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A U S T R A L I A

Utilizing Synchronous Distributed Groupware to Facilitate the
Normalization of Interdisciplinary Collaboration

by

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Dear Professor Brünig,

In accordance with the requirements of the degree of Bachelor of Information Technology (Honours) in the School of Information Technology and Electrical Engineering, I present the following thesis entitled

“Utilizing Distributed Groupware to Facilitate the Normalization of
Interdisciplinary Collaboration ”

This work was performed under the supervision of Associate Professor Stephen Viller. I declare that the work submitted in this thesis is my own, except as acknowledged in the text and footnotes, and has not been previously submitted for a degree at the University of Queensland or any other institution.

Yours sincerely,

A handwritten signature in black ink, appearing to be 'Ken', with a stylized flourish extending to the right.

Ken Yoong Lim

Acknowledgments

I would like to first express my gratitude towards my supervisor, Stephen Viller for his support and tutelage throughout the project. I would also like to thank Dr. Ben Matthews for the feedback and guidance provided during the study. They have given me the direction and confidence necessary to navigate the intricate process of research. Finally I would like to acknowledge the assistance and support provided by my peers.

Abstract

Interdisciplinary collaboration is quickly becoming the primary method by which contributions can be made to both industry and academia. However, very little is being done by educational institutions to promote the skills and mindsets required for successful interdisciplinary collaboration. Synchronous distributed groupware is a subset of groupware which aims to facilitate real-time collaboration among geographically dispersed group members.

Developing a synchronous distributed groupware application with the aim of promoting interdisciplinary collaboration among students represents the core outcome of this study. The testing of this application provided a means of identifying challenges associated with both groupware development and the promotion of interdisciplinary collaboration in a tertiary education setting. In addition, the study provided valuable data regarding both the user base's opinions of the topic and their usage habits.

These data were used to inform the formulation of several solutions to the aforementioned challenges. It was determined that the top priority for software of this nature would be to maximize the users' perceived benefit from the application. Ease of use also contributed to the likelihood of success for the application, though to a smaller extent.

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Glossary

BRAIN	Brain Research through Advancing Innovative Neurotechnologies
CSCW	Computer-Supported Cooperative Work
MVC	Model-View-Controller
HTML	Hypertext Markup Language
CSS	Cascading Style Sheets
PHP	PHP Hypertext Preprocessor
URL	Uniform Resource Locator
IT	Information Technology
UQ	University of Queensland

Chapter 1

1 Introduction

It is evident that monodisciplinary challenges in both industry and academia have been steadily exhausted by years of research, paving the way for more complex, interdisciplinary problems. These challenges can only be solved through the integration of skill sets from different disciplines (Amoussou, Boylan, & Peckham, 2010). One of these endeavors is the BRAIN (Brain Research through Advancing Innovative Neurotechnologies) initiative where scientists and engineers are coming together to revolutionize our understanding of the human brain ("Brain Research through Advancing Innovative Neurotechnologies (BRAIN) - National Institutes of Health (NIH)," 2013). Robertson, Martin and Singer describes this trend as a necessity, addressing the inherent limitations of monodisciplinary research and the need for a higher degree of interdisciplinary collaboration as we step into the future (Robertson, Martin, & Singer, 2003). Interdisciplinary collaboration is not just limited to different disciplines. Some subsections of the same discipline can be distinct enough from each other that they face similar challenges to more traditional forms of interdisciplinary collaboration. For example, the branching methodologies in social sciences were encouraged to come together to improve contribution to Computer-Supported Cooperative Work (CSCW) (Shapiro, 1994).

However, despite its importance, the intricacies of interdisciplinary collaboration, in particular its methods, remain alien to many due to the opaqueness of various interdisciplinary teams when it comes to their methods of collaboration (Robertson et al., 2003). This phenomenon is compounded by most institutions still not requiring the disclosure of interdisciplinary teams' collaboration processes and methods (Robertson et al., 2003). Aside from denying other researchers access to valuable collaboration methods, this void in communication also makes it difficult for some to assess the validity of the data collected as the process of collaboration itself determines the context of a research project (Robertson et al., 2003). The current lack of consideration that these institutions give to interdisciplinary collaboration results in young interdisciplinary teams that require significant time investment. They need more time to establish a common conceptual framework before they can function efficiently in a multidisciplinary team environment.

The establishment of a common conceptual framework is the cornerstone of effective interdisciplinary collaboration (Rosenfield, 1992). This goal is achieved via the hybridization of commonly accepted concepts and theories to form common ground between individuals of differing discipline (Rosenfield, 1992). This concept bears striking similarity to the concepts of perspective taking, common ground and mutual knowledge whose effects on collaboration have been extensively researched (Cramton, 2001; Davis & Khazanchi, 2006; Holtgraves, 2002; Isaacs & Clark, 1987).

The core idea of groupware is “*intentional group processes plus software to support them*” (Johnson-Lenz & Johnson-Lenz, 1982). This sentiment certainly lives on today, with various forms of groupware being developed and marketed to facilitate and simplify collaborative processes. Most of these applications are synchronous, allowing for real time collaboration on various tasks.

This project aims to leverage synchronous distributed groupware as a method for promoting better understanding between differing disciplines in tertiary education while addressing various challenges associated with developing groupware. Special notice was taken of the “8 challenges” (Grudin, 1994) which helped shape the development of a web-based application around which this study was designed. These endeavors serve to answer the question: How can synchronous distributed groupware facilitate the normalization of interdisciplinary collaboration?

This paper provides a review of existing literature that discusses the current state of interdisciplinary collaboration in tertiary education and its implications for future research and development. This paper will also explore other concepts that factor into the dynamics of interdisciplinary collaboration and the design of synchronous distributed groupware while providing an overview of existing solutions that facilitate remote collaboration. Details of the study conducted including its background and the methodology used will also be outlined. Outcomes from the study will then be presented using a combination of both results obtained and discussion. Finally, conclusions will be drawn from the outcomes to inform suggestions regarding future work.

Chapter 2

2 Literature Review/Prior Art

2.1 Interdisciplinary Collaboration Under the Microscope

2.1.1 Interdisciplinary Collaboration

Interdisciplinary collaboration refers to the act of pooling together knowledge and skills between individuals of varying disciplines to solve a common challenge. This concept is well explained by Robertson, Martin and Singer. *“To understand the world it has seemed necessary to analyze it by breaking it into many pieces. But to act in the world, to try to address the issues for the understanding of which highly specialized knowledge was presumably sought, we need to somehow reassemble all the pieces.”* (Robertson et al., 2003). The importance of interdisciplinary collaboration stems from the prevalence of multi-disciplinary problems in both academia and industry that can only be solved through the hybridization of the various involved disciplines (Amoussou et al., 2010). Endeavors such as the BRAIN initiative exemplify this notion, bringing together scientists and engineers to further our understanding of the human brain (“Brain Research through Advancing Innovative Neurotechnologies (BRAIN) - National Institutes of Health (NIH),” 2013). However, interdisciplinary collaboration is not just limited to collaboration between different disciplines. Branching methodologies or conventions within a single discipline can frequently be distinct enough that they are effectively different disciplines (Shapiro, 1994).

In order to for interdisciplinary collaboration to succeed, well-formed disciplinary boundaries, cultivated through years of monodisciplinary training, must first be overcome. The most effective method to overcome these disciplinary barriers by far is to develop a common language that facilitates a shared conceptual framework (Rosenfield, 1992). Peter Galison expanded on this idea by adding that productive collaboration can only happen

when individuals began to share both languages and methods (Galison, 1997). He also proposed the idea that collaboration dynamics are not unlike a ‘trading zone’ in which the commerce of ideas and methods could occur (Galison, 1997). Of course, navigating this ‘trading zone’ is not trivial. In order to fully achieve common language and methods, a team must first put in a sizeable effort to get past things like deeply ingrained work styles and methods of assessment (Goring et al., 2014). This effort offsets the benefit that can be gained from establishing said common language and methods, thus severely limiting the benefits a team can reap from them (Goring et al., 2014).

2.1.2 Underlying Concepts of Interdisciplinary Collaboration

The facilitation of collaboration, and by extension interdisciplinary collaboration, is intrinsically tied to various psychology and social science concepts. Communication is a major component of group work, so concepts such as referencing and perspective taking are frequently cited in exploratory literature regarding collaboration. Perspective taking allows participants in a conversation to “*assess the background knowledge, plans, attitudes, beliefs, outlooks, and so on, of one’s fellow interlocutors*” (Fussell & Krauss, 1992). In this context, perspective taking is required to allow team members to understand foreign concepts from another discipline’s point of view as well as to present one’s own concepts to practitioners of foreign disciplines in a way that is more likely to be understood.

However, perspective taking alone is not enough to guarantee successful collaboration. As mentioned before, a solid foundation of mutual knowledge is first needed in order to fully transcend disciplinary boundaries (Rosenfield, 1992). In most communications literature, mutual knowledge is considered to be a prerequisite to effective communication and performance in cooperative work (Cramton, 2001). This theory is particularly true for the geographically dispersed as they are forced to only communicate via technology (Cramton, 2001). Another similar concept is the idea of common ground. It was first proposed by Thomas Holtgraves in 2001 and is defined as the sum of a particular group’s mutual knowledge, beliefs and suppositions (Holtgraves, 2002). One of the most ubiquitous and relevant examples of this idea are conventions where different communities and disciplines each carry their own unique set of terminologies. For example, an arachnologist would assume

that the word “web” means the silken structure that spiders create while a web developer would define it as the World Wide Web. This would cause them trouble while communicating about the word “web” unless they are both aware of each other’s definition and ideas about the word “web”. This phenomenon represents the formal definition of mutual knowledge which is *“Knowledge that communicating parties share and know that they both possess”* (Fussell & Krauss, 1992).

Various studies have been conducted to determine the correlations between well-established mutual knowledge and common ground, and effective collaboration. These studies include the “postcard study” from Isaacs and Clark where a mixture of novice and expert navigators of New York City were paired up and tasked to identify various postcards depicting New York City landmarks (Isaacs & Clark, 1987). After the completion of this exercise, it was noted that pairs consisting of only experts consistently outperformed all other combinations as they often share the same perspective on the names of each landmark (Isaacs & Clark, 1987). Cramton studied the impacts of the presence and absence of mutual knowledge in the context of dispersed collaboration by analyzing archived datasets referencing a collaborative project carried out by various students across nine universities on three continents (Cramton, 2001). Cramton found that in the absence of mutual knowledge, dispersed teams often suffer from a drastic drop in performance (Cramton, 2001). A similar study was also carried out, analyzing the impacts of mutual knowledge on virtual team performance (Davis & Khazanchi, 2006). Virtual teams are defined as *“teams whose members are separated by time and space and who have been brought together to accomplish a goal by conducting communication predominately through technology.”* (Lipnack & Stamps, 1997). The results of this study mirrored that of the one previously conducted by Cramton.

However, other scholars such as Holtgraves contend that there are methods to circumvent the mutual knowledge problem, saying: *“a proposition is manifest if a person is capable of representing it mentally.”* (Holtgraves, 2002). This implies that as long as a speaker is able to convey their ideas in a way that is understandable by a listener, mutual knowledge is not required for effective communication (Holtgraves, 2002).

2.1.3 Collaboration without Mutual Knowledge

Communication breakdown in collaboration is not an uncommon occurrence in interdisciplinary teams, especially when teams do not take the time to first establish mutual knowledge. These breakdowns are commonly caused by misunderstandings regarding different parties' perceptions of the information being shared. They heavily impact the ability of a team to function, causing reduced decision making quality and productivity as members of a group have difficulty in conveying and interpreting task-relevant information (Cramton, 2001). Work has also been done by other scholars that show the correlation between the failure to establish mutual knowledge and compromised work relationships (Rolv Mikkil Blakar, 1973; R.M. Blakar, 1984). These studies showed that breakdowns in communication can potentially impact team members' perceptions and opinions of each other and potentially deter future collaboration (Rolv Mikkil Blakar, 1973; R.M. Blakar, 1984).

2.1.4 Interdisciplinary Collaboration in Higher Education

Given the ubiquity of interdisciplinary work especially in research, it comes as quite a surprise that many people still fail to grasp the intricacies of interdisciplinary collaboration (Robertson et al., 2003). This knowledge gap is caused in no small part by the general lack of transparency in interdisciplinary teams when it comes to sharing methods of collaboration (Robertson et al., 2003). This desperate need for clarity and information is in turn caused by a variety of issues, notably the traditional reward structure's inability to reward good collaboration, instead choosing to focus solely on results (Goring et al., 2014). This results-focused ideology is highlighted by the fact that most institutions do not require interdisciplinary teams to disclose their collaboration methods, only the results and data gathered from their research (Robertson et al., 2003). This opaqueness has the potential to hurt the credibility of the research as the process of collaboration itself often defines the context of a research project (Robertson et al., 2003).

2.1.5 Fostering the Culture of Interdisciplinary Collaboration

To allow students to seamlessly transition into interdisciplinary work post education, they must be well educated in their own disciplines while being ready to engage in interdisciplinary endeavors (Amoussou et al., 2010). However, care must be taken to not take away the depth of knowledge that is important to solve the most challenging problems (Amoussou et al., 2010). There are a number of ways by which this can be achieved.

A top-down approach can be utilized where institutions build a “platform for collaboration” which fosters interdisciplinary research through an *“infrastructure of research organizations, academic journals, funding committees and informal networks of researchers”* (Robertson et al., 2003). This approach aims to create an environment where the collaborations among individuals of differing disciplines are considered normal rather than extraordinary (Robertson et al., 2003). Institutions can also require that interdisciplinary teams make their collaboration methods transparent (Robertson et al., 2003) so that their experiences can help guide younger teams trying to engage in similar forms of collaboration (Anderson, Rosenfield, & Kessel, 2008). This sharing of experience is achieved by the senior teams serving as examples for younger teams, passing on valuable methods for effective interdisciplinary collaboration (Anderson et al., 2008). Institutions should also consider successful collaboration as a measure of research success beyond the normal metrics (Goring et al., 2014), as little to no praise is given to those who work with other disciplines (Rosenfield, 1992).

The bottom-up approach on the other hand, simply consists of raising awareness and stimulating conversation on the topic among students and staff (Amoussou et al., 2010). This increased consciousness can help many other potential methods of fostering the culture of interdisciplinary collaboration surface (Amoussou et al., 2010) as well as promote systemic change towards enabling better interdisciplinary collaboration. This is arguably the easier route of the two as it is a much more gradual process and thus easier to adopt.

2.2 Synchronous Distributed Groupware and its Challenges

2.2.1 Groupware

In the most traditional sense, groupware is defined as “*intentional group processes plus software to support them*” (Johnson-Lenz & Johnson-Lenz, 1982). Whenever groupware is mentioned, the concept of CSCW is frequently brought into the fold. CSCW observes group dynamics in order to uncover different methods in which technology (in particular computers) can be used to augment and improve productivity (Ellis, Gibbs, & Rein, 1991). The similarity in motivations of groupware and CSCW allow them to be used interchangeably (Ellis et al., 1991). Ellis et al. proposes that a broader perspective be taken of groupware, classifying groupware as any application purpose-built for audiences ranging from small groups to large organizations regardless of whether or not they support cooperation. This idea contrasts other scholars’ view of the matter, as they usually define groupware as “*software for small or narrowly focused groups*” as opposed to large organizations (Grudin, 1988).

Groupware can be divided using the time space taxonomy (Ellis et al., 1991). Time-wise, applications are distributed over a scale with synchronous (real-time) and non-synchronous (non-real-time) interactions in each pole; space-wise, applications are distributed over a scale with face-to-face representing the smallest distance between users and increasing as users are more distributed (Ellis et al., 1991). Table 1 shows the groupware time-space matrix as proposed by Ellis et al.

	Same Time	Different Time
Same Place	Face-to-face interaction	Asynchronous interaction
Different Places	Synchronous distributed interaction	Asynchronous distributed interaction

Table 1: Ellis’ Groupware Time Space Matrix (Ellis et al., 1991)

Alternatively, groupware can be categorized using application level functions such as computer conferencing, coordination systems, message systems, multiuser editors and group decision support systems (Ellis et al., 1991). However, as groupware technology advances and demand increases, the lines between these categories become progressively blurred and more integrated systems will emerge (Ellis et al., 1991).

2.2.2 The Eight Challenges

Unlike traditional single-use applications which only consist of a human-computer interaction, groupware requires that designers also consider human-human, computer-computer and computer-human aspects during the design process (Monk et al., 1996). However, many designers opt to utilize intuitions in single-user software. This behavior stems from designers underestimating the difficulty of evaluating the performance of groupware applications (Grudin, 1988). These practices tend to cause their design process to break down as groupware has the tendency of benefiting asymmetrically (Grudin, 1988).

The aforementioned problems were then further expanded by Grudin into eight main challenges for developers (Grudin, 1994). These challenges are detailed in Table 2.

Problem	Description and Solution
Disparity in work and benefit	Description: Groupware applications do not provide equal benefit to all group members. Solution: Reduce the work required of non-beneficiaries.
Critical mass and Prisoner's Dilemma problems	Description: Groupware is only effective when used by a majority of team members. Solution: Reduce work required of all users and build in incentives for use.
Disruption of social processes	Description: Group members may reject groupware if it interferes with the current status quo. Solution: Avoid assumptions of a "rational" workspace.

