daily users (LogMeIn.com/About, 2018). One of LogMeIn’s primary values is to Collaborate Openly, “Our success is driven by our ability to build relationships, break silos and connect across teams, functions and geographies” (LogMeIn.com/About, 2018).

With an emphasis on cross-team collaboration, I looked to GoToMeeting as a major source for inspiration for my collaborative remote presentation control product. GoToMeeting allows users to effortlessly join virtual meetings and connect with other remote team members by just clicking on a meeting link (GoToMeeting.com/Features, 2018). Inspired by GoToMeeting’s link sharing capabilities, my collaborative remote presentation tool will similarly enable presentation organizers to share email invitations with other presenters, inviting remote group members to join the group presentation easily. Another important feature that I hope to mirror is GoToMeetings ability give keyboard and mouse control to other virtual meeting members (GoToMeeting.com/Features, 2018). I hope to emulate this capability within my own collaborative remote presentation control tool by allowing presentation organizers to share control of the group’s presentation. By joining the group presentation, an internet

browser window will appear on each group member's personal machine showing the real-time screenshare of the group presentation. Additionally, all group members will automatically be given control over the presentation, allowing everyone to move forward or backward in the presentation as they see fit. The goal of this collaborative presentation control capability is to strengthen the group's overall presentation by eliminating the awkward slide transitions that are present when only one group member has control over the presentation.

From a more technical and design perspective, I have also looked to GoToMeeting's unique toolbar (For image, see Appendix A) as a source for inspiration for my collaborative presentation control tool. The GoToMeeting Toolbar gives users the power to mute their microphone, see meeting attendees, and give other users keyboard and mouse control. Another unique feature of the toolbar is that it is invisible to other meeting members when the presenter shares their screen with all other attendees. I used GoToMeeting's toolbar as a starting block when designing the control panel for my collaborative remote presentation control tool. The control panel for my tool will similarly allow group members to see what other active presenters are present in the presentation, as well as a new ability to view presenter's notes when talking through presentation slides without revealing the notes to other viewers (via screen share); however, it will not contain many of the features that are shown in the GoToMeeting toolbar because my tool only serves to link remote presenters together on the presentation and gives them the ability to collaboratively control moving through the presentation slides. Users will need to use virtual meeting software separately in order to connect the presentation collaborators with the viewers of the presentation. Because my tool is to be used in conjunction with virtual meeting tools, like GoToMeeting, I chose to keep the control panel as lightweight as possible.

Aside from GoToMeeting, another important collaborative tool for remote professional and educational teams is Google Slides. Google Slides is an online presentation building tool that allows users to create, build, edit, collaborate, and present

wherever you are (Google.com/slides/about, 2018). Like the more traditional application-based tools, Microsoft PowerPoint and Apple's Keynote, Google Slides gives users the ability to create colorful, informative presentations. According to Duffy (2016), Google Slides differs from both PowerPoint and Keynote in two critical ways: the ability to have multiple presentation creators work on the same presentation synchronously and the ability to share presentations with others by quickly generating an email-based link that other presenters can click on and begin presenting the same presentation instantly. Duffy (2016) goes on to say that "Google Slides is the best truly free presentation app you'll find, strong on collaboration and with a few special touches." In the spirit of synchronous collaboration, I hoped to allow all active presenters to control the movement of the presentation at the same time, without designating who needs to move slides forward and backward.

Similar to GoToMeeting (discussed above), I find that Google Slides' emphasis on effortless team collaboration across space and time to be a valuable model when considering how to best address the presentation needs of remote teams. While Google Slides allows users to build a presentation simultaneously and collaboratively, an important feature that it lacks is the ability to present a presentation collaboratively. As covered above, my collaborative remote presentation tool will grant users the ability to leverage the agility of Google Slides by allowing the presentation organizer to simply plug in the link to the Google Slides presentation in order to view the presentation. I will also emulate the similar link sharing features of both GoToMeeting and Google Slides by allowing my collaborative presentation tool to send unique, email-based link to the presentation so that organizers can easily share with their collaborators in order to join the presentation. One of the main goals of my collaborative presentation control tool is to foster collaboration while still remaining as agile and lightweight as the other popular online collaborative tools that I discussed in this section of the literature review.

Due to the changing nature of remote work/education, technology plays an important role in facilitating the exchange of information. From how the rise of remote

education/work has changed the way that people are doing business to the effects of remote collaboration on presenting information across large distances, There continues to exist a small gap in technological assistance when it comes to remote collaborative group presentations. I have shown how current remote presentation tools, while helpful, have not optimized the way that remote groups are presenting information to their peers; my remote collaborative presentation control tool will address these issues by allowing all group members to have control over remote presentations. If remote groups can seamlessly present their knowledge to large audiences regardless of their location, then remote work and education can continue to revolutionize the way that people view remote work and collaboration. If remote work is to persist and continue to grow in the future, it is important to develop new and better tools that will facilitate seamless group collaboration (Chamorro-Premuzic et al, 2018) .

Chapter 3: Research Methods

Information-based Design Research is an iterative process through which effective application designs are generated by obtaining relevant user feedback and design validation (Stappers and Giaccardi, 2018). While Information-based Design Research is applicable for product development in many fields, these methodologies are especially useful when developing user-friendly software applications. User input is invaluable for informing the software design process for effective end products. All too often, software projects fail to meet the needs of users because the design team failed to take user input into account when performing their design process.

In an effort to address the needs and expectations of users, I chose to perform user interviews that also contained a usability testing component so that user input might inform the design process for my Remote Collaborative Presentation Tool (RCPT), albeit in an expedited fashion. This chapter of my research focuses on the usability-centered design process, including research participant demographics, research methods, measures, and data analysis that are utilized in this task-based usability study.

Participant Demographics and Recruitment

Participants in this study included 10 professional individuals and students. Participants included five men and five women between the ages of 25 and 43. All participants were volunteers. The fact that participants volunteered to participate in the study is also a limitation of this research; future research with non-volunteer participants should be conducted in order to make the participant sample more representative of the overall population of users that would be using this tool. Participants were recruited by responding to a research solicitation posted on the authors LinkedIn and Facebook news feeds (for Research Solicitation Language, see Appendix B). Research solicitations included a link to a (screening) survey that prospective participants were asked to fill out if they were interested in participating in the study (to view screening survey, see

Appendix C). The screening survey was performed using a Google Form and contained seven screening questions assessing prospective participants age, use of Virtual Meeting Tools, and past experience remotely presenting professional or educational content (with and without co-presenters). Participants were deemed ineligible to participate in this research study if they were i) under the age of 18, ii) had never utilized a virtual meeting tool (such as Zoom, GoToMeeting, WebEx, etc.), or iii) had never presented educational or professional content remotely (via a Virtual Meeting Tool).

In total, the recruitment screening survey received 45 responses; of those 45 responses, 23 (51%) were deemed to be eligible for the study. Participants were deemed ineligible if they were 1) under the age of 18, 2) had never utilized a web conferencing tool for professional or educational purposes, or 3) had never presented content remotely using a web conferencing tool for professional or educational purposes. Specifically, 2 were deemed ineligible for this study because they were under the age of 18, 5 were deemed ineligible because they had no past web conferencing tool use, and 15 were ineligible because they had never presented content remotely using both presentation and web conferencing tools. Those that were deemed eligible were asked to include some basic contact information (such as name, email and phone number) so that the researcher could schedule a time to perform the usability testing sessions with them at a later date. The researcher contacted these eligible participants via email and scheduled a time to meet for a usability testing session between January 1, 2019 and January 31, 2019. Informed consents were also distributed to participants via email (see Appendix D). The informed consent form contained information about research procedures, benefits and risks of participating, voluntary participation, compensation, and contact information of the researchers. The purpose of the study was also explained in the consent form. The researcher collected participants informed consent statements via email response to the informed consent form. As promised in the informed consent form, participants received \$10 Amazon gift cards (delivered electronically, via email) for participating in the study. Participant user sessions lasted between 30 and 60 minutes and were performed remotely

using GoToMeeting. Through GoToMeeting, the researcher was able to screen share and give mouse and keyboard controls to participants so that they are able to interact with the tech prototype. Each participant user session was also recorded (via GoToMeeting) and saved to the researcher's personal computer, where each file was password protected to ensure anonymity among participants.