Exception handling	<p>Description: Group activities might generate a wider range of exceptions than groupware is able to handle.</p> <p>Solution: Using tailorable systems.</p>
Unobtrusive accessibility	<p>Description: Provide unobstructed accessibility to group processes.</p> <p>Solution: Add groupware features to an already successful application rather than launching a new one.</p>
Difficulty of evaluation	<p>Description: Analysis and evaluation of groupware is hard to generalize and learn from.</p> <p>Solution: Developers need to utilize correct skills, provide resources and disseminate results.</p>
Failure of intuition	<p>Description: Intuition in development are based on primarily experience in single-user applications unsuitable for groupware.</p> <p>Solution: Recognize the risks of depending on intuition.</p>
The adoption process	<p>Description: A more meticulous introduction to the workspace is required for groupware.</p> <p>Solution: Adding groupware to existing applications.</p>

Table 2: Grudin's Eight Challenges for Developers (Grudin, 1994)

Other scholars further explored these criteria, conducting panels to identify actionable criteria to guide groupware design (Ambe & Monk, 1997; Monk et al., 1996). The outcomes of these panels closely mirror Grudin’s challenges, but put additional emphasis on criteria such as individual benefit and minimizing user effort (Ambe & Monk, 1997; Monk et al., 1996). The results of the aforementioned panels are summarized and shown in the table below (Table 3).

Criteria	Mentions
Critical Mass	4
Personal Benefit	17
Minimal User Effort	18

Table 3: Summarization of results gathered from “Criteria for Effective Groupware” and “Criteria for Effective Groupware 2” (Ambe & Monk, 1997; Monk et al., 1996)

2.2.3 Communication Challenges in Groupware

Groupware with large user bases also have the potential to form virtual communities, bringing in other social dynamics. Territorialism, the expression of ownership towards an object, is very likely to emerge as team members collaborate and is usually expressed through various responses to perceived invasion of territory (Brown, Lawrence, & Robinson, 2005). This phenomenon is shown to be very apparent in online co-authoring applications such as Wikipedia (Thom-Santelli, Cosley, & Gay, 2009). As such, visible markers should be used to concretely establish user hierarchies and boundaries to encourage participation (Thom-Santelli et al., 2009). Leadership poses a key role in any form of collaboration and is no different for online collaborative tasks (Luther & Bruckman, 2008). However, it has been proven that traditional top-down leadership structures are sub-optimal in promoting effective collaboration in geographically distributed groups (Luther & Bruckman, 2008). This is compounded by the users’ strong sense of ownership constricting the capacity at which a leader can function (Luther & Bruckman, 2008). As such, “shared leadership” is generally preferred when online collaboration is concerned (Zhu, Kraut, & Kittur, 2012).

In addition, the inherent limitations of computer-mediated communications when compared to face-to-face communication (Straus, 1997) means that extra measures must be taken in order to improve awareness of group members. This awareness is important to group members as it is used to provide context for their own tasks and drive team communications (Dourish & Bellotti, 1992). One of the main methods of establishing this is by creating a shared space where group members can constantly monitor their common task (Kraut, Gergle, & Fussell, 2002) while providing constant feedback on the group progress (Dourish & Bellotti, 1992). Still, it is worth noting that the development of computer-mediated communications is not necessarily to replace face-to-face communications, but to provide an alternative for it when face-to-face communication is not possible (Straus, 1997).

2.2.4 Challenges in Synchronicity

The MVC (Model-View-Controller) architecture has been a mainstay in synchronous groupware application design due to its effectiveness in maintaining consistency in different users' views (Graham, Urnes, & Nejabi, 1996). However, geographical distribution introduces network latency to the system which in turn causes issues such as difficulty in view synchronization and jarring transitions in user interfaces (Savery & Graham, 2011). Savery and Graham proposed two basic approaches of overcoming this (Savery & Graham, 2011):

- The issue is addressed in the user interface by improving users' awareness of how latency is affecting their interaction, or;
- Behind the scenes using custom algorithms to reduce the impact of latency

They then dubbed any groupware application that use either of these approaches to recognize time in their design as “temporally-aware” (Savery & Graham, 2011). Other measures can also be taken to improve efficiency in an MVC architecture as explored by Graham et al. (Graham et al., 1996). Therefore it is possible to implement an efficient synchronous distributed groupware system using the MVC architecture given that correct steps are taken (Graham et al., 1996).

2.3 Prior Art

Various collaborative tools have been deployed in industry and tested in academia. While the functionality of these tools vary, their end goal remains the same: to facilitate collaboration in some way, shape or form. Several examples are included in this section, highlighting the core focus and functions of each of them.

2.3.1 Meme Tags

Meme tags is a wearable system that aims to smoothen the formative process in cooperative work (Borovoy et al., 1998).

It consisted of a digital name tag to substitute regular paper nametags in conferences. This digital name tag includes a screen that is used to share ideas (or memes) with attendees from other disciplines who can then accept or reject each other's memes using buttons on the device. Figure 1 shows the implementation of the Meme Tag. Usage data from these tags are gathered and projected onto a community Mirror in a public space to further promote the sharing of ideas among potential collaborators.

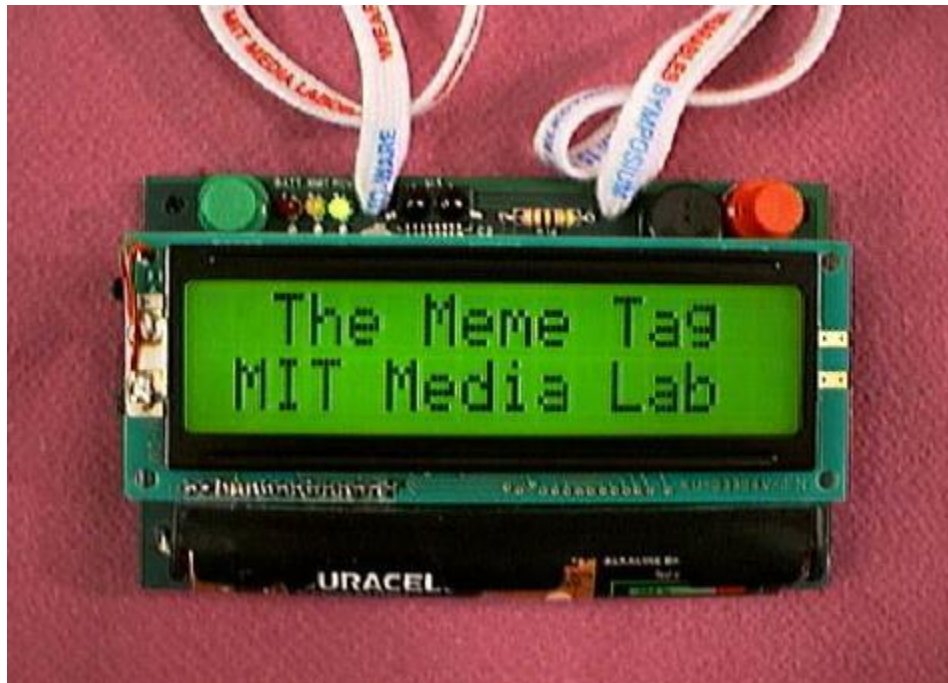


Figure 1: Meme Tags promote idea sharing in conferences

The concept was proven to be successful through several stages of testing. Borovoy et al. found that people were very involved in using the tags at each event it was deployed in. It was also able to facilitate conversation effectively among users regardless of background (Borovoy et al., 1998).

2.3.2 Google Hangouts

Teleconferencing tools refer to tools that allow support for telecommunication in group interactions (Johansen, 1984). Google Hangouts represents the most popular of these tools.

Google Hangouts allow users to communicate using either text, voice or video in real time, enabling a higher degree of collaboration even when users are distributed geographically. While unable to fully circumvent the communication deficits due to network latency and lack of body language, Google Hangouts has proven itself very effective at facilitating collaborative tasks among small to medium sized teams. Users simply need to invite their team members into their room and select the means with which they want to communicate with them. This interaction is made simply by a minimalistic user interface as shown in Figure 2.

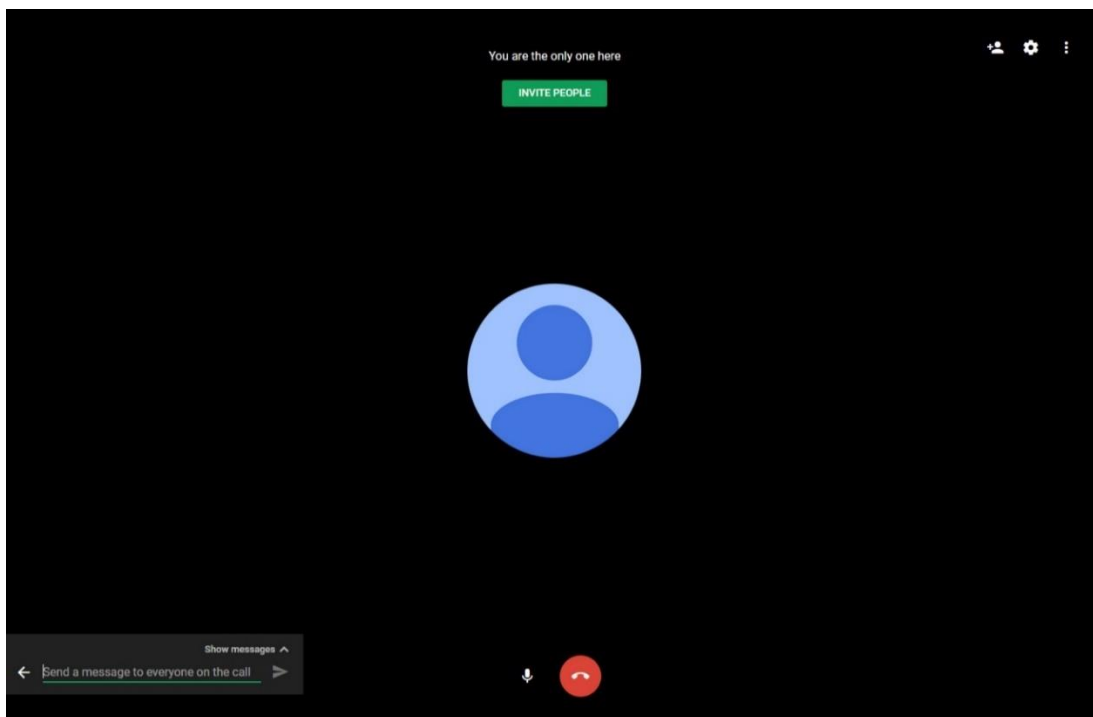


Figure 2: Google Hangouts user interface

This has been used in the past alongside YouTube broadcasting to facilitate medical training by allowing students better access to an online panel of experts (Chan, Joshi, Lin, & Mehta, 2015). A Google Hangouts session between several geographically dispersed educators answering student questions was first broadcasted to an audience before being archived to YouTube for asynchronous viewing at a later time. It was found that the use of Hangouts was highly successful at increasing student participation in their education (Chan et al., 2015). Chan et al also pointed out the potential of using Google Hangouts in other aspects of education (Chan et al., 2015).

2.3.3 Google Drive

Google Drive represents Google's attempt at releasing a free to-use, collaborative, office suite. It falls under the category of a multiuser editor.

Google Drive includes functions such as real-time editing of files and integrated communications in the form of a chat box. This allows geographically distributed users to work simultaneously on digital items such as text documents, spreadsheets and slideshows. However, the limitations in the communication medium (text-based chat) make it difficult to coordinate with other contributors. As a result, many users have turned to using other forms of online communication such as the aforementioned teleconferencing tools to make up for this limitation.

2.3.4 Review

All of the above applications are forms of groupware that enable and support various forms of collaboration. However, most of these interactions are open-ended with users retaining full control of their interaction. The following figure (Figure 3) illustrates these application on a graph measuring the effectiveness of remote communication and the amount of focus put on encouraging interdisciplinary interactions.

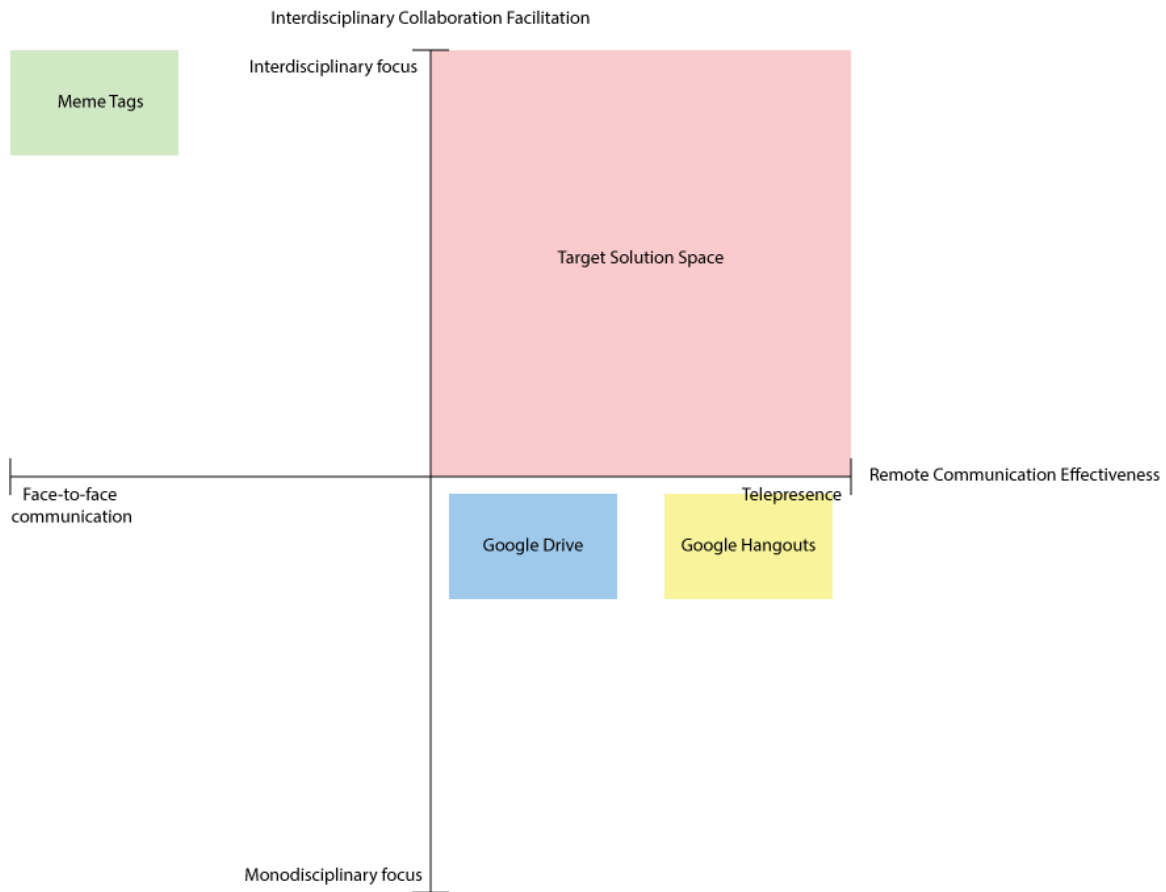


Figure 3: Graph plotting effectiveness of remote communication against focus on the facilitation of interdisciplinary collaboration

As shown above the solution must strike a balance between effective remote communication and a focus on facilitating interdisciplinary collaboration.

Of the discussed products, only Meme Tags (Borovoy et al., 1998) actively promoted communication between individuals of different disciplines. The other tools left the nature of the interaction to be determined by the user and as such, does not specifically aid in assisting interdisciplinary collaboration. However, it is worth noting that both Google Drive and Hangouts are much better suited for remote collaboration due to better communication support. Given that the context of use for this solution is in a tertiary education institute where different schools are segregated from each other, remote communication is paramount to the success of the solution.

Chapter 3

3 Project Background

3.1 Project Overview

The main objective of this project was to develop a form of synchronous distributed groupware that can help students from different backgrounds and disciplines establish a more solid foundation of mutual knowledge without directly altering the current structure of university education. To achieve this, an online, task-based interaction with integrated text-based chat functionality was developed. This prototype aims to allow students of different disciplines unite around the common task of solving various questions in order to promote conversation around interdisciplinary collaboration. Furthermore, it will be able to expand their knowledge of each other's disciplines.

The prototype was tested in two separate testing sessions with the first having 4 participants and the second having 2 participants. The participants were first allowed to interact freely with the prototype while being observed for 30 minutes before being interviewed to gather further insight on their views of the interdisciplinary collaboration problem while simultaneously gathering feedback for the prototype. Data was gathered in the form of observations, chat logs and audio recordings of both their interactions and interviews.

3.2 Prototype

3.2.1 Background

Due to the university use context of the prototype, it was designed to be an amalgamation of two technologies students were already familiar with. The question solving portion of the interaction was modelled closely after the existing university online quiz interface while the chat box was modelled after other commonly used chat boxes. In order to produce a prototype that fulfilled both of these criteria while maintaining a high level of accessibility for users, a web application was developed using the MVC architecture.

Several factors were considered when designing the prototype:

- **Ease of use:** The learning curve and effort of installation for application must be kept as low as possible. As such, design elements familiar to students were used and a web-application was the platform of choice as it does not require the installation of special software.
- **Geographical Distribution:** Due to the fact that different faculties are dispersed throughout university and students are largely tied to their respective schools while in university, the system must be designed as though users are geographically distributed. Therefore, the prototype groupware design must be distributed to facilitate communication over short to intermediate distances.
- **Communication Effectiveness:** While text based communications are deemed to be ineffective compared to other media such as voice and video, it is the most reliable when handling a large volume of students. It is also the easiest to gather data from as other factors such as audio and video clarity heavily impact data quality from the latter two communication media. Synchronous communication must also be implemented to further improve the quality of communication between users.
- **Ease of deployment:** The prototype must be relatively simple to deploy while still maintaining all the required functionality to be tested as a piece of synchronous distributed groupware for interdisciplinary use.

3.2.2 Technologies Used

To maximize compatibility with all devices, only simple web technologies were utilized in the creation of the prototype. The front end of the prototype consisted of a combination of HTML (Hypertext Markup Language), CSS (Cascading Style Sheets) and Javascript in the form of jQuery while the back end consisted of PHP (PHP Hypertext Preprocessor) scripts supported by a MySQL database (Figure 4).

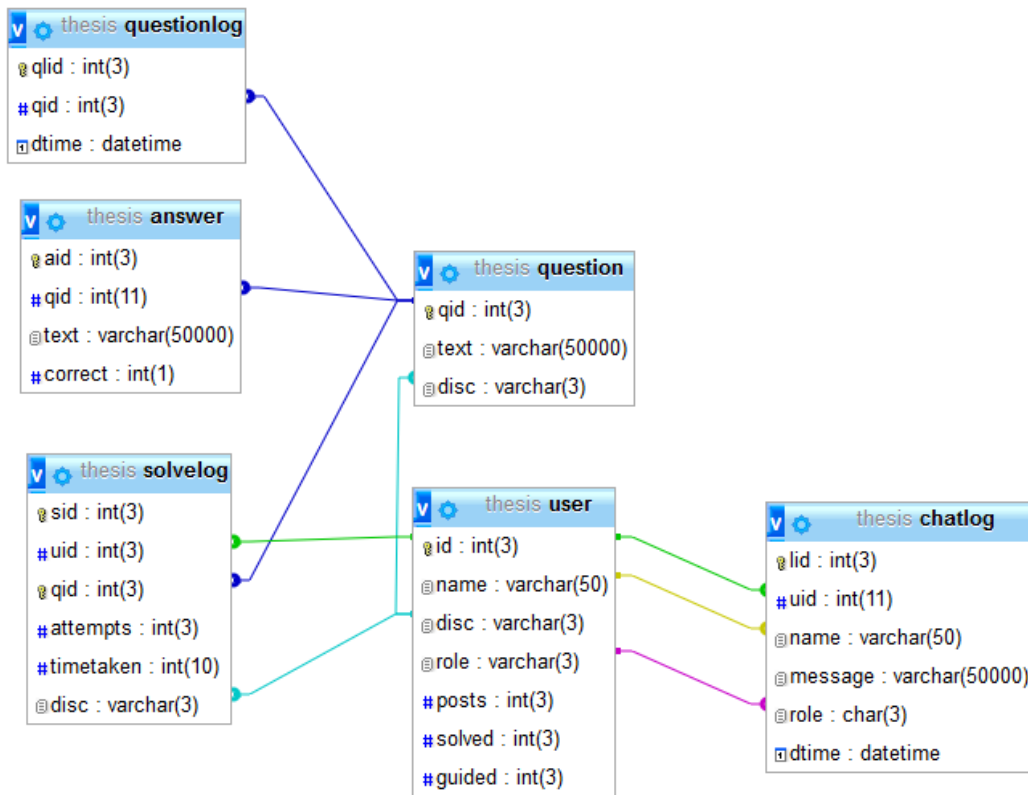


Figure 4: Relational database schema used for the application

To achieve the goal of a synchronous interaction the prototype was built upon the MVC architecture as it has been proven to be very effective at supporting synchronous groupware processes (Graham et al., 1996). In addition, the application implements a timer-based back end which aims to minimize the user's perception of latency.

The components present in the MVC implementation is detailed in the following table (Table 4) and figure (Figure 5):

Model	The model consists of a MySQL database to store all relevant data including chat logs, usage data and user accounts. It also includes PHP scripts for data updating and retrieval.
View	HTML web pages with CSS styling were used to display data acquired from the controller to the user. It also includes several jQuery functions to handle and display data sent by the model.
Controller	A suite of AJAX functions to invoke server-side PHP scripts. Also includes jQuery scripts to handle and clean inputs for these PHP scripts.

Table 4: MVC components of the prototype

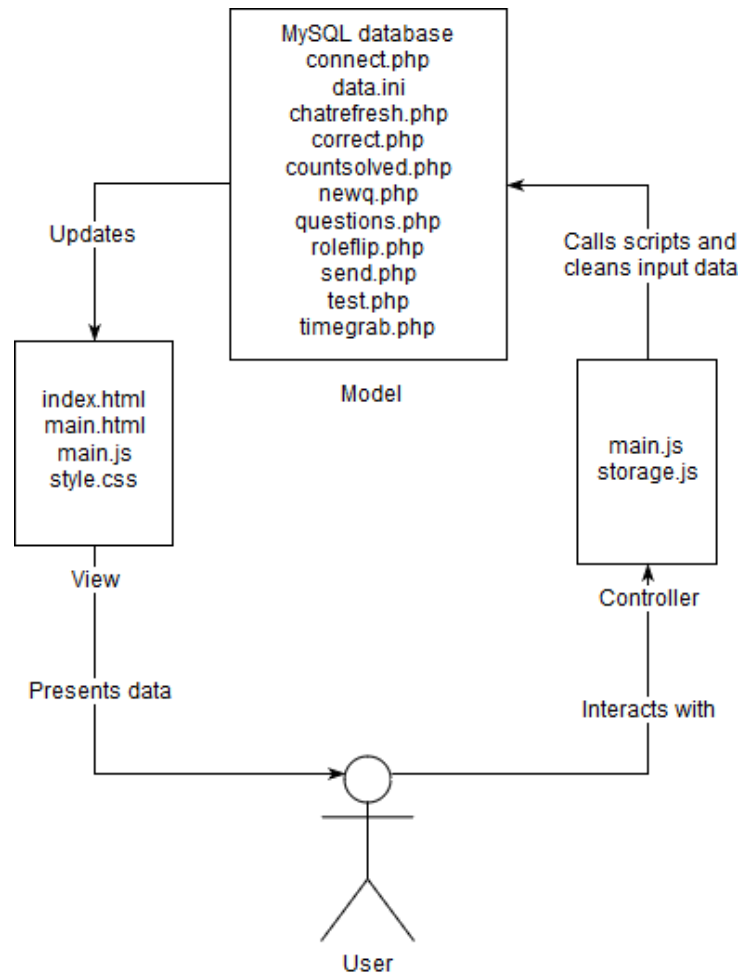


Figure 5: Graphical representation of prototype MVC implementation

3.2.3 Functionality

- **Role-based problem Solving**

Each user's interaction hinges on two factors: their discipline, and their role in the interaction. A user can have the role of either a solver or a guide. A solver is responsible for solving the questions that the system fields to them; a guide is responsible for giving the solver hints about the question without providing the answer. Roles will be automatically swapped using a PHP script when a discipline manages to solve a preset number of questions.

- **Relevant and appropriate questions**

Questions will be from the guide's discipline and are chosen from sources such as past exam papers and first year course materials to make sure that guides are well acquainted with the concepts involved. To better select these questions, a survey was conducted on several students pursuing either IT or Psychology to determine appropriate topics for the quiz during the development of the application. The outcomes of this survey were used to select questions for the final quiz.

- **Text-based chat**

A text-based chat tool has been implemented and is featured prominently in the application. This tool represents the main channel of communication between users and facilitates the bulk of the interactions in the prototype. Users are able to type their messages and send it to a database which both logs and stores their messages. These messages are then retrieved and displayed in the chat display every 1 second, producing a synchronous communications platform for collaboration.

- **List of contributors**

To leverage the territorial nature of online collaboration (Pan & Blevis, 2011; Thom-Santelli et al., 2009), the implementation of a list of contributors next to the main chat box was planned. This feature was aimed at increasing participant involvement with the application by providing positive reinforcement whenever they contribute towards solving a problem.

However, as the test sample was much smaller than the target demographic it was decided that a smoke and mirrors implementation of this feature would suffice for early testing. This decision was made to free up development time for other features.

- **Interaction Timer**

A timer in conjunction with statistic cards were proposed to introduce competitive game elements to the interaction. However, this idea was scrapped as it introduces additional boundaries in the interaction. The timer was kept intact however, to observe if the presence of one would incite competitiveness or panic from the users.

- **Full chat and usage logs**

The system is designed to gather all important usage data such as chat logs and user interaction with the problems. This data is stored in 3 separate tables: one for chat logs, one recording questions given and one recording the number of attempts as well as the time taken to solve each question.

3.2.4 Interactions

The interactions in the prototype are kept as open-ended as possible to allow users to interact with the prototype as naturally as possible.

- **Solving Questions**

Solvers are able to solve various questions from foreign disciplines with the help of guides.

- **Engaging in Conversation**

Both solvers and guides are able to converse with each other using integrated chat functionality. Guides are expected to guide solvers in their tasks using their pre-existing knowledge while solvers are to probe the guides on concepts relevant to solving their current question. However, users are free to use the chat function to engage in other types of conversation as well. This aims to develop a strong foundation of common ground between the participants throughout the interaction.

3.2.6 Design

An ultra-simplistic design was utilized for the prototype with clear separators between sections and clear text to improve readability. Several design elements were also borrowed from currently existing applications to reduce cognitive load of users while learning the application. For example, the question and answer section borrows heavily from the format of University of Queensland online quizzes while the chat box has a layout similar to other popular chat applications in the market such as Slack. A wireframe (Appendix A1 Wireframe) was first used to establish the basic structure of the application before developing the first of the three prototypes. Information will be displayed from top to bottom in the application with the following priority:

Status messages > Question > Chat displays > Chat Input

This implementation is to ensure that users are first aware of the system's status before engaging with other aspects of the application.

Other quality of life improvements were implemented during of the development process to improve user awareness and usability:

- Correct answers are highlighted green for guides to help jog their memory in case they have forgotten about the topic (Implemented in prototype 2) (Appendix A3 Prototype 2).
- Users can send messages using the enter key instead of clicking the send button (Implemented in prototype 1) (Appendix A2 Prototype 1).
- The chat display scrolls automatically to the newest message whenever a new message is received (Implemented in prototype 2) (Appendix A3 Prototype 2).
- Users are given a clear indicator of their current role in the interaction (Implemented in prototype 2 and 3) (Appendix A3 Prototype 2, Appendix A4 Prototype 3).

The following figures (Figure 6, Figure 7) detail the layout and design of the final version of the application.

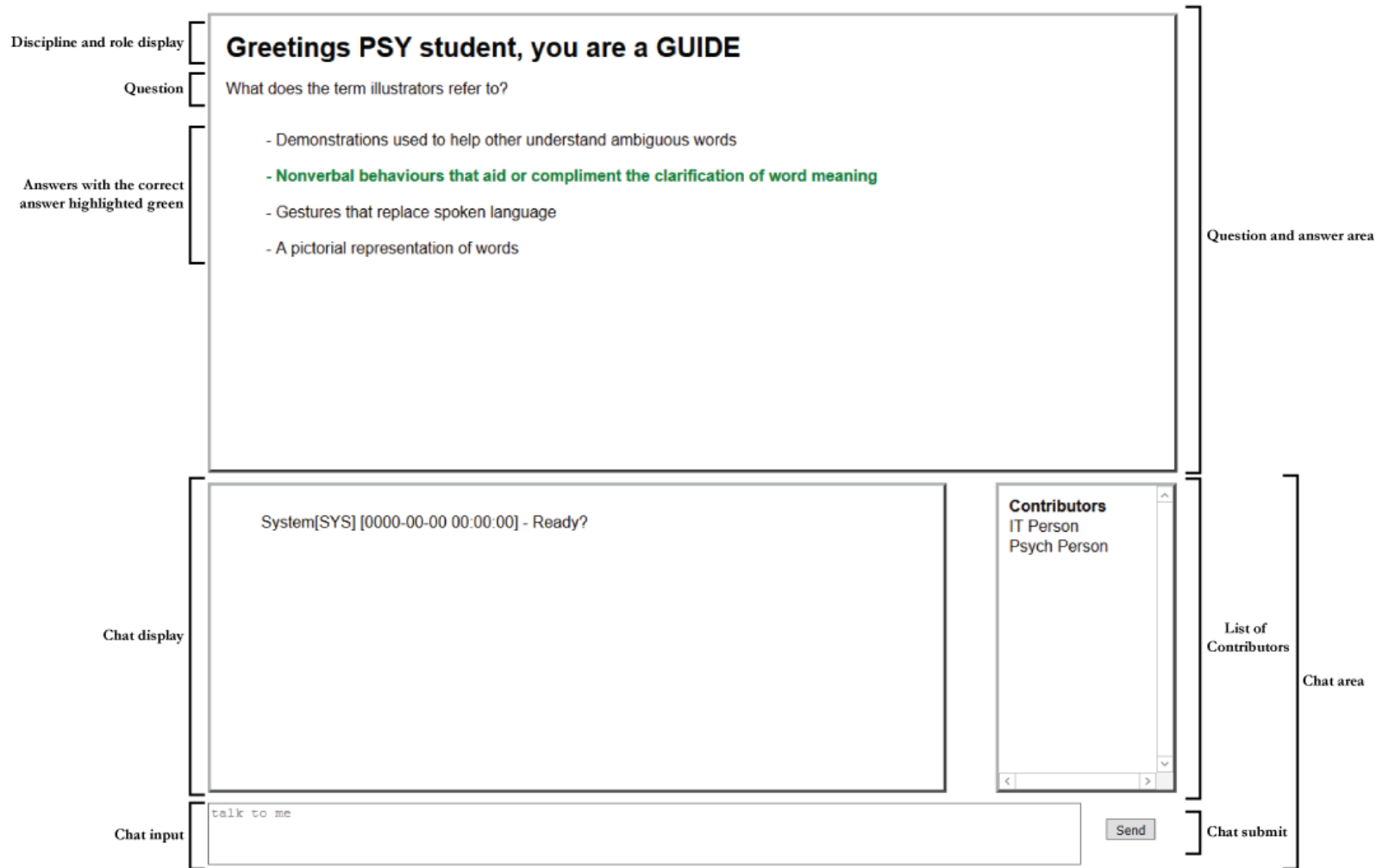


Figure 6: User interface from the guide's perspective

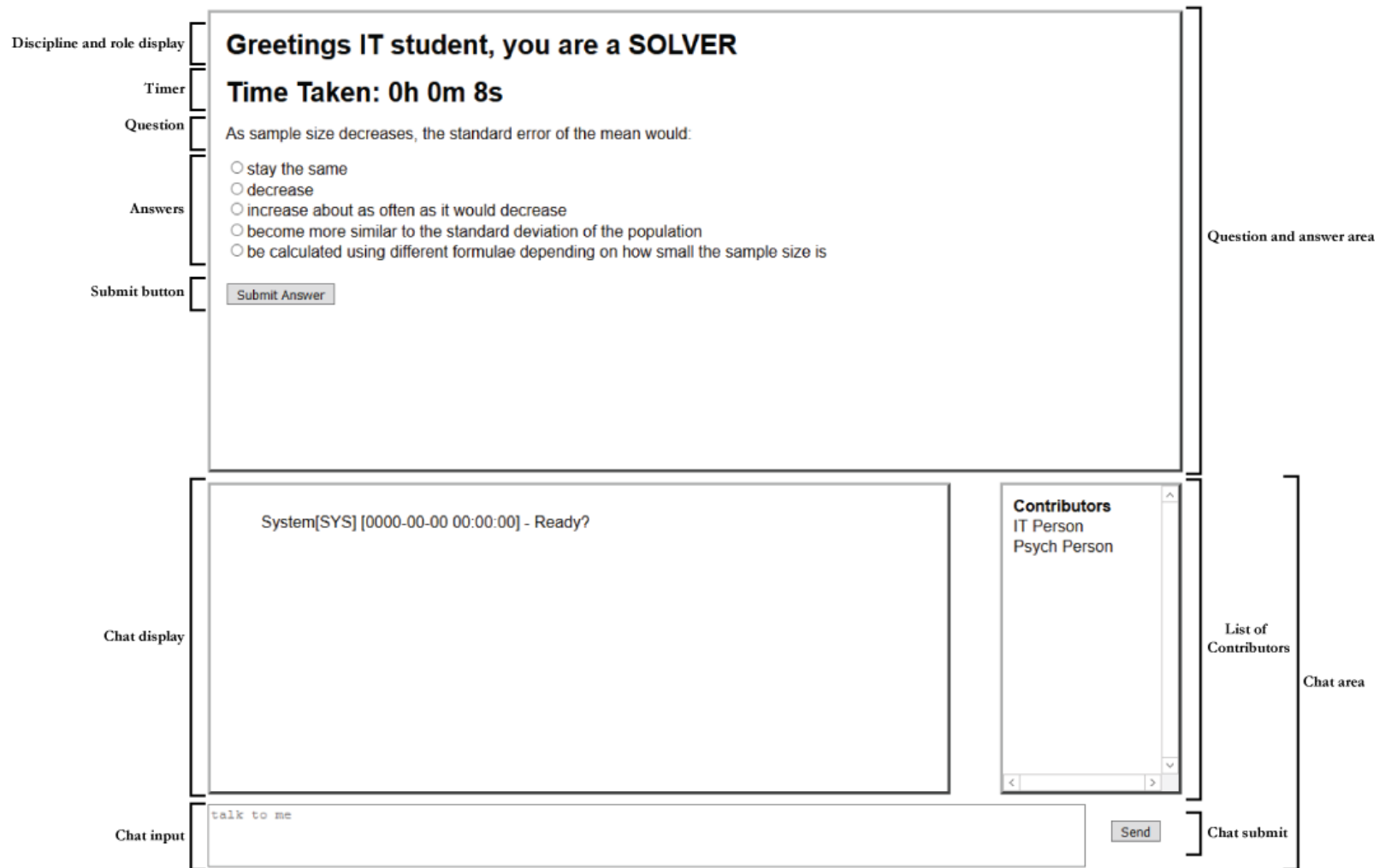


Figure 7: User interface from the solver's perspective

3.2.6 Deployment

The prototype was deployed in a UQ (University of Queensland) Web Zone, which made it accessible to any UQ student or staff member who is aware of the URL (Uniform Resource Locator) of the website. This form of deployment made it much easier to test as participants can simply access the prototype via a web browser through their personal devices. However, this URL was not shared with participants until the test session as the test sessions were private.