User Interview and Usability Session

In order to get as much information as possible from participants, user sessions contained three distinct components: a semi-structured interview component, a task-based usability testing session component, and a debriefing component.

Participant Interview Component

Before beginning the usability testing portion of each participant interview, it was important to get background participant demographic information as well as additional user feedback on participant's prior and current use of web conferencing tools and presentation software. The researcher chose to perform a semi-structured interview to address each participants' experience utilizing various tools in both professional and educational settings. The goal of each semi-structured interview component was to gather feedback from users around 1) which web conferencing and presentation tools they use currently or in the past, 2) features/capabilities of interest with current tool usage, and finally, 3) pain points with current tool usage. The researcher felt that these topics would be the most useful for preparing accurate and user-feedback-based design recommendations. To view topic discussion questions, please see the Appendix E, Participant Interview Guide.

Usability Testing Session Component

After obtaining user feedback on current tool experiences, participants were directed to interact with the interactive prototype that the researcher designed. Screens for

the prototype were designed using Sketch; the screens and interactions were combined into an interactive tech-based prototype using InVision. Participants were asked to perform seven task-based scenarios to assess the usability and user-friendliness of the interactive tech-based prototype. Task scenarios were designed by the researcher to represent the most critical and basic functionalities for a future minimum viable product (MVP) of the RCPT. To view descriptions of each task-based scenario, please see the Appendix E, Participant Interview Guide.

Debriefing Component

Once users completed had completed the Usability Testing Session Component if each user session, participants were asked to comment on their experience interacting with the prototype. Specific attention was also paid to participant feedback regarding additional features or design improvements that can be made in the future for the final product. To view descriptions of debriefing questions, please see Appendix E, Participant Interview Guide.

Initial RCPT Prototype Designs

As previously discussed, participants were asked to complete seven tasks with the tech-based Remote Collaborative Presentation Tool (RCPT) prototype designed by the researcher. In this section, I will give a brief overview of the initial prototype designs that were presented to participants in during participant interviews. In Figure 1 (below), I have included an image of the initial RCPT screen.



The image shows a light gray rectangular box with a white background. At the top, it says "Please load a presentation" in bold. Below that, there are two options for loading a presentation. The first option is "Paste a sharable link:" followed by a text input field. The second option is "Or select a file from your computer:" followed by another text input field and a "Browse" button. At the bottom left of the box, there is a "Done" button.

Figure 1. Initial RCPT screen. Users are encouraged to upload presentation files (either from their local computer or a sharable link).

The screen featured in Figure 1 was designed to help users upload presentation files into the RCPT. Users can either choose to upload presentation files from their local machine (.ppt, pdf, etc.), or upload a presentation file via a sharable link (Google Slides presentation).

Once a presentation has been loaded into the RCPT, users are directed to the screen in Figure 2 (below). Figure 2 shows the overall RCPT interface once a presentation file has been uploaded into the tool. On this screen, users are able to interact with the bulk of the RCPT features. These features include: view presentation slides (top, left), put the presentation slides in full screen mode (arrow icon, top, right of presentation slide image), expanding/collapsing presentation notes (bottom, left), view and invite other active presenters to the presentation (top, right), chat with other active presenters (middle, right), as well as mute/unmute the computer microphone and move presentation slides forward/backward in the presentation controls area (bottom, right).

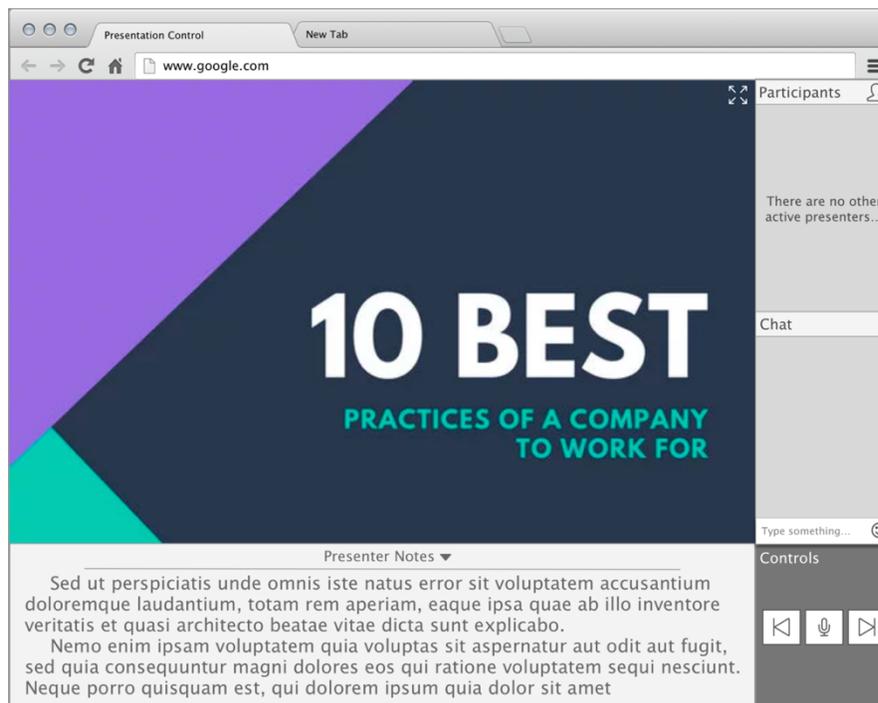


Figure 2. This image shows the overall user interface for the RCPT once a presentation file has been uploaded into the tool. Users can perform a variety of functions to interact with both the presentation as well as their other active presenters on this screen (features listed above).

The user interface was designed with the intention of having a user upload a presentation file into the tool and then inviting other active presenters to the presentation so that multiple individuals can control the flow of the presentation slides synchronously. Other features, such as the view/hide presentation notes, presenter chat, and full screen mode, were added in order to optimize the user experience of this tool based on features from other popular web conferencing and presentation tools (See Literature Review).

Data Analysis

Analysis of the user-friendliness of the tech-based Remote Collaborative Presentation Tool (RCPT) prototype was assessed by evaluation of task performance ratings that the researcher gave each participant as they were performing tasks throughout the usability session. Task ratings are given on a 0-2 scale. 2 representing a task Success with Ease (SwE), 1 representing a task Success with Difficulty (SwD, participant was able to complete the task after one failed attempt), and 0 representing a Task Failure (F), participant was unable to complete a task after two or more failed attempts. Overall task success scores can be found in the task success rating spreadsheet (see Appendix F).

The researcher also asked participants to suggest improvements or additional features that can be added to the remote collaborative presentation tool in order to improve its usability and effectiveness. The discussion of these participant responses can be found in the Discussion Section of this paper.

Chapter 4: Research Results

The remote participant sessions (containing individual interview and usability testing components) performed in this research effort produced many interesting implications for the future of the Remote Collaborative Presentation Tool (RCPT). Upon completion of ten hour-long interviews, I reviewed session notes and audio/video recordings to develop a list of major findings to apply to the design. After speaking with users about their use of web-conferencing tools, presenting content remotely, both as individual presenters and presenting with a group, and also their ability to navigate through the tech-based prototype that I designed for the remote interviews, I have come to several unique conclusions that should be explored further in the future.