Chapter 4

4 Test Methodology

4.1 Method

The project detailed in the prior chapter was then used to enable a series of test sessions which consisted of two 30-minute phases: a user testing phase and a user interview phase. Each of these phases are carried out with different goals in mind and produced a different set of outcomes for the project.

4.1.1 User Testing Phase

User testing phases adopted an Action Research method based on the model by Kemmis and McTaggart (Kemmis, McTaggart, & Program, 1988). This decision meant that each session iterates upon the last, utilizing previous observations and feedback to produce a smoother test experience while maintaining a largely open-ended test procedure. However, major changes to the prototype and methodology were avoided to maintain the usability of data from different test sessions adjacent to each other. An internal goal of 6 participants was set to obtain a reasonable information gain to resource requirement ratio (Nielsen & Landauer, 1993).

The action inquiry cycle utilized by these testing phases is detailed in the following figure (Figure 8):

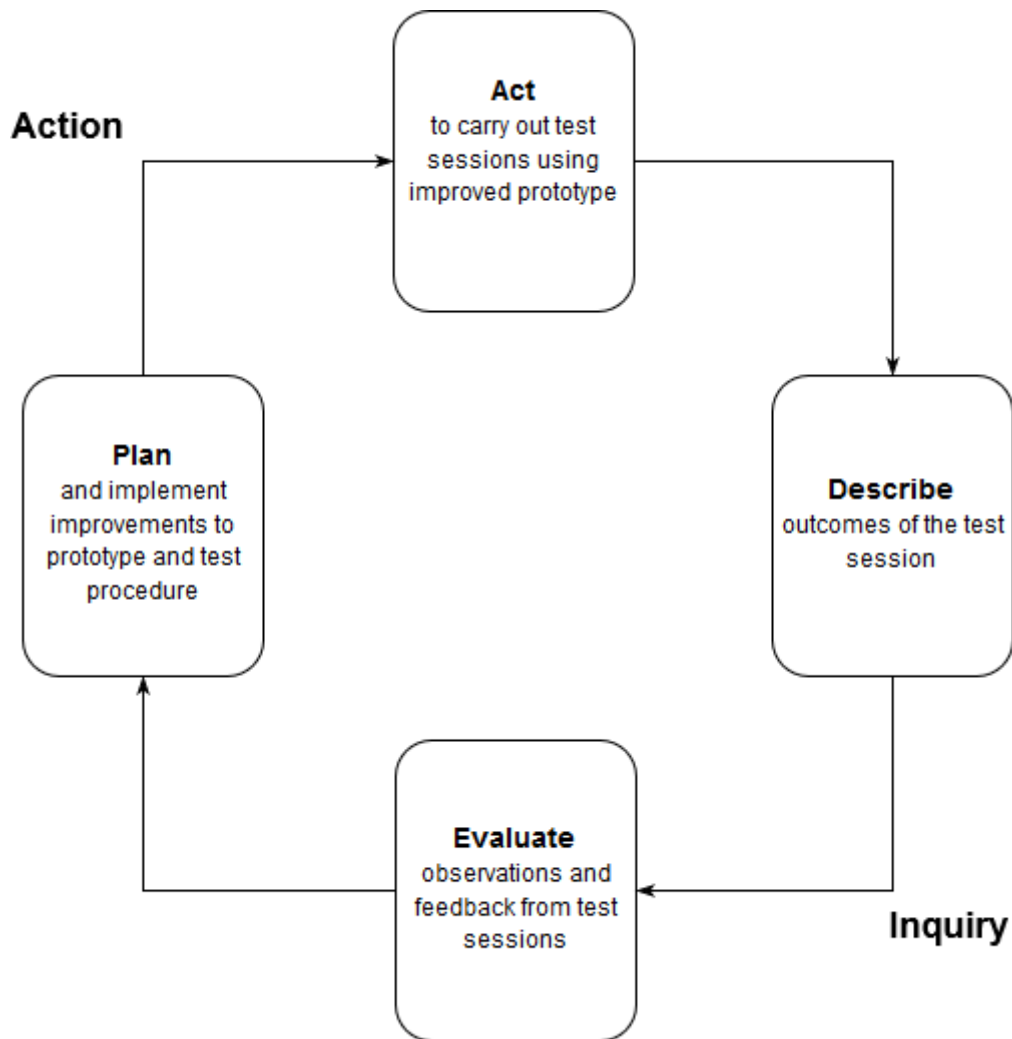


Figure 8: Action inquiry cycle utilized by the test sessions

Each of these test phases follow the following format:

- Participants are first given a briefing on the test procedure and allowed to read and sign their respective written consent forms.
- Participants are divided into two groups of equal number based on their disciplines.
- The groups are separated and are allowed to interact with the prototype using the view specific to their discipline.
- Guides are encouraged not to provide answers directly to the solvers.
- Group roles are reversed once a certain number of questions are answered.

- The test ends after a total of 6 questions have been answered or 30 minutes have elapsed.
- Participants proceed to the interview phase.

In all testing phases, interaction boundaries are kept to a minimum in order to facilitate natural interactions. This methodology allows for the gathering of more accurate data and relevant observations.

4.1.2 User Interview Phase

After interacting with the application for 30 minutes users were interviewed individually for about 10 minutes each. These interviews were semi-structured and were conducted to acquire both their opinions on interdisciplinary collaboration in university and feedback on the usability of the prototype.

This interview methodology was chosen to allow the investigator to better pursue unexpected answers to the basic interview questions. The basic question set used in the interviews is as follows:

- What are you studying and what year are you in?
- What was your overall experience with the system?
- How did it change your understanding of IT/Psychology, if at all?
- Would you use this on a regular basis?
- Do you think that the university is affording you enough opportunities to work with individuals of differing disciplines?
- Do you see yourself benefitting from working more with individuals of differing disciplines?
- What difference do you think this application will make to the current university ecosystem if deployed?
- Would you like to provide any feedback regarding the usability of the system?

4.2 Data

Three forms of data were gathered during testing: log data, field notes and audio recordings.

Chat logs, records of questions fielded and records of the number of attempts and the time taken to solve each question make up the log data. This log data is gathered using the application itself and is stored in a MySQL database at the university.

While conscious effort was made to minimize boundaries in the interaction, the testing sessions were placed under constant observation throughout their duration. Notes were then taken based on observation of all participants during the testing session. While this increases the risk of introducing the Hawthorne effect to the test sessions it was deemed an acceptable risk as observational data is a major part of the research outcomes (Landsberger, 1958).

In-team conversations were also recorded using the laptops utilized for testing while interviews were recorded using mobile phones.

All 3 forms of data were transcribed at a later date and subsequently analyzed to find common patterns and meaningful outliers.

4.3 Ethics Processes

All participants in each testing session were provided with a thorough briefing on the study before testing began in addition to being provided the Participant Information Sheet (Appendix B2 Participant Information Sheet and Written Consent Form (Appendix B3 Written Consent Form. They were also advised both verbally and via the information sheet, that their participation was completely voluntary and that they would be able to withdraw from the study at any point of testing at their discretion with no penalties or provision of reason required.

All participants who agreed to participate in the study were then required to complete and sign the Written Consent Form provided before progressing further into the study.

4.4 Participants

To participate in this study, participants needed to fulfil the following criteria:

- Studying at the University of Queensland
- Enrolled in a program related to either IT (Information Technology) or Psychology but not both.

These two disciplines are chosen as they are a combination that is highly relevant in the field of interaction design and CSCW. Participants studying both disciplines were avoided as their knowledge of both disciplines will affect the overall accuracy of the data.

4.4.1 Recruitment Process

Participants were recruited by one of two methods: being acquaintances with the investigator or via the promotion of the research in classrooms.

Acquaintances who fit the criteria for testing were approached and presented with details about the study. If they were interested, they were be invited to a formal testing session. Snowball sampling was then used on this initial set of acquaintances to gain access to an even wider participant pool (Goodman, 1961).

Prior to securing ethics approval, emails were sent out to several course coordinators in both Psychology and IT based courses. This preemptive contact helped introduce the research topic and establish rapport to gain access to their respective classrooms for recruitment at a later date. The project was then promoted to these classes after ethics approval was acquired. Interested participants were contacted by the investigator via email or face-to-face. During this approach participants who did not fit the prerequisites of the study were notified of their unsuitability for the study. In addition, details about the study and testing sessions were provided to potential participants.

4.4.2 Participants who Volunteered for the Study

Six participants, three from an IT background and 3 from a psychology background, elected to be a part of the study. Four of them participated in the first testing session while another two participated in the second testing session. Of the six, five of them were recruited from acquaintances and snowball sampling while only one of them was recruited from classes. Despite all participants coming from either an IT or psychology background, their experience level in each of their fields range from first year bachelor's to master students.

4.4.3 Existing Relationships Between Participants

The participants were recruited from largely separate social group and as such, did not have any pre-existing close relationships with each other. All IT students had no prior contact with any of the psychology students recruited. Participants from similar backgrounds were mostly acquaintances with no close relationship. As such, these relationships are unlikely to impact the interactions between participants of differing disciplines.

4.5 Test Sessions

4.5.1 Test Session 1

The first test session carried out involved a grand total of four participants of which two of whom studied IT and two of whom studied psychology. The main goal of this testing session was to gauge the application's effectiveness at facilitating communication between individuals of differing disciplines. Data were also gathered on the interaction dynamics both between and within groups (differing disciplines versus similar disciplines, face-to-face versus computer mediated). Several changes were made to the prototype after the testing session based on user feedback and observation analysis as detailed in the table (

Table 5) below:

User role display	A display has been added to the top of the question and answer section to inform users of their role in the interaction to prevent confusion.
Highlighting answers for guides	The correct answer is now highlighted for guides to assist them further in guiding solvers while partially filling out knowledge gaps.
Scroll bug fix	The chat box now only auto-scrolls when a new message is received.

Table 5: Changes implemented after test session 1

4.5.2 Feedback Session

As part of the “proposing phase” for test session 2 a feedback session was carried out during the intermission between the two testing sessions with several other IT students to acquire additional feedback relating to the design and implementation of the application. Heuristics evaluation was also carried out against Nielsen’s heuristics to uncover further issues with the user interface (Nielsen, 2005; Nielsen & Molich, 1990) with the following results (

Table 6):

Heuristic	Note
Visibility of system status	System updates in a timely manner, however, additional clarity can be added to role display by displaying a user’s discipline as well.
Match between the system and the real world	The system presents its data in a language universal to its users. Different terminologies that might be foreign to certain users but this is the system’s nature.
User control and freedom	Users have limited methods of correcting their own mistakes apart from manually informing other users of their mistakes.
Consistency and standards	Questions fielded in the interaction follow the conventions of their respective disciplines.
Error prevention	Redundancies are built into the system to prevent errors from the controller and model.

Recognition rather than recall	The system borrows design features from applications that are familiar to users such as university online quizzes and traditional chat boxes to minimize cognitive load on the users.
Flexibility and efficiency of use	The prototype is devoid of personalization options and accelerators. However these are not important for early stages of testing.
Aesthetic and minimalist design	An ultra-minimalist design was adopted to minimize effort needed to learn and use the system.
Help users recognize, diagnose and recover from errors	Errors do not generate any error messages. However, these are handled in the background and do not affect the overall user experience.
Help and documentation	Users are given a thorough briefing on the prototype before they begun interacting with it.

Table 6: Heuristics testing results

This feedback and the heuristics test results was used to implement several quality-of-life improvements in the application to further improve usability. These changes aim to mitigate the effects these usability issues bring to testing during the second session. Changes to the application that resulted from this feedback session are as follows (

Table 7):

User discipline display	Discipline selected is now presented to the user along with their role at the top of the screen to further reduce confusion about their roles.
Frequency of role changes	Users now alternate between guide and solver after each question to shorten the time it takes for users to benefit from the application. This change is to experiment with methods of increasing perceived benefit to the user.

Table 7: Changes implemented after feedback session

4.5.3 Test Session 2

Only 2 participants were involved in the second testing session with one IT student and one psychology student. This test session shared all of the goals of the first test session with two extra objectives:

- Investigate differences in interaction dynamics when there is only one participant from each discipline.
- Determine if alternating roles after each question would increase participants' perceived benefit from the system.

Chapter 5

5 Findings and Discussion

The analysis of the test and interview sessions produced several interesting patterns that indicate the potential for synchronous distributed groupware to be used as a method for bridging disciplinary divides in tertiary education institutions. These findings also highlighted various design challenges that would be faced in such an undertaking.

5.1 Test Session Findings

5.1.1 Asymmetrical Interactions

One of the most noticeable trends observed during both testing sessions was that there was a large discrepancy between the two roles in terms of both effort and reward.

Guides universally had to put in a larger amount of effort compared to their solver counterparts for each question while reaping minimal rewards since they were not gaining any new knowledge from the interaction. Solvers on the other hand, had the tendency to simply ask vague, general questions before waiting for the guides to reply or in some cases, spoon-feed in-depth explanations to them. The difference in the effort to reward ratio is made even starker when one considers that the solvers are reaping the most benefits in the form of new knowledge.

This asymmetry in the interaction also meant that solvers had the tendency to get bored while waiting for guides to respond to their questions. Some participants exhibited clear signs of boredom, checking their phones and sometimes talking about irrelevant topics while interacting with the prototype. An IT guide even expressed frustration towards this dichotomy, exclaiming: *“I like how they’re not even asking anything, just like an ‘ok’”*.

This difference is clearly shown in the following figures (Figure 9, Figure 10) comparing the amount of words sent by users as guides compared to as solvers:

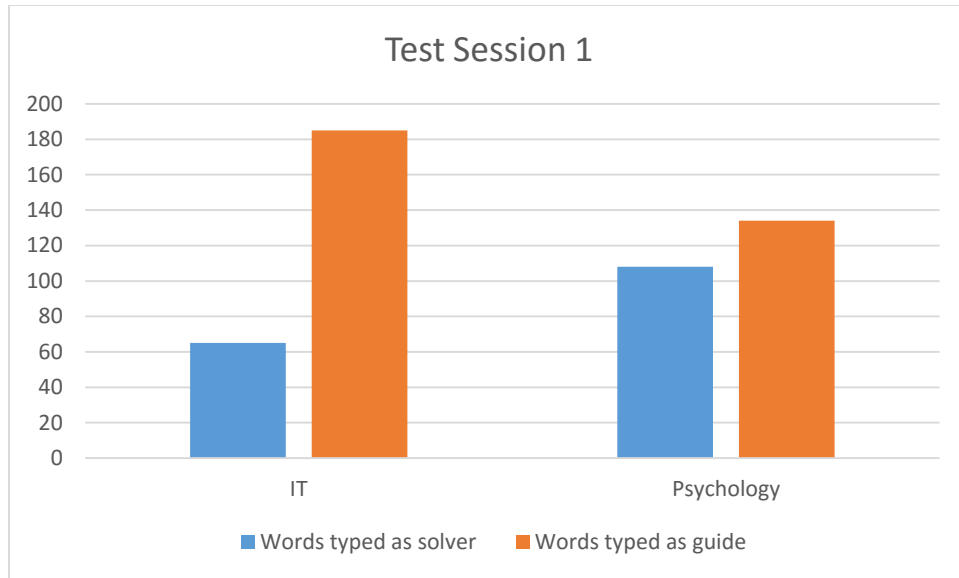


Figure 9: Words typed comparison for test session 1

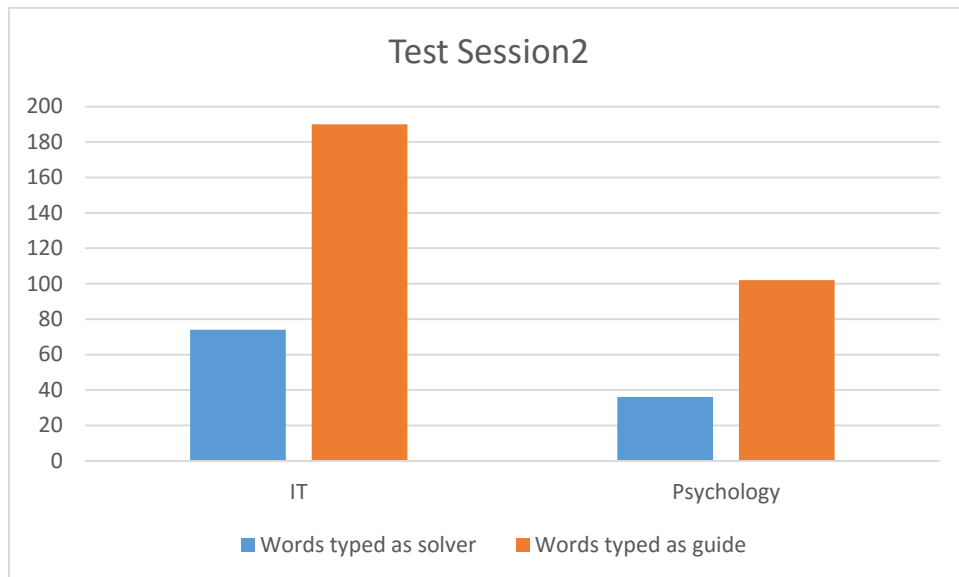


Figure 10: Words typed comparison for test session 2

In test session 2, an attempt was made at mitigating this issue by switching the roles of participants after each question rather than after three questions. This change aimed to shorten the time a guide would need to wait in order to experience benefit (learning as a solver) from the system. However, this change did not produce any conclusive evidence of benefitting the interaction.