Context for use of Web conferencing tools

All participants endorsed the use of Web conferencing tools in the past. At the time of the interview, participants primarily expressed using Web Conferencing (WC) in a professional setting (for their occupation). Six expressed using WC tools for professional use only, one expressed using WC tools for educational (school-based) purposes only, and three expressed using WC for both professional and educational purposes. Those that endorsed using WC for both professional and educational purposes were part-time students who also worked in a professional setting.

Those participants that mentioned the use of WC tools in a professional setting utilized these tools for a variety of reasons. The most common reasons for using WC tools in a professional setting were stakeholder/client meetings, remote presentations, remote work, and client/participant interviews. Two also endorsed the use of WC tools for leading online classes or webinars.

Participants who expressed using WC tools in an educational setting appeared to have a much narrower range of use for these tools. Those that used WC tools in an educational setting primarily endorsed using these tools as a means of joining online

classes or presenting educational content remotely to their school colleagues as a part of a class curriculum.

Experience with Web Conferencing Tools

Participants endorsed using a variety of Web Conferencing tools for professional and educational purposes. A list of web conferencing tools mentioned by participants (and the frequency of their mention) can be found below in Figure 3.

Tool Name	Frequency of Use
Skype	5
Google Hangouts/Meet	5
Blackboard	4
GoToMeeting	4
Zoom	4
WebEx	2
Other (Proprietary Web Conferencing Platforms)	2
UberConference	1
Slack	1
LogMeIn	1
Microsoft One	1
Adobe Connect	1

Figure 3. Frequency of Web Conferencing Tool Use Endorsed by Participants.

When discussing participants web conferencing tool preferences and tool use patterns, some common themes developed across participants. Many participants experienced the same or similar issues/limitations, as well as features of interest across web conferencing platforms. In an effort to be comprehensive, I have included sections below outlining common response themes across participants.

Web Conferencing Tools: Issues/Limitations

During the interview portion of this research, six participants expressed frustration at how difficult it was to join web conferences across some web conferencing platforms; P2 mentioned, “when you get to a certain [higher] number of meeting attendees, [Skype] can be hard to share meeting information and get people to join the meeting.” Applications like Blackboard and Skype were seen by participants as difficult to join video conferences. Participants stated much of this frustration stemmed from the fact that users must download or login to applications in order to join virtual conferences. Web Conferencing platforms that did not force users to download applications in order to join virtual meetings (e.g. Google Hangouts, GoToMeeting, and WebEx) were viewed in a much more positively than those that do not. Users mentioned that web conferencing platforms forcing you to download their application just slowed them down and wasted time that could have been used more effectively during the meeting. Users also expressed these concerns not only for themselves, but also for their business clients. Two participants mentioned that they have had to manually instruct their business clients in the past on how to download and join the meeting, which resulted in both wasted time and frustration on the part of the business clients; consequently, this may have affected participants’ business relationships with their clients.

Related to issues around downloading applications in order to join a virtual meeting, participants also expressed aggravation around difficulty sharing meeting joining information. Tools that did not allow the creation of a sharable meeting link were seen as inefficient by most participants. Five users expressed the need to be able to share

meeting information quickly so that they can have impromptu web conferences with clients, friends, and/or students. One participant (P6), a high-school instructor, mentioned Blackboard as being particularly difficult because students had to log into several different school-related portals in order to join virtual classes; “Kids will find any excuse to not join a [class] meeting, so [the WC tool] has to be easy to log in.” Each time students had to log into an application was another barrier to each student actually joining the meeting, so joining meetings via a sharable link was of paramount importance.

Web Conferencing Tools: Features of Interest

Web Conferencing tools that encouraged video, face-to-face, remote conferencing were much preferred by participants than those that had audio-only conferencing. Zoom was specifically called out by four participants as having superior video conferencing capabilities compared to many of the other conferencing tools. These participants particularly preferred that Zoom enlarged the view of the active speaker during web conferences, while still allowing users to see the other meeting attendees faces in smaller sections on the screen. For participants that use web conferencing tools for business reasons, three specifically mentioned that being able to see someone’s face on the other end of the video call was incredibly important in building successful relationships with colleagues and clients alike. P1 mentioned, “Relationships are built in meetings with face to face contact...When the video is there, you have to be engaged. Seeing people's reactions are critical.” Being able to see a speaker’s face in a web conference gave the meeting a personal touch and allowed for different attendees to feel more connected with those they were meeting with.

As mentioned above in the Issues/Limitations section, tools that allowed for link sharing and easy joining were viewed much more positively than tools that did not have that capability. Tools that allowed for easy shareable link generation and one-click joining were much preferred than tools that required a log in or application download to join a meeting.

One last feature that was important to participants was the ability to easily screen share content from their local machine with other meeting attendees. Three participants again mentioned that Zoom's screen sharing capabilities were "intuitive and seamless" (P9). Participants favored the prominent 'Share Screen' button in the Zoom interface as well as the fact that Zoom users could choose between sharing entire screens and just sharing an application (e.g. Internet browser, presentation tool, etc.) on their screen. For users that work mostly with a single screen, this screen sharing distinction was important because they often did not want viewers to see all of the applications on their screen, which may have contained notes or other aides for the screen sharing user. Participants also mentioned that they liked that Zoom showed the presenter what application they were sharing by outlining this application in green. They thought that all of these screensharing features were important and contributed to an overall positive experience with the web conferencing product.

Experience with Presentation Tools

In addition to using Web Conferencing Tools, participants stated that they had used a variety of presentation applications to present content for either professional or educational purposes. A list of presentation applications mentioned by participants (and the frequency of their mention) can be found below in Figure 4.

Application Name	Frequency of Use
Microsoft Powerpoint	8
Google Slides	6
Prezi	3
Keynote	1
Microsoft Power BI	1
Adobe InDesign	1

Figure 4. Frequency of presentation tool use endorsed by participants.

When discussing participants presentation application preferences and tool use patterns, some common themes developed across participants. There appeared to be trends in common issues and likeable features across different presentation applications. A discussion of the themes that developed across participants can be found below.

Presentation Tools: Features of Interest

Presentation tools such as Microsoft PowerPoint, Prezi, and Keynote were applauded by participants for having a multiplicity of different design options when building presentations. Options like slide themes, layouts, transitions, and typographical options were appeared to be very important to most participants when making a presentation ‘polished’ and professional. According to five participants, other presentation applications, like Google Slides and Microsoft Power BI, appeared to be somewhat limited in expressive design options. Four participants specifically mentioned that options for slide themes in particular were limited when using Google Slides. These participants expressed that having various design options in their presentation application

was important because design options really ‘optimize’ presentations, “taking presentations to the next level” (P6), by allowing presentations to be about more than just the content that is contained in them.

Three participants also mentioned that the ease of sharing presentation files/links was very important to the presentation creation process. Google Slides in particular was called out as being exceptionally easy to share presentation files (via sharable link), as well as being able to download presentation files in a variety of different file formats (e.g. .ppt, .pdf, etc.). Sharing presentation files was incredibly important to users when they are building a presentation collaboratively, require feedback, or are disseminating the presentation to a large number of business clients/students. Google Slides’ link sharing feature was seen as a feature of interest for all participants that endorsed using Google Slides. Three participants also mentioned that Google Slides’ and Adobe InDesign’s ability to download a presentation into many different file formats was particularly handy when sharing presentations with clients that do not use Google/Adobe products (often for government security reasons). The ability of a presentation application to be shared and downloaded easily increased the efficiency of presentation creation among participants, which had business value to most participants.