5.1.2 Competitiveness

Participants in both test sessions exhibited an unexpected level of competitiveness whilst interacting with the prototype. While the different groups did not compare results after or during each session (as they did not have the means to do so), a concerted effort was made by every test group to answer all questions in only one attempt. This trend carried on even after participants were notified that there was no penalty for answering a question incorrectly. Some participants responded that they would like to get all questions in one go. This attitude resulted in every single question in both test sessions answered correctly with only one attempt (Figure 11).

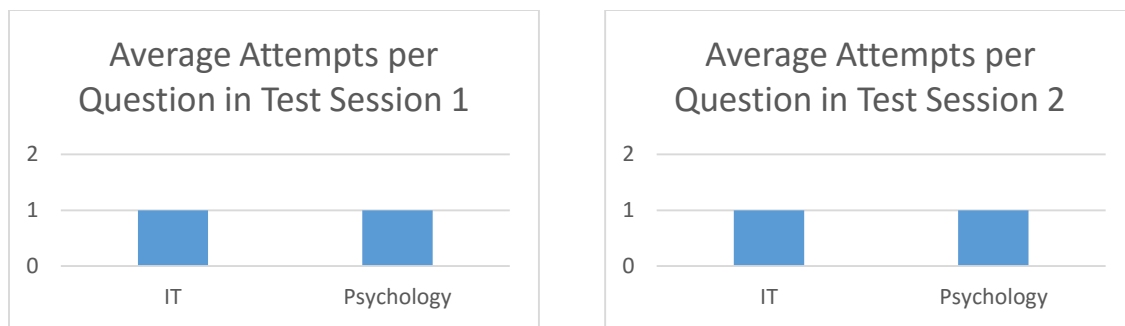


Figure 11: Average attempts per question for each discipline in each test session

This competitiveness is also observable in the conversations between participants. Participants were far more focused on completing the task rather than learning about each other's disciplines. For example, after receiving an explanation from a guide, a psychology solver commented: *"I get it that makes sense but...It still doesn't help me answer the question yet"*.

5.1.3 Knowledge Fluctuations

The test operated under the assumption that guides would have flawless knowledge of the basic concepts in their fields. However, this assumption quickly broke down in practice as guides had forgotten many concepts that they had learned during their earlier years in university. As participants were already in their later years of study, these knowledge gaps were caused by forgetting concepts over time due to disuse. Guides requested on multiple occasions

to be allowed access to a search engine, citing the fact that in real life if they did not know something, they simply looked it up on the internet. These gaps in knowledge and the need for assistance caused some guides to hesitate while building their messages, slowing down the interaction and worsening the asymmetrical interaction problem.

Conversely, some solvers went into the test session already bearing information about the guide's discipline attained through self-study in the past. Interestingly enough, these solvers did not instantly complete their questions, choosing instead to first cross-reference their knowledge with the guides before finally making a decision. However, this interaction did not seem to increase their boredom with the system but instead helped drive further discussion on the question topic.

5.1.4 Communication

Contrary to expectations, participants had little to no issues with assumption of one another's knowledge. All participants made concerted efforts during the interaction to utilize lay-language to communicate with the other group. However, they seemed to struggle to construct their messages using said lay-language, with pairs in session 1 discussing message construction thoroughly verbally before typing their messages into the system while individuals in session 2 carried out multiple rewrites on most messages before sending. This focus on message construction was compounded by the rule that guides should not give solvers the answers directly as this forces guides to find novel methods of explaining the relevant concepts.

Participants were able to communicate quite openly with each other despite having no prior contact with each other and being held back by the limitations of computer mediated communications (Straus, 1997). Groups were generally satisfied with the communication with all users citing a positive experience with the system. This feedback is supported by the fact that the guides were able to help all solvers solve their question with a single attempt as can be seen from Figure 6. However, it is worth noting that in test session 1, communication within groups was still far more frequent than between groups as shown by the following figure (Figure 11).

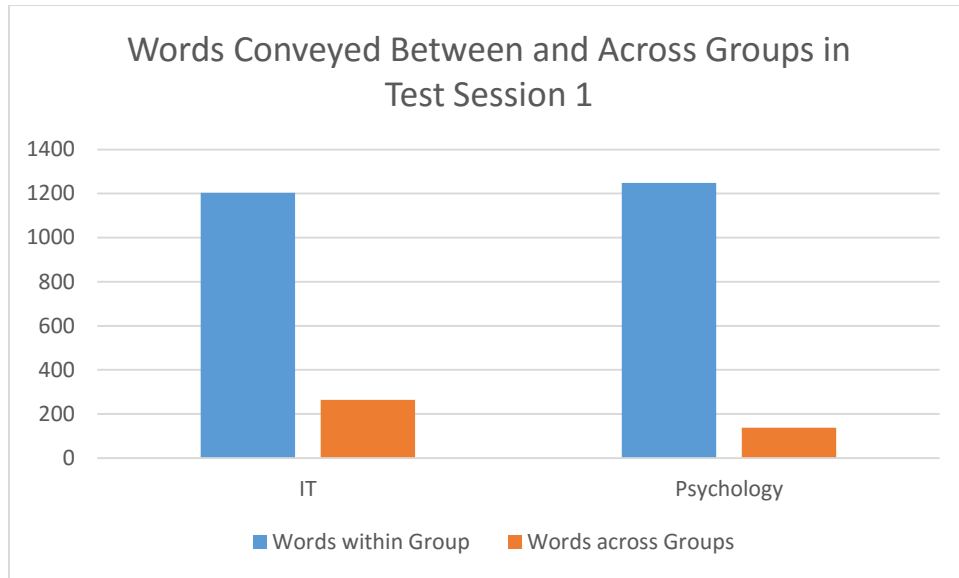


Figure 12: Words conveyed between and across groups for each discipline in test session 1

It was also observed that a rudimentary leadership structure was established within each pair during session 1 with one member of the group taking a more dominant position in the interaction compared to the other via taking charge of both intra and inter-group communications. These “leaders” usually had control of the keyboard and reviewed all suggestions by the other member before entering the message into the system.

5.2 Interview Analysis Findings

5.2.1 Opinions on the Problem Space

User perceptions of the problem space help establish the user requirements that help dictate the direction towards which a project should move towards. These opinions represent the main outcomes of the interviews. In response to a query asking if the university encourages interdisciplinary collaboration among students, one participant responded with the following:

“I want to say no... Not that it’s stopping me from working with people in different disciplines. I think that the programs I was a part of have sort of been skewed or structured in a way that there is not a lot of interdisciplinary interaction” ~ IT Student

All interviewees agreed unanimously that their respective university programs do not contribute sufficiently to them learning methods of interdisciplinary collaboration, providing little to no exposure to other disciplines during the course of their program. The few exceptions cited were when the participants took an elective during their time in university or in a tester-participant scenario.

However, despite not being afforded the opportunities to do so all participants were privy to the benefits of interacting with individuals of differing disciplines. One IT student noted *“that the more diverse the group of people you interact with the more you learn ...you pick up on things, you pick up on terms, concepts and it’s just more accretive to learning than just sitting in your own little group talking about the same things over and over.”*. The benefits of developing common ground as a facilitator of conversation was also agreed upon by participants. However, none mentioned other benefits beyond that.

5.2.2 Opinions on the Solution

“It was fairly simple design and yeah I’ve seen a chat box before so I know how to use that. And I’ve taken plenty of online quizzes which were very similar to the format style of it.” ~ Psychology Student

All participants who used the prototype reported a positive experience. The psychology students reported a lower cognitive load while learning the application compared to the IT students, citing the similarity of the system with other already existing systems to be useful in reducing the effort needed to properly learn and use the system.

“Initially it was difficult but after like learning how things happened I could use it just by recognition.” ~ IT Student

The IT students on the other hand, reported a slightly longer learning time and had several more critiques on the usability of the system. Many critiqued the presence of several unused functionalities such as the list of contributors and the timer while pointing out places where improvements to the design could be made.

“I just see people within my degree and I just think other people around me are just you know...not that smart because they don’t know what I know but seeing what they know I’m just like ooh...okay maybe not.” ~ IT Student

The prototype was also successful in benefitting the participants by further informing them about the other discipline. The study was able to dispel erroneous misconceptions while fostering a sense of respect for one another by sharing the challenges faced by different disciplines. This effect is compounded by the prototype’s unexpected ability to facilitate the comparison of the rudimentary knowledge of various disciplines, giving participants an even better perspective of their knowledge. It also seemed to have succeeded in establishing some form of common ground between participants as they managed to *“learn some more stuff about it, about certain terms and that kind of stuff.” ~IT Student*

However, the enthusiasm from participants for using the application going forward was notably low, ranging from *“no”* to *“yeah I mean it might, actually.”* Most participants explained that this view stemmed from a lack of perceived benefit from interacting with the application; learning about other disciplines does not directly improve their ability to perform better in their studies. This academic-focused mindset was present across all participants.

“Some of the questions were a bit (hard to work with)...like the definition one?” ~ IT Student

Furthermore some participants expressed that some of the questions, particularly overly linear questions such as term definitions tended to inhibit discussion. Problem solving questions were observed to draw the most discussion as solvers not only needed to know the theory behind the concepts in question, but methods of application as well.

Finally, one IT student pointed out that he would want user names in the system to be clearer: *“...it would be nice to see what the names were”*.

5.3 Discussion

5.3.1 Pursuing a Symmetrical Interaction

Mirroring observations by Grudin (Grudin, 1988, 1994) which were supported by two following panels (Ambe & Monk, 1997; Monk et al., 1996), personal benefit remains the primary focus of each user while interacting with the application. However, the system seems to be unable to convey potential benefit to the users. The stark difference of effort invested between solvers and guides represents the crux of this matter, lowering enthusiasm from both sides with solvers slowly becoming bored of the interaction and guides developing a sense of exasperation due to the differences in efforts being made.

This difference is observable in both the number of words sent as a guide compared to as a solver and in the effort put into constructing each message. In test session 1, pairs tended to discuss message construction far more often as guides than as solvers while in test session 2, guides spent more time rewriting their messages than solvers did. This additional time spent stems from the need to explain their concepts in lay-language, an interdisciplinary collaborative skill that is not often utilized by students or encouraged by the university (Robertson et al., 2003). This observation is consistent with the first of Grudin's challenges for groupware which states: *"a groupware application never provides the same benefit to every group member."* (Grudin, 1994).

In order to remedy this problem, two goals must be achieved:

- **Increase solver participation**

Solver participation must be increased to reduce the perceived difference in contribution between solvers and guides. Benefits of the application should also be more clearly demonstrated (Grudin, 1994) by utilizing congratulatory messages to both guides and solvers. These messages can serve as a form of positive reinforcement that explicitly tells a user that they are benefitting from using the application.

The request for clearer name displays might also indicate that some forms of territoriality were present during the interaction. However, evidence was not

conclusive enough to show that this effect was present. Should this theory be true, changes can be made to the design to highlight personal contributions and motivate participation (Thom-Santelli et al., 2009).

Application benefits can also potentially be demonstrated by the system via the introduction of a shorter wait time before participants engage in activities that they perceive as beneficial. For example, allowing users to alternate between roles after each question can increase the perceived benefit of the system as they are learning new knowledge in shorter intervals. However, this method did not produce conclusive evidence of its effectiveness and should be investigated further.

Value can also be added to the knowledge being gained from the application by applying it to disciplines that are closer in nature such as software engineers and software designers or the different branches of social science methodologies (Shapiro, 1994). This was pointed out by a psychology student who said: *“I don’t see why I couldn’t do it with another psych student and then we could both be benefiting from all the questions as opposed to me doing this with an IT student.”* An alternative method of applying this collaborative method is to simply integrate the application with an official university course, giving academic validity to the knowledge gained.

- **Minimize effort needed to learn and use the application**

This goal appears to have been sufficiently achieved for the purposes of basic testing by borrowing design elements of other applications familiar to the users. Further efforts can be made to improve usability by referring to heuristics tests (Nielsen, 2005; Nielsen & Molich, 1990) and adding currently missing features to properly flesh out the application. The implementation of a web application also contributes towards this goal as it is *“adding to an already successful application (a network browser) rather than launching a new application (Grudin, 1994)”*. The minimal-latency chat box in conjunction with a common task display functioned well as a visual shared space for the participants and helped facilitate better awareness and collaboration (Dourish & Bellotti, 1992; Kraut et al., 2002).

These goals are consistent with the results obtained by Ambe and Monk (Ambe & Monk, 1997; Monk et al., 1996) and will be the focus of future iterations of the prototype.

5.3.2 Cultivating Mutual Knowledge

Based on user feedback and observations, the application was successful in cultivating some form of mutual knowledge between the users based on the overall communication quality improvements reported by participants. This result is consistent with the findings of multiple studies which indicated that the presence of mutual knowledge can greatly improve team performance and communication (Cramton, 2001; Davis & Khazanchi, 2006; Fussell & Krauss, 1992; Isaacs & Clark, 1987). Unfortunately, unlike the “postcard study” (Isaacs & Clark, 1987) qualitative metrics could not be used to assess the data acquired due to a much lower number of participants and larger variations in tasks.

Participants were also noted to be well aware of the benefits of mutual knowledge, quoting the benefits it can bring to both communication and workflow in a collaborative setting. Some even lamented the fact that the university does not promote interdisciplinary collaboration among students. This opinion indicates that should the application be deployed en masse in a more appealing format, it is possible to have the user base reach “critical mass” (Grudin, 1994).

The task based-nature of the interaction was able to keep users mostly focused on the opposite discipline and learning more about it. However, some patterns were observed during the testing sessions that suggest over time users will simply aim to complete the tasks instead of using the application to learn more about other disciplines. For instance, guides were extremely tempted to simply give out the answers to the solvers while solvers had the tendency of ignoring certain pieces of information that are not directly relevant to solving the question. Another problem observed was that guides were unable to recall certain pieces of information about their disciplines which inhibited their ability to teach the solvers. On the contrary, some older guides or guides that have engaged in self-studies of the opposite discipline found the questions too easy and rendered the learning outcomes of the interaction null for other users. For example, an IT student from session 1 commented: *“They (other participant in pair) actually knew a little bit about but I couldn’t participate really because I didn’t know what*

they were talking about.”

By restructuring the questions both in terms of content and format, both of these issues can potentially be solved. Participants have remarked that the multiple-choice format was less conducive to facilitating conversation than a more open-ended format such as short answer questions. The implementation of a more open-ended form of question will put more emphasis on the absorption of knowledge by the solver while promoting discussion about the questions being asked.

“The questions need to be things that force the kind of explanation. If it's just like A,B or C you just kinda say...there's no real way I can explain it.” ~ IT Student

Adjustment of the content towards questions with more intricate answers rather than simple ones will further help facilitate conversation and build common ground as one participant remarked. However, care must be taken during the content adjustment to select questions that are suitable for the audience. Questions that are too simple risk falling into the realm of common knowledge while complicated ones might be too hard for guides to explain.

5.3.3 Review and Study Limitations

As indicated above, having a task-based interaction was somewhat successful at promoting communication regarding interdisciplinary collaboration while real-time online communications helped effectively facilitate such communications effectively. However, due to limitations of the study in terms of sample population and methodology, the social implications of such an application was not able to be conclusively determined. In addition, problems related to deployment and maintenance cannot be established. These limitations mean that of the eight original challenges proposed by Grudin, only a few were able to be adequately addressed (Grudin, 1994):

- **Disparity in work and benefit:** Guides were putting in far more effort while reaping fewer benefits than solvers. This issue is to be solved by increasing work done by the

solvers while reducing effort required to use the application. The questions used will also be restructured to better facilitate conversation and make it easier for guides to convey their ideas.

- **Critical mass and Prisoner's Dilemma problems:** Participants expressed some level of interest in using the application. However, interest can be increased and preserved by implementing additional features and making benefits more perceptible to users.
- **Unobtrusive accessibility:** All users can access the application from any internet-capable device as the application is tied to web browsers.
- **Failure of intuition:** Assumptions were made during the planning of the study that negatively affected the results acquired. These include the assumption that all guides would be familiar with low-level knowledge of their fields and that they would not engage in self-study for the opposite discipline. Extra care will be taken in the future to avoid such assumptions.
- **Disruption of social processes:** While participants did not reject the idea of the application, the sample size was far too small to conclusively determine that it does not violate any pre-existing social taboo.
- **Exception handling:** Not enough testing sessions were carried out with a large enough population of participants to determine the full spectrum of exceptions.
- **Difficulty of evaluation:** The data gathered in this study are not generalizable as the population used was too small to produce data indicative of the population.
- **The adoption process:** The testing of the interaction in private is not indicative of usage of the application while deployed in public.