While the ability to share and download files quickly and easily was important to participants, five also mentioned that being able to collaboratively build presentations with colleagues was important to their presentation creation process. Again, Google Slides was specifically called out across participants as being the only presentation application that allows users to work synchronously when building a presentation. Because of its cloud-based filing system, Google Slides allows more than one person to have access and edit a presentation file at a time. Eight participants endorsed working in teams/groups for their work, and being able to work on the same file at the same time was very important to them. Being able to synchronously build a presentation with a group made creating presentations much faster and more efficient for participants, regardless of the use setting. Now that I have discussed some presentation application features of

interest across participants, it is important to examine the major issues/application limitations for the various presentation applications mentioned by participants. In the next section I will discuss the shortcomings and pain points associated with participant use of presentation applications.

Presentation Tools: Issues and Pain Points

One of the issues that participants expressed when discussing their use of various presentation applications was the lack of compatibility across many of the presentation platforms. Tools like Microsoft PowerPoint and Prezi must be purchased and downloaded in order to utilize their software. Other tools like Apple's Keynote are only available on Apple Mac devices, thus limiting their compatibility among groups that utilize both PCs and Macs. In addition to difficulties downloading/purchasing these applications, file compatibility across these platforms was lacking according to three participants. Though presentation files can be shared across platforms, slide design and format appeared to be altered when sharing presentation files across the various presentation platforms. Participants mentioned slide format issues when viewing a Microsoft PowerPoint presentation file in Keynote. These formatting issues can cause major issues when sharing presentation files with clients/students, as formatting can make a presentation feel haphazard or 'sloppy', according to P7. Presentation file compatibility across applications is imperative when sharing presentations with others.

Don't want people to see presentation notes and other things on the screen

Another minor issue across participants and presentation applications was the ability to see presentation notes when using a screen sharing tool to present content remotely to colleagues/clients. All participants endorsed presenting content for remote professional or educational purposes, so the inability to see presentation notes was a setback for participants. There did not appear a way in any of the presentation tools to 'pop-out' presentation notes onto a new window or choose to not show the presentation notes on viewers screens when screen sharing. In order to circumvent this issue, P5

mentioned that she was forced to use multiple screens and multiple presentation windows when presenting her content remotely to her work colleagues. She was forced to have two windows with the same presentation file loaded so that one presentation window could be used for screen sharing (what meeting viewers would see) and the other presentation window to view her presentation notes. When creating long, complex presentations, presenter notes can become an important way to guide the presenter through the multitude of content contained in the presentation; without the presenter notes, some participants expressed feelings of being 'lost' or not being able to present their content as well as it deserved. Not being able to see presenter notes puts pressure on presenters to remember everything that they have to convey during the presentation, thus diminishing presentation quality.

Key Usability Test Session Findings

For the usability testing portion of each interview, I designed a tech-based prototype for users to interact with so that I could gather their reactions and feedback about the design and functionality of my proposed RCPT. In order to adequately test the user-friendliness of the tech-based prototype, I designed seven tasks for users to perform that represent the most important functionalities a remote collaborative presentation tool. For each task, I introduced a scenario to provide background information about the task and instructed participants to interact with the prototype as if I were not there to help them (feedback and comments, however, were asked to be shared freely). Task rating results can be found in Figure 5, below.

		Raw Scores										Totals	
Task Description		MF	YE	KG	EA	KD	CdSF	BS	AP	AS	GK	1	0
Task 1	Load Presentation	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	7	0
Task 2	Presentation Notes	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sb	Sa	7	0
Task 3	Invite Colleagues	Sa	Sb	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sb	7	0
Task 4	Chat	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sb	Sa	Sb	7	0
Task 5	Full Screen	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	7	0
Task 6	Mute	Sb	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	7	0
Task 7	Move Forward Slides	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	7	0
		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10		

Sa	Completed w/ Ease
Sb	Completed w/ Difficulty
F	Failed to complete on own

Figure 5. Task Performance Ratings Separated by Participant.

Overall, participant responses to the RCPT were very positive. All participants thought that the interface was easy to navigate and simplistic in design. As shown in the task rating chart, none of the participants failed any of the seven tasks they were asked to perform. The lack of any task failures from any of the participants suggests that the interface was perhaps too simple in design and should have included some more complex features. It should also be mentioned that all of the research participants were volunteers with past experience using both web conferencing and presentation tools, so they may they may have achieved task successes because they were already familiar with these tools. Additional research with participants that have less/no experience with web conferencing and presentation tools needs to be performed so that my assumption of the interface not being sufficiently complex can be validated. A detailed analysis of participant feedback on additional features can be found in the Discussion section of this analysis.

Out of 70 total task rating scores, 64 were rated as ‘Success with Ease’ (meaning that it took these participants only 1 attempt to complete the task), and only six were

rated as ‘Success with Difficulty’ (meaning that it took these participants attempts to complete the task), and none were rated as ‘Task Failure’. No single participant received more than 2 SwD ratings during their session. The tasks with the most ‘Success with Difficulty’ ratings were Task 3 (‘Invite Other Active Presenters’) and Task 4 (‘Chat Box’), each with two (2) ‘Success with Difficulty’ ratings. Other tasks that received SwD ratings included Task 2 (‘Show Presenter Notes’) and Task 6 (‘Mute Microphone’), each with one (1) SwD rating.

Task 2 (‘Show Presenter Notes’) received a SwD from P9. This participant attempted to move forward a slide in the presentation before clicking on the ‘Show Presenter Notes’ tab at the bottom of the interface. According to the participant, “I thought maybe because this was a title slide and it didn't have any notes, so I wanted to go to the next slide.” All participants also expressed expectations and preferences to have the ability to not show the presenter notes when screen sharing a presentation with viewers.

Task 3 (‘Invite Other Active Presenters’) received SwD ratings from both P2 and P10. Both participants stated that they initially had problems seeing the ‘Person +’ icon in the top right-hand corner of the ‘Presenters’ tab because the icon was too small. While this icon visibility feedback is certainly helpful, these visibility issues may have been due to the fact that the InVision prototype appears smaller than usual when presented in a web-browser. Once the researcher enlarged the screen, participants immediately understood the meaning and purpose of the icon.

Task 4 (‘Chat Box’) received SwD ratings from both P8 and P10. Both participants attempted to click on the names of other Active Presenters in the ‘Participants’ section of the interface in order to send a chat message to them, “I thought that you could click on each of [the other presenters] to message them.”

Task 6 (‘Mute Microphone’) received a SwD rating from P1. P1 expressed some confusion when viewing the ‘Mute’ icon (shown on right) in the interface, “I feel like

Mute symbol is either a red phone or red with an x through it or a speaker symbol. Color would be helpful here but not strictly necessary.”

While these findings on their own help to shed light on user experiences with both Web Conferencing and Presentation applications, it is important to convey how these results and themes will specifically affect the future of my Remote Collaborative Presentation Control (RCPT) Tool. In the next section, I will discuss overall participant feedback on the RCPT, additional RCPT features for the future, as well as design improvements that I have made based on user/participant feedback from these remote participant user sessions.

Chapter 5: Research Discussion

As discussed in the previous section, remote user sessions (with interview and usability testing components) with participants yielded much useful feedback from participants regarding the usefulness and design of the Remote Collaborative Presentation Tool (RCPT). In this section I will discuss the implications the overall research results based on participant design feedback, as well as show some updated designs based on user feedback.

Overall, users appeared to find the RCPT a useful and worthwhile tool when presenting content remotely as part of a group. Most users expressed that past experiences presenting content remotely as part of a group were awkward and required much prior preparation in order to deliver a smooth and seamless presentation. I hope that the addition of a tool similar to the RCPT would allow groups to deliver remote presentations with smooth transitions so that viewers can more effectively focus on the content being presented. Given that there is a growing professional culture of working remotely, there is a need for tools that facilitate remote collaboration and presentation. Most participants in this study endorsed presenting content for business purposes, but several continue to give presentations as a way to share educational content with students/colleagues.

Several important themes developed throughout the participant sessions regarding features of interest when using Web Conferencing and presentation tools. Participants preferred web conferencing tools that offered users video, face-to-face conferencing, as well as platforms that didn't force users to download an application onto their machine, and also allowed users to easily share meeting joining information with other meeting attendees. Web conferencing tools such as Zoom, Google Hangouts, and GoToMeeting received many positive mentions from participants regarding their ease of access and video-sharing abilities. Skype was also one of the more commonly used tools endorsed by participants, but several participants mentioned that Skype can be difficult to download/log-in to, which makes the web conferencing tool less effective for business

and educational uses. It is important that Web Conferencing tool developers consider factors such as ease-of-access and video sharing when updating their tools in the future.

Microsoft PowerPoint and Google slides were by far the most widely used presentation tools endorsed by participants. Common features of interest for presentation tools endorsed by most participants included a variety of slide deck design options, collaborative presentation building, and ease of presentation sharing with others. Google slides was specifically called out by several participants because they appreciate the ability to collaboratively build presentations at the same time as others, as well as Google Slides ease of presentation sharing (link sharing capabilities). Some of the pain points experienced by participants when working with presentation tools included having to download the presentation application to their local computer, as well as the inability to see presentation notes when in presentation mode. While Microsoft PowerPoint was the most widely used tool among participants, some did not like that PowerPoint had to be downloaded in order to access presentations (compared to Google Slides, which does not have to be downloaded in order to access), as some colleagues and clients do not have Microsoft PowerPoint downloaded on their machines, this could make presentation building and sharing difficult for users. Most participants also mentioned disliking that no presentation tools offer the ability to see presentation notes when in presentation mode. Participants had developed workarounds for this issue (opening multiple presentation windows to see presentation notes, etc.) but these work-arounds appeared to be less-than-optimal for most users. I hoped to address some of these pain points and features of interest when making design changes to the RCPT based on participant feedback (design changes discussed below).

During the user testing portion of each participant session, the prototype of my RCPT was received very positively by participants. All participants appeared to be able to navigate the prototype effectively and had a good understanding of the various functions that the RCPT included. Features such as viewing presenter notes, chatting with other presenters, and inviting other presenters to join control of the presentation were

very valuable to user. Users gave extensive feedback on the RCPT designs presented to them, and also gave feedback on additional features that would be useful to include in the RCPT (discussed below).

While my RCPT tool was received very positively by all participants, future research is needed to assess the feasibility of these types of tools as well as how to integrate these tools with current Web Conferencing tools. Many participants expressed that, while the RCPT was certainly a useful tool, it was yet an additional tool they need to use in tandem with current web conferencing tools in order to enhance the experience of their presentations. Many participants expressed that it would be useful if the functionality and features of the RCPT could be integrated into the interfaces of common web conferencing tools in order to cut down on the number of tools they needed to use. This topic of RCPT and web conferencing tool integration is an important one and should be researched further in the future in order to gauge the feasibility of including this functionality with web conferencing tools.

Additional Features and Design Updates

As referenced in the Research Methods section of this paper, suggestions from participants were gathered during participant interviews on additional features or design updates that would make the RCPT a more useful and easier-to-use tool (for discussion of initial RCPT designs presented to participants, please reference the Research Methods section, Initial RCPT Prototype Designs). In this section, I will discuss changes to initial RCPT designs based on user feedback gathered during each participant interview.

Two participants expressed a need to be able to load multiple presentations at once into the RCPT. These participants stated that they sometimes give more than one presentation to viewers/stakeholders during the span of a single web conference. These participants suggested adding the ability to load multiple presentations into the RCPT at a time as well as having the ability to order the sequence of the presentations within the RCPT interface.

In order to address these user suggestions, I have added the ability to load more than one presentation into the RCPT (Figures 6a and 6b below).

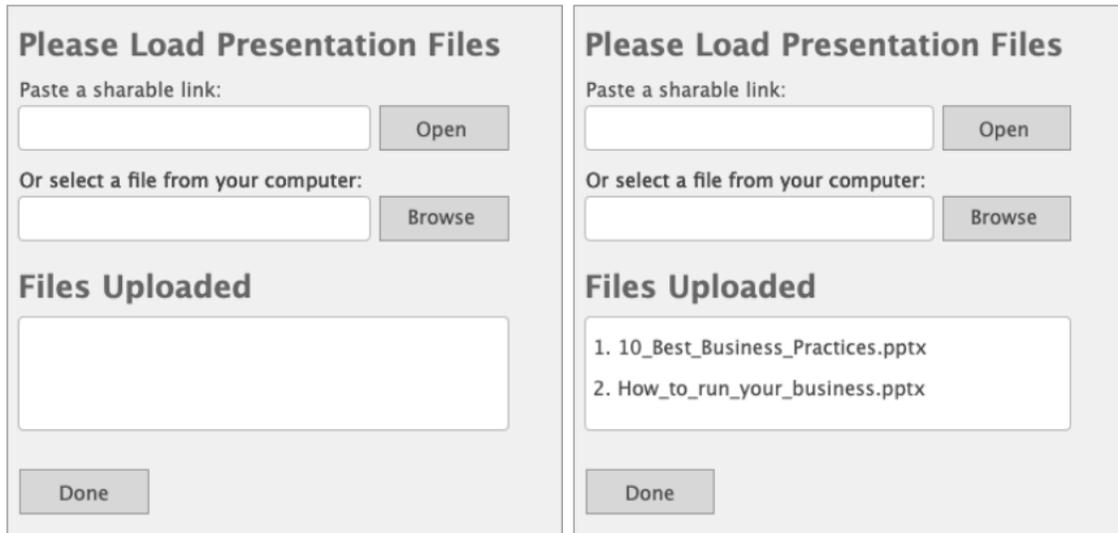


Figure 6a and 6b. Updated Designs with the ability to upload multiple presentations at once. Figure 4a (left) shows the initial empty state of the file upload. Figure 4b (right) shows what the upload window will look like if 2 presentations are loaded into the RCPT.

Multiple presentations now appear as separate tabs at the top of the RCPT interface (Figure 7, below).

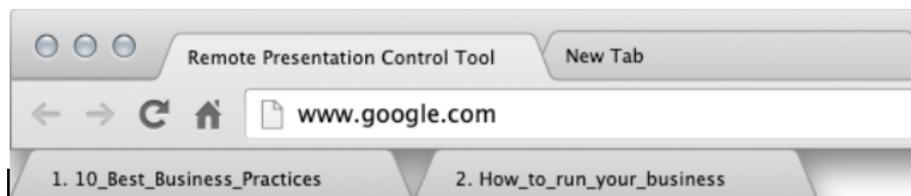


Figure 7. Updated designs showing multiple presentation tabs within the RCPT. Each presentation loaded into the RCPT will have its own tab. Users only need to click on corresponding presentation tabs to access other presentations. Users can also click and drag presentation tabs to order them in any way the presenter sees fit.

Participants are able to order the presentations in the tool by clicking and dragging the different presentation tabs into the order that the user sees fit.

All participants preferred that presenter notes not be shown when screen sharing (using a Web Conferencing Tool) a presentation with other viewers. In order to assure

presenters that only the presentation is being shown when using a Web Conferencing tool's screen sharing capability, I have added a bright green outline around the presentation window in the RCPT that indicates that only the presentation slides are being screen shared with presentation viewers (Figure 8 below).