In addition, it was also found that participants frequently misconstrued the purpose of the application. This phenomenon comes as a by-product of the task-focused nature of the application. Further investigation needs to be conducted on various other forms of tasks to determine the best way to minimize this task-first attitude in participants. The emphasis on observation as a method of data collection means that the Hawthorne effect has potential to skew the data collected in this study (Landsberger, 1958).

Chapter 6

6 Conclusions & Future Work

6.1 Conclusions

Despite the trajectory of both industry and academia indicating a strong need for interdisciplinary collaboration (Amoussou et al., 2010), institutions are falling short when it comes to promoting the skills and methods required for effective interdisciplinary collaboration (Robertson et al., 2003). Therefore, new ideas should be explored to help students develop these skills and promote conversation about the topic.

This study identified the use of synchronous distributed groupware as a method by which the goal of promoting interdisciplinary collaboration could be achieved without the university investing time and money on educational reforms. However, this particular medium introduces its own set of challenges (Grudin, 1994) that pertain largely to the application's ability to build and maintain a large enough user base benefit the users.

Firstly, such an application must be able to convey its benefits clearly and equally to all users. This property ensures that users are both satisfied and continue collaborating with each other with the application. Furthermore, it helps avoid asymmetrical interactions which can lead to user dissatisfaction.

Ease of use and installation represent another important issue that should be focused on when designing synchronous distributed groupware in this space. Groupware is a medium that is incapable of producing benefits to its users if the number of users is insufficient (Grudin, 1994). As such, it is paramount that there are no obstacles during both installation and use that can potentially deter users from either installing or regularly using the interactions.

To facilitate better communication, it is important that the task chosen for the interaction is suited for facilitating discussion about interdisciplinary collaboration and concepts foreign to novices. Overly linear questions such as term definitions were found to be inhibitive of

communication and should be avoided completely whereas problem solving questions were observed to be very effective in facilitating discussion.

Given the prevalence of these patterns in testing, efforts should be focused on understanding methods which allow groupware to convey more value to its users and on reducing the effort of users in retrieving said value. Furthermore, the degrees to which different tasks facilitate communication should be investigated to further augment the interaction as an interdisciplinary training tool.

6.2 Future Work

This study shows that synchronous distributed groupware has potential to promote interdisciplinary collaboration. To ensure the success of such an application, additional work must be done to address the concerns posed by deploying groupware that delivers novel functionality. This work includes carrying out additional testing on a much larger population from the same disciplines to pinpoint methods of increasing the application's perceived value to users. In addition, it will increase the accuracy of the data already gathered. The aid of individuals more familiar with qualitative research can also be enlisted to increase data accuracy.

Moreover, a more complete version of the application can be released publicly both as part of a university course and as a standalone application. Doing so would show contrast in attitudes towards an application of this nature with and without official backing behind it. In this case, focus should be given to the participants' perceived benefit from the application as well as changes in communication trends between participants over time.

After thoroughly investigating a single pair of disciplines, the same investigation should also be carried out on different combinations of disciplines to determine if the trends exhibited in the IT-psychology pairing are also present in other pairs or even the university as a whole. Carrying out the investigation on other demographics can also better pinpoint the benefits of having pre-established mutual knowledge. These results can be acquired by comparing combinations of disciplines with varying degrees of separation from one another. For example,

software designers and software engineers (low separation), and artists and mathematicians (high separation).

Appendix A Development

Appendix A1 Wireframe

Question 1 of 6

Timer

Question		Answer Section (Solver only)	
<div>Chat Log</div> <div><div></div><div></div><div></div><div></div></div>		<div>List of Contributors</div>	
<div>Text Message Section</div>		<div>Send</div>	

Appendix A2 Prototype 1

What is the correct jQuery selector for targeting all image elements in a HTML document?

- \$('')
- \$('img')
- document.getElementsByTagName('img')
- \$(img)

ITs Alive[GUI] [2017-10-26 04:40:47] - Sorry i mean 'h' should be the second number

ITs Alive[GUI] [2017-10-26 04:41:01] - the first space wouldbe 4 in this example

Psyght for Sore Eyes[SOL] [2017-10-26 04:41:26] - is it c

ITs Alive[GUI] [2017-10-26 04:41:33] - no

ITs Alive[GUI] [2017-10-26 04:41:41] - c wouldnt show the 'h'

ITs Alive[GUI] [2017-10-26 04:42:09] - Ok so in python the last number is exclusive

ITs Alive[GUI] [2017-10-26 04:42:21] - its d

Contributors

IT Person

Psych Person

talk to me

Send

Guide view

Time Taken: 0h 0m 7s

Which of the following CSS rules will apply styling to the HTML element `<nav id="mainNav">... </nav>`?

- ☐ `.mainNav {color: red;}`
- ☐ `#mainNav {color: red;}`
- ☐ `id > mainNav {color: red;}`
- ☐ `+mainNav {color: red;}`

Submit Answer

ITs Alive[GUI] [2017-10-26 04:40:38] - yeah it does

ITs Alive[GUI] [2017-10-26 04:40:47] - Sorry i mean 'h' should be the second number

ITs Alive[GUI] [2017-10-26 04:41:01] - the first space wouldbe 4 in this example

Psyght for Sore Eyes[SOL] [2017-10-26 04:41:26] - is it c

ITs Alive[GUI] [2017-10-26 04:41:33] - no

ITs Alive[GUI] [2017-10-26 04:41:41] - c wouldnt show the 'h'

ITs Alive[GUI] [2017-10-26 04:42:09] - Ok so in python the last number is exclusive

Contributors

IT Person
Psych Person

talk to me

Send

Solver view

Appendix A3 Prototype 2

You are a GUIDE

Which of the following CSS rules will apply styling to the HTML element `<nav id="mainNav">... </nav>`?

- `.mainNav {color: red;}`
- **`#mainNav {color: red;}`**
- `id > mainNav {color: red;}`
- `+mainNav {color: red;}`

ITs Alive[SOL] [2017-10-18 05:02:21] - huh

ITs Alive[SOL] [2017-10-18 05:25:27] - hi

ITs Alive[SOL] [2017-10-26 04:22:50] - Hi

Psyght for Sore Eyes[GUI] [2017-10-26 04:23:00] - hi

ITs Alive[SOL] [2017-10-26 04:23:37] - Whats the difference bewteen the techniques?

Psyght for Sore Eyes[GUI] [2017-10-26 04:23:45] - should i explain them all

Psyght for Sore Eyes[GUI] [2017-10-26 04:23:47] - omg

Contributors

IT Person

Psych Person

talk to me

Send

Guide view

You are a SOLVER

Time Taken: 0h 0m 3s

What is the correct jQuery selector for targeting all image elements in a HTML document?

- ☐ \$('')
- ☐ \$('img')
- ☐ document.getElementsByTagName('img')
- ☐ \$(img)

Submit Answer

ITs Alive[SOL] [2017-10-18 05:02:21] - huh

ITs Alive[SOL] [2017-10-18 05:25:27] - hi

ITs Alive[SOL] [2017-10-26 04:22:50] - Hi

Psyght for Sore Eyes[GUI] [2017-10-26 04:23:00] - hi

ITs Alive[SOL] [2017-10-26 04:23:37] - Whats the difference bewteen the techniques?

Psyght for Sore Eyes[GUI] [2017-10-26 04:23:45] - should i explain them all

Psyght for Sore Eyes[GUI] [2017-10-26 04:23:47] - omg

Contributors

IT Person

Psych Person

talk to me

Send

Solver view

Appendix A4 Prototype 3

Greetings PSY student, you are a GUIDE

Lucas is currently in an active phase of Schizophrenia. He feels like there are spiders crawling all over him. Which statement best describes his reported symptom?

- Paranoid delusion
- Thought disorder
- **Tactile hallucination**
- Visual hallucination

Psyght for Sore Eyes[SOL] [2017-10-13 01:11:18] - Ok

ITs Alive[GUI] [2017-10-13 01:12:29] - so an image element is shown in html (another language that builds the structure of the website).as .

ITs Alive[GUI] [2017-10-13 01:15:09] - however within jQuery if you want to select something that contains the tag '<>' you exclude them from the syntax. The selecting command is the \$.

Psyght for Sore Eyes[SOL] [2017-10-13 01:16:06] - so then the answer would be \$('img') ?

ITs Alive[GUI] [2017-10-13 01:16:15] - yes

ITs Alive[GUI] [2017-10-13 01:16:34] - i mean hopefully

Contributors

IT Person
Psych Person

talk to me

Send

Guide view

Greetings IT student, you are a SOLVER

Time Taken: 0h 0m 9s

Lucas is currently in an active phase of Schizophrenia. He feels like there are spiders crawling all over him. Which statement best describes his reported symptom?

- ☐ Paranoid delusion
- ☐ Thought disorder
- ☐ Tactile hallucination
- ☐ Visual hallucination

Submit Answer

a relationship

Psyght for Sore Eyes[GUI] [2017-10-13 01:41:33] - in order to provide evidence for your hypothesis (H1) u need to prove the HO (Null) to be false

Psyght for Sore Eyes[GUI] [2017-10-13 01:41:45] - so if it is false

Psyght for Sore Eyes[GUI] [2017-10-13 01:41:54] - there is probably evidence for the relationship

ITs Alive[SOL] [2017-10-13 01:41:55] - the the researcher was correct

ITs Alive[SOL] [2017-10-13 01:41:58] - cool

Contributors

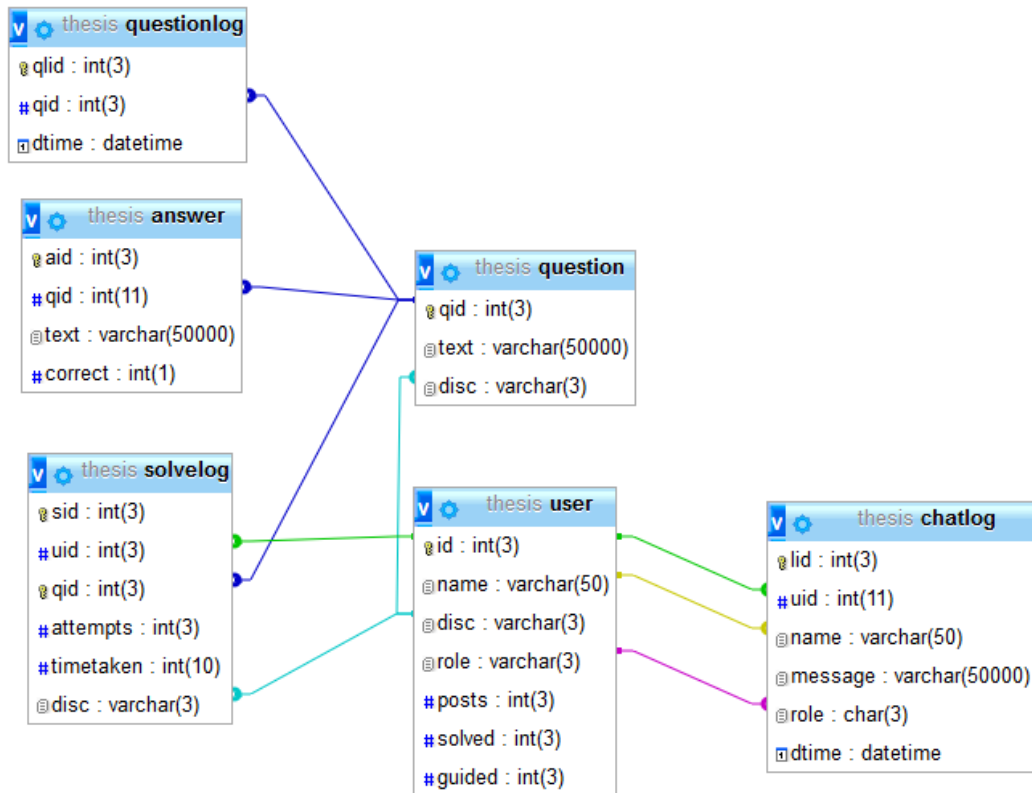
IT Person
Psych Person

talk to me

Send

Solver view

Appendix A5 Relational Database Schema



The database implementation will be contained in a ZIP file included with this submission as an SQL file.

Appendix A6 Code

All code written for the prototype will be contained in a ZIP file included with this submission.

Appendix B Ethics

Appendix B1 Project Description Document

The project description document will be contained in a ZIP file included with this submission.

Appendix B2 Participant Information Sheet



School of Information Technology
and Electrical Engineering

Chief Investigator
Ken Yoong Lim
Telephone: (04) 3162 9651
Email: s4337621@student.uq.edu.au

Participant Information Sheet

Project Title: How Can Publicly Distributed Groupware Facilitate the Normalization of Interdisciplinary Collaboration?

Voluntariness

We seek your assistance in a research project investigating the possibility of utilizing publicly distributed groupware to facilitate rudimentary forms of interdisciplinary collaboration within the context of a higher education institute. Your participation in this study is completely voluntary - you are not obligated to take part in it if you don't want to. If you do decide to take part in the project, you can withdraw from it at any point without providing reason, and without penalty.

Purpose of the Study

Ken Yoong Lim is conducting this research at the University of Queensland. The purpose of the project is to better understand the potential of publicly distributed groupware in fostering the necessary mindset and conventions involved in interdisciplinary collaboration. The end goal is to design an interaction that university students can use on a regular basis to improve their interdisciplinary collaboration skills without the university engaging in expensive and time consuming reforms to help them do so in curriculum. This research is being conducted for Ken Yoong Lim's honors research and will result in a thesis.

Eligibility

You are eligible to participate in this study if you are currently studying in the University of Queensland pursuing any degree related to the following disciplines:

- Information Technology
- Psychology

Participation

The user testing for the project will involve interacting with a simple web application as a part of a pair. The aim of this is to determine if having rudimentary interactions between students of different disciplines will help improve interdisciplinary collaboration. Issues with the interface and application design will also be identified in this session. You will be video recorded as you interact with the application to aid in later analysis and asked some questions during and after the testing session. The session should take 2 hours in total and will take place in the St Lucia UQ Campus. If you are interested you may also opt for a copy of the final thesis to be sent to you.

About the Interaction

- You will be given the role of either “guide” or “solver” and will be interacting with another team of users from a different discipline.
- The interaction will be a simple quiz on simple concepts from either IT or Psychology.
- As a solver, you are responsible to solve various questions about a discipline you are not familiar with using feedback from the guides.
- As a guide, you will be responsible to guide the team of solvers using your knowledge of the subject matter.
- You will be required to solve 5 questions as a solver and guide a team of solvers through 5 questions as a guide.
- This process will be repeated once more with a different group.

Risks

The potential risks of participation are minimal as no sensitive material will be present in the quizzes.

Benefits

You will not receive remuneration for participation although you are afforded the satisfaction of contributing to knowledge and an opportunity to participate in thesis research first hand. You can also opt to receive a copy of the final thesis once research is complete.

Your Privacy

All data gathered from and about you will be stored in university servers for security. Should the need to bring research data out of the university arise at any point, only one encrypted copy will leave the university via a USB flash drive. Only the supervisor of this project and the principal investigator will be able to access the data. All data will be destroyed after the research is complete via deletion. Any transcriptions will not include your names or identifying information. No names, addresses or any other identifying information will be included in any report on the project. The contents of the interviews will be made public via extremely limited excerpts used in the honors thesis, usually a few sentences quotes to illustrate a certain point. When these are published, no identifying information will be included. During the interview you are free to flag replies as off-the-record and these will not be transcribed or used in the research. No reasons for this are needed.

Your Rights

You reserve the right to withdraw from this research from any point before or after it has started. If you do withdraw from the project after it has started, the materials that you have completed to that point will be deleted and will not be included in the project.

Your Concerns

If you feel distressed by the research process, either during the data collection or afterwards, then you should raise your concerns with the researcher or with any officer listed in the “Ethical Approval” paragraph below.

Debriefing

At the end of the study you will be asked whether you would like to discuss any aspect of it. We will be happy to discuss any concerns or issues at this time.

Further Information

Should you be interested in finding out about the results of the project, you can express interest in receiving a copy of the final thesis in the consent form. If you wish to receive this information, we will ask you for your contact information so that we can send this information to you.

Ethical Approval

This study adheres to the Guidelines of the ethical review process of The University of Queensland and the National Statement on Ethical Conduct in Human Research. Whilst you are free to discuss your participation in this study with project staff (contactable on (04) 3162 9751 or via email at s4337621@student.uq.edu.au), if you would like to speak to an officer of the University not involved in the study, you may contact the Ethics Coordinator on 3365 3924.

Researcher Name: Ken Yoong Lim

Researcher Title: Bachelor of IT (Hons) Student

Researcher Affiliation: Department of ITEE, Faculty of Engineering, UQ

Researcher Email: s4337621@student.uq.edu.au

Supervisor Name: Stephen Viller

Supervisor Title: Associate Professor

Supervisor Affiliation: Department of ITEE, Faculty of Engineering, UQ

Supervisor Email: viller@itee.uq.edu.au

Appendix B3 Written Consent Form



School of Information Technology
and Electrical Engineering

Chief Investigator
Ken Yoong Lim
Telephone: (04) 3162 9651
Email: s4337621@student.uq.edu.au

Written Consent for Participants

Title: How Can Publicly Distributed Groupware Facilitate the Normalization of Interdisciplinary Collaboration?