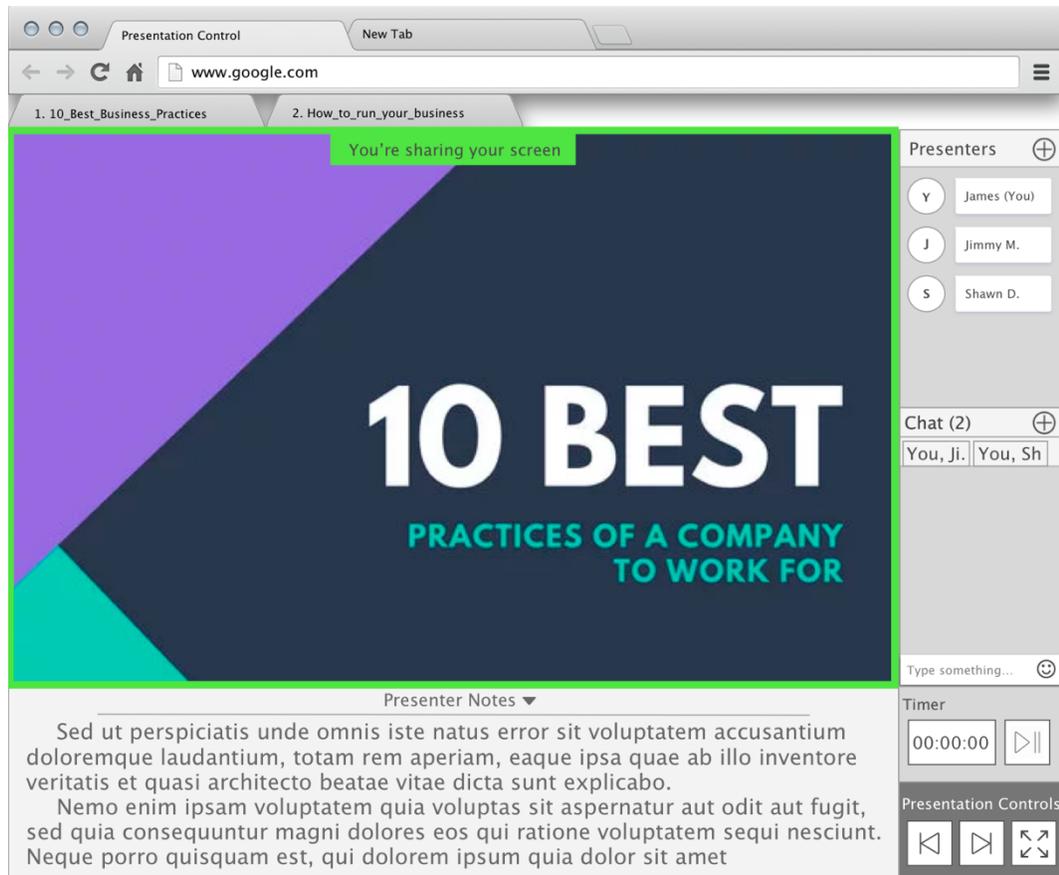


Figure 8. Updated designs with green outline around presentation window. Participants can be assured that the presentation notes and chat windows will not be seen if they share their screen with presentation viewers.

Some participants requested that an indicator be added to the Presenters portion of the RCPT to show that they themselves are also a presenter for this presentation. I have added a bubble showing that the user them self is a presenter to make the Presenter section clearer and more accurate. Two participants had issues recognizing and finding the 'add presenters' button. In order to address these concerns, I have replaced the more

stylized 'add presenters' icon for a simpler '+' icon. I think that this replacement will make the 'add presenters' action more visible and clearer what the purpose of this icon is (Figure 9 below).



Figure 9. Updated Designs with simple '+' icon to indicate how to invite presenters to join a presentation.

Most participants expressed a need to create multiple chat rooms between presenters rather than just having a single chat section for communication between all presenters. In order to address these suggestions, I have added the ability to create new chats windows between other presenters. Users can now create chats and add any group of other presenters into a specified chat tab.

Users can also create a chat between themselves and one other presenter simply by double clicking on the specified Presenter bubble in the Presenters portion of the RCPT Interface.

I have also added a small display to the chat tool showing which presenters are in any given chat window for clarity when users are messaging others (Figure 10 below).

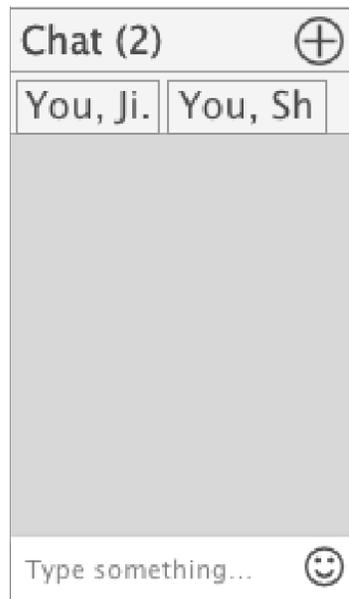


Figure 10. Updated designs with tabs for different chat conversations so that presenters can chat with different groups of presenters. Designs also contain a '+' icon so that presenters can choose which presenters they would like to start a chat with.

In order to make the 'Presentation controls' section more universal, I have moved the 'Full Screen Mode' button into the 'Presentation Controls' portion of the RCPT interface (see Figure 9, below). No participants expressed confusion around the 'Full Screen Mode' icon, so I have kept the display of the icon the same in its new location.

Some participants were confused by the function of the 'Mute' button in the RCPT interface. Participants wondered how this button would work given that you must use the RCPT with a Web Conferencing Tool (e.g. Zoom, GoToMeeting, etc.), which already have a mute function built into their interfaces. In order to reduce integration issues between these two tools, I have decided to delete the 'Mute' function from the RCPT interface, and instead rely on the Mute function within the Web Conferencing tool for audio control (Figure 9, below). I hope that deleting the Mute function from the

RCPT will reduce integration issues between the RCPT and the partner Web Conferencing tool.

Some participants expressed an interest in having presentation control button descriptions in order to be clearer about what each button's function was for the user. In order to remedy this confusion, I have added a hover-over description for all of the buttons in the RCPT interface. The goal of these hover-over descriptions is to reduce confusion around each button's exact function and allow users to navigate the features of the RCPT more effectively.

Two participants requested that a Timer/Clock function be added to the RCPT interface so that users can see how long the presentation has lasted in case the presentation has time constraints. In order to address these requests, I have added a 'Timer' feature to the 'Presentation Control' portion of the RCPT interface (See Figure 11 below). With this feature addition, any active presenter will be able to start, stop, and pause the 'Timer' so that they can see how long their presentation has lasted. I hope that this feature addition will reduce presenter anxiety when their presentation has strict time constraints by letting them see how long they have been presenting.

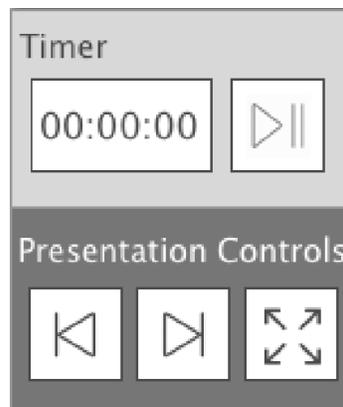


Figure 11 Updated presentation control panel designs with the addition of the full screen button as well as a new timer feature so that presenters can see how much time has elapsed when presenting.

In order to show the cohesion and overall appearance of the tool with these updated design changes, I have included a screenshot of the RCPT's interface in Figure 12, below. Figure 12 showcases all of the initial features of the RCPT (with the exception of the mute microphone button, which was deleted), but many of these features have been updated/enhanced because of participant feedback (see above for design update discussion). In order to gauge the effectiveness of these design updates, it is imperative that research be conducted in the future as part of this iterative design process. I believe that participant feedback in this research has led to meaningful design change in the RCPT interface that will benefit users in future iterations of this tool.

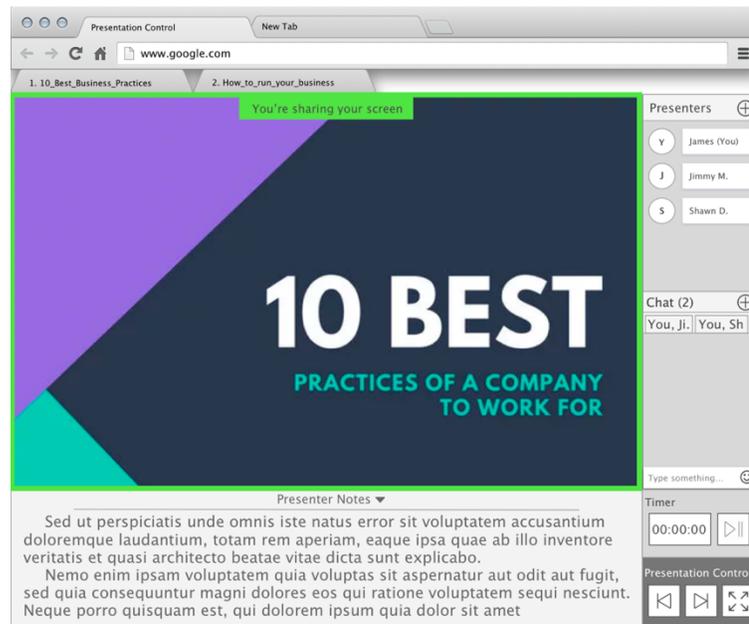


Figure 12. Overall RCPT interface designs with updated design features and capabilities (this screen shows interface after presentation file has been uploaded into the RCPT).

Chapter 6: Conclusion

This user-centered research with a usability testing component has yielded many valuable insights that should continue to be explored by future studies assessing the feasibility of a Remote Collaborative Presentation Tool (RCPT). Currently, no tools exist that would allow a remote group to collaboratively control their presentation. The tech-based prototype developed for this research would allow small groups to present content remotely as smoothly and effectively as possible, eliminating the need for awkward transitions. When presented with the tech-based prototype of the RCPT, all 10 users in this study were able to perform seven tasks that were designed to test the main functions of the RCPT, including: loading a presentation into the tool, inviting other active presenters, chat functions, and controlling presentation slide flow. Despite users' success in performing these tasks, it should be noted that all of the participants in this study were chosen because they screened positively for past web conferencing and presentation tool use. This limitation is something that needs to be rectified in future studies, as it is important that all users, regardless of past tool experience, should be able to perform these essential tasks in the RCPT. Further iterative design validation research is also needed to assess the success of the design changes made in this study as a result of participant feedback. This research has provided an effective first step for others in the future to address the needs of users regarding the use of remote presentation tools. The development of a tool such as the RCPT is a worthwhile and much needed tool for both professional and educational use. Another important topic that should be explored further is the issue of how to integrate this RCPT into current web conferencing tools, instead of building a stand-alone RCPT tool. Web conferencing continue to grow more powerful and more sophisticated, and this research has clearly indicated that groups who present content remotely represent a population of users whose needs continue to remain unmet. With the rising rates of remote work and remote online education in the United States alone, it is important that tech developers address users' needs for increased collaboration

and efficiency when using remote web conferencing and presentation tools. In a world where employees and students are further apart geographically than ever before, it is important to create technology that unites us, rather than divides us.

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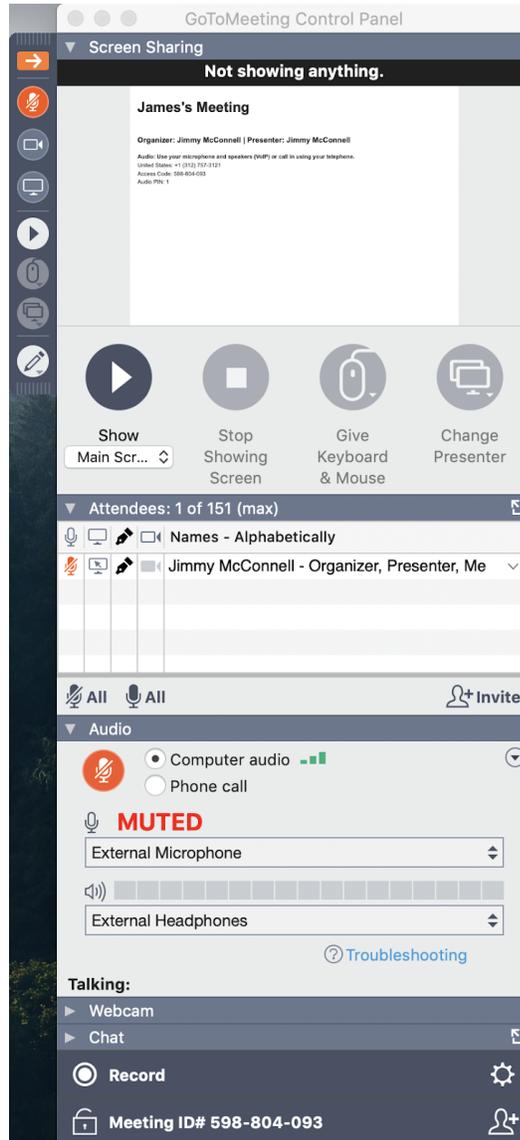
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Appendix A: GoToMeeting Toolbar, Design Inspiration



Appendix B: Research Solicitation Language

Initial Research Solicitation:

Attention! I am working on my thesis for my Master's Degree in software design and I need participants for my user testing sessions! You can participate in a user session remotely from the comfort of your own home and you will also receive a \$10 amazon gift card for participating. If you are interested, please fill out this (very) brief survey (<https://goo.gl/forms/MIPgdMXd5BhBE5Dn2>) and I will contact you (if you are eligible) about scheduling a time to meet. Sessions will be held in early/mid January and will be approximately 45 minutes long; you only need a desktop computer or laptop to participate. Please feel free to share this on your own feeds if you can, I would really appreciate the help.

Secondary Research Interest Email:

Thank you for expressing interest in participating in a usability session for my ongoing thesis work! If you are receiving this email, it means that based on your answers to my initial screening survey, you seem like you might be a good candidate to participate in my user sessions.

I will be conducting my user sessions on the weekends in January, but I would like to try and fit everyone in in the next two weekends (1/5/19-1/6/19 and 1/12/19-1/13/19). Please respond to this email with times that you will be available during those weekends, from about 10am to 4pm, for a 45-60 minute interview (conducted remotely from your home on a laptop or desktop computer). Once I receive your availability, I will try and schedule a firm time for us to meet via email and will send you the consent form for the sessions.

Those who participate will receive a \$10 Amazon gift card via email at the end of their usability session. Thank you all again!

Signature

Appendix C: Screening Survey Questions

Collaborative Group Presentation Tool Screening Survey

Thank you for agreeing to fill out this brief screening survey; Please answer these questions honestly. If you qualify to be a participant in this study, brief 30-45 minute interviews will be conducted in early/mid-January. Qualifying participants will receive a \$10 Amazon Gift Card for their participation.

Question 1: Are you over the age of 18?

- Yes
- No

Question 2: Have you ever utilized a Virtual Meeting/Web Conferencing Tool (e.g. Zoom, GoToMeeting, Google Hangouts, etc.) either for work or educational purposes?

- Yes
- No
- I'm not sure

Question 3: Have you ever presented content remotely using a Virtual Meeting Tool? (e.g. given a presentation to colleagues/classmates)

- Yes
- No

Question 4: What presentation software do you use to present content for work or school?

- Google Slides
- Microsoft PowerPoint
- Apple Keynote
- Prezi

- I do not have to present information for work or educational purposes.