Chief Investigator: Ken Yoong Lim
School of Information and Electrical Engineering
The University of Queensland

I, the undersigned
hereby consent to take part in the research project titled: **How Can Publicly Distributed Groupware Facilitate the Normalization of Interdisciplinary Collaboration?**

1. I have read the information sheet given to me and fully understand what the researcher has explained to me about the study. I agree to be a part of this project.
2. I understand how much time I have to spend to be a part of this project.
3. I understand that this study was designed to learn how to help university students engage in interdisciplinary collaboration more readily but it might not be directly beneficial to me.
4. I understand that information about me and my performance in this study will not be shared with anyone else and the researchers will keep everything private to the best of their ability.
5. I understand that I reserve the right to withdraw my participation and consent in this study at any point in time. It will not affect any of my involvement at the University of Queensland.

[] I would like to receive a digital copy of the final thesis after the research is complete (tick if interested).

(Signed)

(Date)

(Witnessed by)

(Date)

Appendix B4 Ethics Application Form

The ethics application form will be contained in a ZIP file included with this submission.

Appendix C Results

Appendix C1 Chat Logs

Test Session 1

PSY > SOL [2017-10-13 01:06:55] - o.o

PSY > SOL [2017-10-13 01:07:46] - Question 1: What is the correct jQuery selector for targeting all image elements in a HTML document?

PSY > SOL [2017-10-13 01:09:18] - What is a jQuery?

IT > GUI [2017-10-13 01:10:00] - jQuery is a library for JavaScript (a web design language)

IT > GUI [2017-10-13 01:10:25] - it is generally used for animations, and building in functionality into the website

PSY > SOL [2017-10-13 01:11:18] - Ok

IT > GUI [2017-10-13 01:12:29] - so an image element is shown in html (another language that builds the structure of the website).as .

IT > GUI [2017-10-13 01:15:09] - however within jQuery if you want to select something that contains the tag '<>' you exclude them from the syntax. The selecting command is the \$.

PSY > SOL [2017-10-13 01:16:06] - so then the answer would be \$('img') ?

IT > GUI [2017-10-13 01:16:15] - yes

IT > GUI [2017-10-13 01:16:24] - i mean hopefully

PSY > SOL [2017-10-13 01:16:33] - looks like it XD

PSY > SOL [2017-10-13 01:17:04] - So what is CSS?

IT > GUI [2017-10-13 01:18:08] - so previously we said html is the structure of the website.

CSS is basically the language used to add style to the structure

IT > GUI [2017-10-13 01:18:32] - Just to make it look pretty

PSY > SOL [2017-10-13 01:19:04] - so position or display?

IT > GUI [2017-10-13 01:24:16] - yeah one of them

PSY > SOL [2017-10-13 01:24:24] - cool

PSY > SOL [2017-10-13 01:24:36] - narrows it down at least?\

PSY > SOL [2017-10-13 01:24:53] - it was position

PSY > SOL [2017-10-13 01:25:36] - first thought is the one with the ! in it because wtf

PSY > SOL [2017-10-13 01:25:43] - why is there an ! mark there

IT > GUI [2017-10-13 01:26:05] - so an HTML document is structured like this:

IT > GUI [2017-10-13 01:26:06] -

IT > GUI [2017-10-13 01:26:12] -

IT > GUI [2017-10-13 01:26:44] -

PSY > SOL [2017-10-13 01:26:55] - explain plez

IT > GUI [2017-10-13 01:27:46] - so in html you first define the document type, which is doctype html. Then you have a head - were you link different CSS and JavaScript files, and the title - and then have the body

IT > GUI [2017-10-13 01:28:28] - you can have an html doc that is not linked to css or javascript

PSY > SOL [2017-10-13 01:28:43] - what is linking tho?

PSY > SOL [2017-10-13 01:28:49] - Do u need a command for it?

PSY > SOL [2017-10-13 01:28:55] -

IT > GUI [2017-10-13 01:29:10] - 'The tags given above are all relevant tags

PSY > SOL [2017-10-13 01:29:12] - like is 'link' an element

PSY > SOL [2017-10-13 01:29:18] - oh ok

PSY > SOL [2017-10-13 01:30:21] - why is there an exclamation mark in one but not the others?

IT > GUI [2017-10-13 01:30:38] - its just how websites read html

PSY > SOL [2017-10-13 01:30:45] - ohk

PSY > SOL [2017-10-13 01:30:49] - not confusing at all

IT > GUI [2017-10-13 01:30:51] - just to make sure its not reading something else

IT > SOL [2017-10-13 01:34:27] - that sounds pretty low to me

PSY > GUI [2017-10-13 01:34:58] - so basically she is asking a small favor then using that to lead onto a larger favor

IT > SOL [2017-10-13 01:35:36] - so it sounds like she has a 'foot' in the door, and then inviting herself in.. metaphorically spesaking

PSY > GUI [2017-10-13 01:35:42] - pretty much

IT > SOL [2017-10-13 01:35:48] -

IT > SOL [2017-10-13 01:36:34] - could you explain

PSY > GUI [2017-10-13 01:36:50] - so an illustrator is a type of nonverbal communication in the form of hand gestures

PSY > GUI [2017-10-13 01:37:15] - it is often used to further 'illustrate' ur point

PSY > GUI [2017-10-13 01:37:28] - as an addition to spoken language

PSY > GUI [2017-10-13 01:37:30] - cool

PSY > GUI [2017-10-13 01:37:32] - good job

IT > SOL [2017-10-13 01:37:38] - thanks

PSY > GUI [2017-10-13 01:38:20] - So the larger ur sample, the closer it is to the population

PSY > GUI [2017-10-13 01:38:35] - The closer to the population the less error there will be in your calculations

PSY > GUI [2017-10-13 01:38:47] - so if the sample decreases the error should increase

PSY > GUI [2017-10-13 01:39:01] - because you are prone to more bias

IT > SOL [2017-10-13 01:39:28] - cool

IT > SOL [2017-10-13 01:39:32] - 'we dont get this one at all

IT > SOL [2017-10-13 01:40:12] - is it correct decision? because from what i remember of statistics researchers try to prove the H_0 false

IT > SOL [2017-10-13 01:40:19] - because they cant prove H_a

PSY > GUI [2017-10-13 01:41:00] - Null hypothesis is saying there won't be a relationship

PSY > GUI [2017-10-13 01:41:33] - in order to provide evidence for your hypothesis (H_1) u need to prove the H_0 (Null) to be false

PSY > GUI [2017-10-13 01:41:45] - so if it is false

PSY > GUI [2017-10-13 01:41:54] - there is probably evidence for the relationship

IT > SOL [2017-10-13 01:41:55] - the the researcher was correct

IT > SOL [2017-10-13 01:41:58] - cool

Test Session 2

IT > SOL [2017-10-26 04:22:50] - Hi

PSY > GUI [2017-10-26 04:23:00] - hi

IT > SOL [2017-10-26 04:23:37] - Whats the difference bewteen the techniques?

PSY > GUI [2017-10-26 04:23:45] - should i explain them all

PSY > GUI [2017-10-26 04:23:47] - omg

IT > SOL [2017-10-26 04:24:04] - just the ones you think are relevant i guess

IT > SOL [2017-10-26 04:24:51] - Just a quick guide is fine

PSY > GUI [2017-10-26 04:26:41] - so as concisely as possible, low-balling = false advertising; door-in-the-face = when you initially propose an idea that they'll definitely turn down and follow that up with a better one; foot-in-the-door = when you take advantage of someone already committing to helping you

PSY > GUI [2017-10-26 04:26:47] - idk the other one

PSY > GUI [2017-10-26 04:26:57] - i did not expect to have to use my brain this much

IT > SOL [2017-10-26 04:27:08] - Hmm ok well I think this sounds like foot in the door

PSY > GUI [2017-10-26 04:27:14] - yasss

IT > SOL [2017-10-26 04:27:19] - lmao neither i thought itd just be ez

IT > GUI [2017-10-26 04:29:03] - Ok so quick explenation of each

PSY > SOL [2017-10-26 04:29:13] - i might know but tell me anyway LOL

IT > GUI [2017-10-26 04:29:29] - the doctype one makes the file a html page

IT > GUI [2017-10-26 04:29:43] - link is like a hyperlink, so to take you to a different page

IT > GUI [2017-10-26 04:29:58] - Body is everything you actually see in a web page

IT > GUI [2017-10-26 04:30:17] - and the title is the name of the page

IT > GUI [2017-10-26 04:30:25] - I think this one is pretty easy lol

PSY > SOL [2017-10-26 04:30:46] - is it link? or

IT > GUI [2017-10-26 04:30:57] - Yeah

IT > SOL [2017-10-26 04:32:00] - Idk how to ask about this question without just asking fort he answer

PSY > GUI [2017-10-26 04:32:09] - idk how to explain it either lol

IT > SOL [2017-10-26 04:32:36] - Um well I guess its not an actual picture

IT > SOL [2017-10-26 04:32:42] - so one of the first 3 probably?

PSY > GUI [2017-10-26 04:33:14] - just imagine someone trying to explain something to

another and it aids speech but doesn't replace it

PSY > GUI [2017-10-26 04:33:26] - and i guess it's not conscious either

IT > SOL [2017-10-26 04:33:32] - So probably B

PSY > GUI [2017-10-26 04:33:36] - yeah

PSY > GUI [2017-10-26 04:33:41] - also omg *complement

IT > GUI [2017-10-26 04:35:27] - Um so I dont really know

IT > GUI [2017-10-26 04:35:36] - I can see the anser but I cant tell you why

PSY > SOL [2017-10-26 04:35:59] - so

PSY > SOL [2017-10-26 04:36:01] - what is it

IT > GUI [2017-10-26 04:36:06] - Its C lol

IT > GUI [2017-10-26 04:37:31] - Uh

IT > GUI [2017-10-26 04:37:33] - its not float

IT > GUI [2017-10-26 04:38:01] - Display is like how it gets shown, not where

IT > GUI [2017-10-26 04:38:19] - And overflow makes text wrap if its too big

PSY > SOL [2017-10-26 04:38:26] - well position is the obvious answer hahah

IT > GUI [2017-10-26 04:38:27] - So like the words too big in the last message are overflow

PSY > SOL [2017-10-26 04:38:29] - like

PSY > SOL [2017-10-26 04:38:30] - where

IT > GUI [2017-10-26 04:38:31] - Yeah lmao

PSY > SOL [2017-10-26 04:38:32] - position

PSY > SOL [2017-10-26 04:38:34] - "_(?)_/"

IT > GUI [2017-10-26 04:39:34] - Ok so its just counting range

IT > GUI [2017-10-26 04:39:39] - but the V is 0, not 1

IT > GUI [2017-10-26 04:39:49] - so 'e' is 1

IT > GUI [2017-10-26 04:39:54] - 'r' is 2

IT > GUI [2017-10-26 04:40:29] - and just count from there, the a should be the first number in the [], and 10 should be the second

PSY > SOL [2017-10-26 04:40:32] - does the space count as something

IT > GUI [2017-10-26 04:40:38] - yeah it does

IT > GUI [2017-10-26 04:40:47] - Sorry i mean 'h' should be the second number

IT > GUI [2017-10-26 04:41:01] - the first space wouldbe 4 in this example

PSY > SOL [2017-10-26 04:41:26] - is it c

IT > GUI [2017-10-26 04:41:33] - no

IT > GUI [2017-10-26 04:41:41] - c wouldnt show the 'h'

IT > GUI [2017-10-26 04:42:09] - Ok so in python the last number is exclusive

IT > GUI [2017-10-26 04:42:21] - its d

Appendix C2 Solve Logs

Test Session 1

Question ID: 7, Attempts: 1, Time Taken: 583s, Solver Discipline: PSY

Question ID: 4, Attempts: 1, Time Taken: 499s, Solver Discipline: PSY

Question ID: 3, Attempts: 1, Time Taken: 399s, Solver Discipline: PSY

Question ID: 10, Attempts: 1, Time Taken: 150s, Solver Discipline: IT

Question ID: 9, Attempts: 1, Time Taken: 96s, Solver Discipline: IT

Question ID: 2, Attempts: 1, Time Taken: 104s, Solver Discipline: IT

Question ID: 11, Attempts: 1, Time Taken: 169s, Solver Discipline: IT

Test Session 2

Question ID: 10, Attempts: 1, Time Taken: 295s, Solver Discipline: IT

Question ID: 3, Attempts: 1, Time Taken: 147s, Solver Discipline: PSY

Question ID: 9, Attempts: 1, Time Taken: 161s, Solver Discipline: IT

Question ID: 6, Attempts: 1, Time Taken: 90s, Solver Discipline: PSY

Question ID: 11, Attempts: 1, Time Taken: 35s, Solver Discipline: IT

Question ID: 4, Attempts: 1, Time Taken: 175s, Solver Discipline: PSY

Appendix C3 Interaction Transcriptions

Test Session 1 (Psychology Students)

The audio recording quality of this testing session was severely compromised and as such parts of several conversations could not be transcribed in full.

PSY 1:	I have no idea...What is this? A chat box?
PSY 2:	I guess we type the question?
PSY 1:	I'm guessing they're guiding us then? Since we don't know anything about them?
PSY 2:	Okay so...I guess we type the question. Honestly I don't know...
PSY 1:	I don't know I think they get the same question as us but they have to tell us.
PSY 2:	Oh, is that it?
PSY 1:	They have to describe it to us so we can get the answer correct I think so they can teach us about...
PSY 2:	Oh okay so we do have the same question.
PSY 1:	I hope I know the psych questions.
PSY 2:	Yeah I know right? I guess we're looking to get it correct.
PSY 1:	What is a jQuery?
PSY 2:	Yeah what is a jQuery?
PSY 1:	Can they actually see this or no? They aren't responding.
PSY 2:	Yeah they aren't responding.
PSY 1:	I like that..."Psyght for Sore Eyes" it's funny. Okay...so...
PSY 2:	So you get the...thing?
PSY 1:	Yeah basically...I get it that makes sense but...It still doesn't help me answer the question yet...I reckon it won't be this one.
PSY 2:	Yeah probably...
PSY 1:	But that's just me being "oh yeah that makes sense". That's probably way too simple though.
PSY 2:	Hmm...yeah this tells me nothing...
PSY 1:	Oh my gosh I'm hungry already...I had morning tea like half an hour ago.
PSY 2:	Oh my I want to get through on time...

PSY 1:	I feel like some of these questions are going to be so simple that they'll be hard to explain. I just won't remember because it would be so long ago.
PSY 2:	What do you think they're talking about?
PSY 1:	I guess...we'll find out?
PSY 2:	What does this even mean?
PSY 1:	I don't know what any of this means...Oh have you seen the names? IT? IT's Alive?
PSY 2:	Yeah yeah...Psyght for Sore Eyes...
PSY 1:	That's great...
PSY 2:	*mumbling*
PSY 1:	*mumbling*...Hmm...you exclude them from the syntax so that would be excluding them so it cannot be that one.
PSY 2:	Yeah...it can't be the top one but then...so...
PSY 1:	Selecting is not one of the top ones it's one of the dollar ones.
PSY 2:	It's either the second one or the last one.
PSY 1:	Yup so it must be that one. Oh okay yeap. Maybe we can type this over and they can...
PSY 2:	But we don't know for sure.
PSY 1:	But that would make sense, using that to target elements...Ah awesome.
PSY 2:	Sweet.
PSY 1:	High five...cool
PSY 2:	This doesn't make any sense to me...What is this...So shall we start by finding out what CSS is?
PSY 1:	Ah right this one...
PSY 2:	Oh...Okay...so we're using that as like...structure...that you use to add stuff...right that makes sense...
PSY 1:	Probably position then I think?
PSY 2:	Probably position yeah.
PSY 1:	Where an HTML element would be rendered...
PSY 2:	Yeah.
PSY 1:	I don't think it's overflow or float. I wonder if they do have options that we can...
PSY 2:	Yeah I think it's just these though.

PSY 1:	But I'm always used to getting only 4 or 3 options instead. He said I don't know I wonder if it's okay...
PSY 2:	He's trying to google the answer?
PSY 1:	Google it...Oh we weren't going to. We were joking. What if the guides don't know the answer? Then can we Google? Oh okay. So does both the guide and the solver get all 4 options?
PSY 2:	Oh okay so they see the same things. Meanwhile we're here just going what is going on?
PSY 1:	I don't even know...I'd reckon position makes the most sense but...that's just me guessing. All this programming stuff is so complicated...
PSY 2:	Yeah I mean if this is just to style to make it look pretty...probably should be simpler than this...
PSY 1:	If we get it wrong does it just reset the page?
PSY 2:	Yeah but we might as well just try and get it first try.
PSY 1:	We got the first one right first go so...
PSY 2:	Yeah let's keep it up.
PSY 1:	Uhh...what are you going to ask them *mumbling*? Yeah around there then.
PSY 2:	*mumbling*
PSY 1:	*mumbling*
PSY 2:	Do you want to make the decision?
PSY 1:	I don't mind. Yeah?
PSY 2:	Yeah just try it. Yay...
PSY 1:	Cool. Oh my god I can't type on this thing this is not my computer. This is fun. "Which of the following HTML elements is not required in a basic HTML page..." What the...
PSY 2:	It's the basic structure I guess?
PSY 1:	Doc type HTML...Why is there a random exclamation mark in that one?
PSY 2:	*mumbling*
PSY 1:	Blank...cool...
PSY 2:	Blank blank blank...just put it in extra brackets?
PSY 1:	What the...