Question 5: Have you ever presented content remotely with a group for work or educational purposes? (e.g. given a presentation with other co-presenters)?

- Yes
- No
- I'm not sure

Question 6: If you qualify to be a participant in this study, can you commit to participating in a 30-45 minute interview (conducted remotely, from the comfort of your own home) with the researcher? Interviews will be conducted in early/mid-January. The researcher will reach out at a later time to schedule these interviews.

- Yes
- No
- I'm not sure

Contact Information: Based on your answers to the previous questions, you appear to be eligible to participate in this study! Please enter some contact information, and [the researcher] will reach out to you about scheduling a time in the near future to meet. If you have any questions, please contact [researcher] at [Researcher@researchemail.com]

- First and Last Name:
- Email Address:
- Phone Number:

Appendix D: Informed Consent Form

I freely and voluntarily consent to participate in this brief interview and usability study under the direction of Jimmy McConnell.

I understand that my participation is completely voluntary and that I may withdraw my consent and discontinue my participation at any time without penalty or prejudice to my business organization or me, except by discontinuing participation before the end of the session, I would forfeit the incentive payment.

I authorize Jimmy McConnell to use the findings from this evaluation and to share the results with his academic advisors and research colleagues, with the provision that neither my name nor affiliation will be associated with any of these results.

I have been given the right to ask questions concerning the procedures to be employed during this study and to have these procedures explained to my satisfaction.

Video/Audio Recording the Session

I have been informed that my participation in this study will be recorded. The recording will include the screenshare content during the usability session (video), and my comments and discussion with the study moderator (audio) during this study. Recordings will be de-identified and password protected. Recordings will only be shared with Greg Walsh, Jimmy McConnell's academic advisor for research analysis purposes only.

Confidentiality and Video/Audio Recording Release

I understand that neither my name nor affiliation will be associated with the recording unless I mention it on the recording. Otherwise, neither the recording nor any of the other information I supply, including my opinions, preferences, or ideas, will be associated

with or attributed to my name. Full session recordings will be stored on Jimmy McConnell's personal computer and shared only with his academic advisor, Greg Walsh.

I hereby give permission to record my participation for the purposes stated above and to use the recordings with the restrictions stated above.

Participant Name (Printed): _____

Participant Signature: _____

Date: _____

Appendix E: Participant Interview Guide

Introduction

Thank you for participating in today's interview and usability session. I am working on a project to develop a tool that will allow people to share control of remote presentations, and I'd like to get your perspective on the effectiveness of the tool.

For this Interview, I'll ask some background questions about your history using virtual meeting tools, such as GoToMeeting, Google Hangouts, Zoom, etc... as well as your needs and experiences with presenting content remotely to your peers/colleagues. I will also give you access to a prototype of the collaborative remote presentation tool. I'll be giving you some scenarios and observing what you do with the system. Remember, **there are no right or wrong answers**, and I'm not trying to trick you or test you or your knowledge in any way. We're just working together to improve the effectiveness of this tool for its intended users and to identify any critical errors or suggestions for improvement that can be made in the future.

Today's session will take about 30-45 minutes.

Do you have any questions before we continue?

Permission to Record

I'd like to record this session so that I can review it at a later time for anything that I might have missed. The recording will only contain audio of our conversation and a video of our screenshare content. Do I have your permission to start the recording?

(Moderator starts the recording after verbal permission.)

Background Questions

1. What is your age:
2. What is your highest level of education:

3. Job Title:
4. Job Duties:
5. Do you use Virtual Meeting tools for professional or educational purposes:
6. Tell about your use of Virtual Meeting or Web Conferencing tools...
 1. What tools have you used (e.g. GoToMeeting, Zoom, WebEx, Google Hangouts)?
 2. What was your experience with these tools?
 3. Where did you use these tools? (e.g. at work, at school, etc...)
 4. Tell me about any issues that you've had while using these tools...
2. Have you ever presented content remotely using a Virtual Meeting or Web Conferencing Tool? (e.g. given a presentation for work or for a class assignment, etc...)
 1. Tell me about your process when you have to present content remotely...
 2. What presentation tools do you use? (e.g. Google slides, Keynote, Microsoft PowerPoint, etc.)
 3. Did you present as part of a group? (i.e. you and others presented content from the same presentation to others in a Virtual Meeting?)
 4. Describe your experience presenting content remotely as part of a group....
 1. What worked well?
 2. Tell me about any issues that you may have encountered when presenting information remotely as part of a group.

Prototype Introduction

Before I show the prototype, I have a few more things to go over with you:

Limited Prototype. Please note that what you're going to see is a prototype with limited interactivity and clickability, not a complete website. These images/screens are still work-in-progress, but they illustrate some design ideas.

Think Out Loud. Please look at these images and tell me your expectations, your thoughts of the language, content, and any suggestions you have to improve them.

Candid Feedback. Please feel free to be candid and share anything that comes to mind, both negative and positive aspects of your experience, something that worked well and is clear or something that did not work or was confusing.

Now, I'm going to give you some scenarios. I would like you to think about the scenarios and interact with the prototype as if I am not here to help you. Please remember, I am not testing you or your knowledge in any way. We are working together to make this prototype more user friendly.

Tasks/Scenarios

1. Let's pretend that you have to give a presentation on Best Business Practices for some of your colleagues. You and two colleagues have collaborated while building this presentation, and the three of you are going to present your information together. You want the presentation to go as smoothly as possible, so you look up applications that allow all three of you to control the presentation together. You find this application and download it; after you open the application, this menu pops up on your computer screen.

1. What file types would you expect this tool can upload?

For this meeting, we are going to pretend that you have obtained a sharable link to your Google Slides presentation. How would you go about doing that loading your presentation in this tool?

2. Now that you have loaded your presentation into the application, you notice that your presentation notes are not on the screen. Is there any way to see your presentation notes on the screen?

1. Would you think that your presentation notes would appear when you share your screen with your viewers on the Virtual Meeting Tool?
2. Are there currently any other co-presenters with you on this presentation?
3. Now, what you want to do is invite your 2 colleagues to control this presentation with you. How would you do that from this screen?
 1. How many people are in the presentation with you?
4. You are almost ready to begin your presentation, but you want to make sure that your co-presenters are ready to begin the presentation with you, how could you message your co-presenters to make sure they are ready to begin?
5. Before you start your meeting, you want to make sure that no one can hear you when the meeting begins, is there any way you mute yourself on this screen?
6. Now that you have invited your colleagues to control the presentation with you, you need to put your presentation in full-screen mode so that your viewers can read the content on the slides when you share your screen during your Virtual Meeting. How would you do that?
7. Now that you have checked whether all of your colleagues are able to share control of the presentation with you, you are finally ready to start your presentation. How do you move forward one slide?

Debriefing Questions

1. What did you think of the overall process we went through today?
 1. Which scenario, if any, did you find the most difficult to perform?
2. Was there anything that you thought was particularly useful in this interface?
3. Were there any features that you think would be useful to add to the interface?
 1. Any final comments or questions?

Appendix F: Task Success Rating Spreadsheet

		Raw Scores										Totals	
Task Description		MF	YE	KG	EA	KD	CdSF	BS	AP	AS	GK	1	0
Task 1	Load Presentation	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	7	0
Task 2	Presentation Notes	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sb	Sa	7	0
Task 3	Invite Colleagues	Sa	Sb	Sa	Sb	7	0						
Task 4	Chat	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sb	Sa	Sb	7	0
Task 5	Full Screen	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	7	0
Task 6	Mute	Sb	Sa	7	0								
Task 7	Move Forward Slides	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	Sa	7	0
		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10		

Sa	Completed w/ Ease
Sb	Completed w/ Difficulty
F	Failed to complete on own