PSY 2:	*mumbling*
PSY 1:	Okay so...
PSY 2:	It can't be body so link?
PSY 1:	So link is...
PSY 2:	I'm going to assume...
PSY 1:	What does linking do though? Don't know how to answer the question...No what did I do?
PSY 2:	Something tells me that might be a bad one.
PSY 1:	Let's just go with one.
PSY 2:	You sure?
PSY 1:	Yeah they said...what?
PSY 2:	Ayy...
PSY 1:	Woo...
Role Switch	
PSY 1:	Okay there we go. That's not...
PSY 2:	If the null hypothesis was false... *mumbling* ...oh my god...
PSY 1:	Oh my god errors...this is statistics not psychology...If a researcher declares a relationship in data to be statistically significant in the same direction to the direction...what?
PSY 2:	Basically what it's saying is if your hypothesis is true and the null hypothesis is rejected...
PSY 1:	That's a correct decision right?
PSY 2:	*mumbling*
PSY 1:	If your null hypothesis is false and your hypothesis is correct and the researcher declares that there is a relationship...that's a correct call.
PSY 2:	Well...yeah.
PSY 1:	What? Yeah well we didn't get the time for that part so that's okay. Yeah did you guys answer it? Okay.
PSY 2:	Alright...

PSY 1:	Grace and Alex are course mates and Alex has a car...*mumbling*...Alex agreed when they were almost at Grace's house she mentioned that she needed to...*mumbling*...was using...
PSY 2:	Uhm...cause the only thing was...*mumbling*
PSY 1:	Yup...Oh...yeah I think that's foot-in-the-door? How do we explain that? I guess just what you said there so like...
PSY 2:	Yeah...
PSY 1:	It's not...
PSY 2:	It's not low-balling because low-balling is when they mess with prices...
PSY 1:	I don't know how else to say it...yeah that's pretty much it.
PSY 2:	I'm pretty sure that's what it is yeah...cool.
PSY 1:	Oh no...this is communication...this is not...okay so illustration is a type of technique I think? Pretty sure it's...I'm pretty sure it's this one but it could also be this one I did it in first year...
PSY 2:	Yeah I don't even know...
PSY 1:	Oh...I'm pretty sure this is...as sample size decrease the error should increase so it cannot be that one...or that one. Because the bigger your sample size the smaller your error. So it's definitely not those two.
PSY 2:	Yeah it can't be those two.
PSY 1:	Yeah so the error should be...
PSY 2:	Yup.
PSY 1:	Except it's not one of the answers so...
PSY 2:	Yeah...what if...*mumbling*
PSY 1:	No cause that's just saying...it decreases and increases.
PSY 2:	But how is it any of those ones?
PSY 1:	Oh they got it I don't know what it is...so I guess they got it I actually don't know what it is... If the null hypothesis is false the researcher declares...*mumbling*...this was the one that we got before...
PSY 2:	Okay...
PSY 1:	So...the null hypothesis is false...It can't be an error though because if the null hypothesis is false that means that the hypothesis is true that there is a relationship

	and then the researcher has declared the data statistically significant...so it is significant so it is a correct decision...this is a very weirdly worded question...I'm pretty sure it is...there's no such thing as a type-3 error.
PSY 2:	No there is...there is actually but I think that isn't what this is I can't remember too clearly.
PSY 1:	Yeah I was going to...
PSY 2:	Yeah...do it.
PSY 1:	No you can do it if you want to...Uhm...so null hypothesis means there's not going to be a relationship...
PSY 2:	What was the other one?
PSY 1:	The h1? The h1 is the hypothesis you're making it's the one you want to make correct and in order to prove that you disprove the null hypothesis.
PSY 2:	Yay we did it!

Test Session 1 (IT Students)

IT 1:	Oh okay...
IT 2:	How did the question change?
IT 1:	So the question changed because they were syncing up to us? Is that...okay.
IT 2:	Whats the correct jQuery...*mumbling* Completely forgotten jQuery but I would imagine...do you know?
IT 1:	Uhm...target all images...Image elements...I actually don't know this I haven't done jQuery in a while but if I remember correctly...
IT 2:	The dollar sign was the selector from...yeah?
IT 1:	Yeah yeah, so I think actually it would be that one but um...
IT 2:	Unless they ask us anything we're just gonna...
IT 1:	So...we're trying to...because uh...because they're uhm...wait do we use the chatbox to communicate, not talking over?
TEST:	Yup. Use the chatbox if you can.
IT 2:	But do we instigate the conversation or initiate?
TEST:	Either way. It's pretty free flow.
IT 1:	Okay...

IT 2:	Likely expected *mumbling*
IT 1:	I'm like half guessing because like before the question said that this was the answer but this one doesn't say so we have to answer it ourselves before...
IT 2:	I didn't notice the answer before, was it in this box?
IT 1:	No this was like...no it was below but um...yeah
IT 2:	Cause I knew how to answer that one.
IT 1:	Yeah yeah so...we're trying to like make it that we...we talk to them and trying to answer for them without giving them the answer.
IT 2:	Yeah...so like guiding them.
IT 1:	Yeah so...
IT 2:	But they aren't asking us anything so we can just have awkward silence.
IT 1:	Yeah...trying to figure out how I can explain to people who don't know what java query is.
IT 2:	Hmm...yeah so like...
IT 2:	I think maybe...have they asked...
IT 1:	Yeah they just asked...
IT 2:	"What is a jQuery" so...maybe start off with explaining what jQuery is?
IT 1:	Yeah true okay so...
IT 2:	Do you think they'll understand this? Uhm...
IT 2:	What else is it used for?
IT 1:	Just functionality within the website.
IT 2:	Now we can do the tag thing...
IT 1:	Yeah...so...
IT 2:	So maybe explain an image element? So...
IT 1:	Yeah...
IT 1:	Some...what is it...what's the word like...
IT 2:	So...the syntax for showing an image in html is...shown maybe let's keep it simple. Shown in html (another language)
IT 1:	Yeah I guess I...
IT 2:	That basically sets up the...the structure for the document?
IT 2:	Primarily just text based?

IT 1:	Yeah yeah...of the...structure of the...I guess like...you can do that just because I don't...wait...
IT 2:	*mumbling*
IT 1:	Hmm...Yep.
IT 2:	Maybe we can say that the selector for jQuery within that is the dollar sign?
IT 1:	I'm like...I'm just having second guesses now...
IT 2:	With...the selector?
IT 1:	Yeah...no cause like...that could be a trick question you know?
IT 2:	I'm pretty sure it's that one but I could be wrong cause I remember from... It's been a while but the dollar sign was the thing that indicated the...
IT 1:	I'm talking about...I mean...the...thing it was selecting, why would it be an answer unless it was trying to pull us off you know... So I don't think that's the answer I think that's the answer.
IT 2:	Like...the second one?
IT 1:	Yeah.
IT 2:	Yeah, yeah that's exactly what I'm saying I think it should probably be without the tag.
IT 1:	Yeah yeah.
IT 2:	I like how they're not even asking anything, just like an "ok". Select an element uhm...select something?
IT 1:	It's not really an element uhh...yeah...
IT 2:	And uhh...syntax? And you use the dollar sign to select?
IT 1:	Selecting...
IT 2:	Command?
IT 1:	Yeah actually command is a good one.
IT 2:	*mumbling amongst each other*
IT 1:	*mumbling amongst each other*
IT 2:	What's that?
IT 1:	I don't know I think it's just...
IT 2:	Showing people that are online?
IT 1:	Yeah I think that's just uhm...it's a list of people that are in the...and we're IT people and I'm assuming they're psych people.

IT 2:	Right okay so that's just...
IT 1:	Just a list of people who are in the chat yeah.
IT 2:	And psych person should probably be one person it's just...falling underneath...
IT 1:	We don't really...
IT 2:	Need that?
IT 1:	Yeah yeah...uhm...because like if a lot of people are inside the chatroom...
IT 2:	Yeah...
IT 1:	And we're all answering the same question...
IT 2:	So then answer should be...go for it...Oh, next question. Which css element... *mumbling*
IT 1:	Wait no it's not display.
IT 2:	Float left is when you tell it to float...uhm...I've never...seen display. When do you use display?
IT 1:	Display is uhh...structured on top of elements so I don't think it affects position. Can I do that again?
IT 2:	It's okay. Maybe we should mention style?
IT 1:	Yeah. Oh my god...
IT 2:	It's alright...Uhm...the language used to style the structure? To add style to the structure.
IT 1:	Oh my god...
IT 2:	Want me to type?
IT 1:	Yeah I'm just having...I think it's just...
IT 2:	I think it's the keyboard.
IT 1:	Yeah yeah. I'm just used to a big keyboard.
IT 2:	Yeah...uhm...do we know the answer? Don't all of them have some impact on the position? Overflow will...
IT 1:	Overflow doesn't impact position actually it's more like the...if it's outside of a div the overflow will be shown I think...yeah...
IT 2:	Uhm...
IT 1:	So where is different, so...
IT 2:	I like how they've narrowed it down. Float left, float right, doesn't that really...

IT 1:	Display doesn't really do anything, it doesn't actually do that.
IT 2:	Mhmm...what about position?
IT 1:	See, like...both of them do define like...the...where the position is on the thing.
IT 2:	How do you actually write position in terms of syntax?
IT 1:	Like...position, left align or...I think it's float.
IT 2:	Yeah because float...changes the div...position? But we don't have to give the answer right?
IT 1:	Yeah no.
IT 2:	How would you say it do we have to explain everything then? I don't know what display is so...
IT 1:	Cause we can't...we can't give them the answer...even though when you Google this, it will give you the answer.
IT 2:	What does display do? Can we Google it by the way? Google things in this...exercise...
IT 1:	Seeing that web...uhh okay alright...
IT 2:	That was unclear...Okay...Display shows where the...I don't know how to define display...Maybe just write...if you...use float, you can indicate what direction to move in? And then just...
IT 1:	Does float take pixels and stuff? Or?
IT 2:	Moves the entire div so for instance if this is your div and you float left it will stick to your left side then you have uhm...another float left so that will come here until I specify that it needs to be underneath it.
IT 1:	That's what position does as well I think. I don't know but...don't you need to be displaying it as a block as well though?
IT 2:	Display text box...
IT 1:	Yeah...so wait...so are these the only answers within the questions?
IT 2:	Can you select multiple?
IT 1:	Really? There's only one answer to this?
IT 2:	Uhm...should we be like...
IT 1:	Cause I'm pretty sure like...
IT 2:	Reflects how poorly web design was taught to us.
IT 1:	Well especially when I web design I just do it on the fly.

IT 2:	Yeah and then you just google things you don't understand. But this is a very specific question.
IT 1:	I think it might be...I think it might be position because float does do that it's when you're connecting two divs together pretty much like when you want to connect them at like one section whereas position if you do left and right you can put them in different areas.
IT 2:	Okay.
IT 1:	But uhm...I thought there was like a...
IT 2:	Position probably?
IT 1:	I'm pretty what I do to change the position of elements is to give it border or like...give it padding, and then give it a certain height. This is just weird.
IT 2:	So maybe we should just write one of them and then move on...
IT 1:	I think they're all corr...no except for...wait no is there just one answer? Cool. This is...wait I didn't do an exam.
IT 2:	They put the exam in last year.
IT 1:	Ah right. Did the fail rate go up? I'd bet.
IT 2:	Right...I don't know...that was pretty useless.
IT 1:	Okay so...
IT 2:	Which is the...*mumbling*...I know this one. It's just like...title? Title right?
IT 1:	Uhm...I mean...
IT 2:	Link would probably be CSS but you don't really need that do you? You don't need the title either.
IT 1:	Yeah I don't...You don't need...
IT 2:	You need doctype? I mean you need the meta thing on top, head and body.
IT 1:	You don't even need HTML, I mean the doctype because like...most browsers will cancel that anyway so...
IT 2:	Yeah.
IT 1:	But um...I'm thinking maybe link and title.
IT 2:	I think probably link? Because you don't really need CSS. *mumbling* Whoa...where'd they go? So...this thing does not support multiple lines?

IT 1:	Our words...our words have disappeared...Oh special characters? So the exclamation mark is not working...I think it just screws up when you put an exclamation mark in there even though the question itself has an exclamation mark.
IT 2:	Whoa that's messed up.
IT 1:	Is this really a question inside the exam?
IT 2:	It's a pretty shit question.
IT 1:	These are really bad questions because technically you don't need two of those. Like you don't even need a title because you just use the file name instead. I mean like...these are really like...opinionated questions. Don't tell me the next questions are gonna be like psych stuff...
IT 2:	That'd be interesting. Does it even tell them the answer is correct?
IT 1:	I don't know does it?
IT 2:	What is ranking the uhm...but it wouldn't be core to the structure itself.
IT 1:	But like...talking about the structure as in...
IT 2:	Yeah so then I'll be head and body right?
IT 1:	So I think that answer there should not be an answer. It should be like...
IT 2:	A subset of it?
IT 1:	It should be like "p" or something because you don't really need it but title...
IT 2:	Do you put the page name in the title?
IT 1:	Yeah yeah you do I think...yeah. It's just you don't really need it.
IT 2:	In that case it would be title? Because it's head, then you link something then you have...I like how they're...it's just this syntax.
IT 1:	Wait did we get it right? Cool.
Role switch	
IT 2:	Oh hey time taken...that's not intimidating at all...*mumbling*...Okay so the null hypothesis is...so you basically want your null hypothesis to be disproved. From my memory of statistics.
IT 1:	Mhmm...
IT 2:	It's false so that means it's a good thing. And uhh...*mumbling*
IT 1:	Wait what? I just...
IT 2:	The question changed? *mumbling* So wait...Chris asked Alex to driver her home?

IT 1:	Mhmm...
IT 2:	And then...once she got home, she told Alex oh, could you help me do something else?
IT 1:	Yeah.
IT 2:	I think it's foot-in-the-door? Because she's already there, so might as well just...Should we...yeah.
IT 1:	It would be nice to see like a...is typing. Cause we're not supposed to hear them right? So...it would be nice if it was like "This person's typing so you might as well just wait...".
IT 2:	*Mumbling*
IT 1:	*Mumbling*
IT 2:	Should we just go with that and just submit it?
IT 1:	Is it?
IT 2:	I think so yeah.
IT 1:	Oh yeah right...I thought it was a trick question.
IT 2:	I'm sure it probably is but do you want...
IT 1:	I guess we'll just go "explain" cause we're supposed to like...
IT 2:	Because that's what the boss expects of you?
IT 1:	Yeah...
IT 2:	This one?
IT 1:	Uhm...yeah...
IT 2:	I don't know if we're right but...the sample size of...*mumbling*...reduce? It would reduce right? Because your sample size is...
IT 1:	Yeah...Oh wouldn't it ...
IT 2:	Shouldn't it incr...because the greater the population size the less chances of an error?
IT 1:	Well...if you have 1 in 10 people and a million people doing something wrong, if you were to make it only 10 of those people existed, at that point it's still 1 out of 10 chance because it doesn't matter how big your size is...like if it's certain that 1 out of 10 people will do something right.

IT 2:	But the more people there are the less error there will be in your calculations so...yeah. Cause if you think it is...let's say we're looking at a sample size of 10 people, our sample will be skewed.
IT 1:	Yup.
IT 2:	So for example this sample of 2 people cannot be representative of the IT community.
IT 1:	Yeah yeah. I mean...yeah. Oh wait...isn't this?
IT 2:	It's recycling questions?
IT 1:	Well I guess we didn't answer that anyway so...
IT 2:	Correct decision actually. *Mumbling*

No voice recording was carried out during the second test session as participants were not in groups.

Appendix C4 Observation Notes

Test Session 1

- Guide/solver role not clear to users.
- Concerted effort made to express concepts in lay-language.
 - However participants found it difficult.
 - Potentially due to lack of shared conventions/common ground
- Participants focused on getting answers correct on their first try.
 - Competitiveness present.
 - Assumption that all questions are single attempt only.
 - Participants sometimes more focused on getting questions right than learning.
 - “That makes sense but does not help me answer the question”
- Guides are far more active than solvers
 - Solvers get distracted easily
 - Sometimes talk to each other about non-relevant topics
- Participants very eager to help.
- More communication between teammates rather than between teams.
 - Could be limitation of medium or lack of common ground
 - Cannot be proven with current test setup
- Participants found that not giving the answer outright to be hard to circumvent with certain questions.
- Participants had fun interacting with each other through the system.

- Participants are surprisingly communicative with each other.
 - Anonymity might be a contributing factor.
 - Synchronous communication minimizes communication roadblocks?
- Scrolling is broken.
 - Constantly scrolls to bottom when chat updates
- Participants have knowledge gaps in their expected knowledge.
 - Search engines suggested to remedy this.
- Some questions aren't considered to be part of the guide's discipline by the guide
 - "This is statistics not psychology"
- Teammates "build" their messages between them before sending.
- Special characters in chat are broken (might not be fixable on time).
- Leadership dynamics present
 - "No you do it"
 - One member talks more than the other in both groups

Test Session 2

- Competitiveness still present
 - Fear of being wrong
 - Both participants still shooting for single attempts
- In general guides interact more with the application
 - Solver simply asks and waits
 - Asymmetrical effort
- Some cross-pollination of knowledge might already be present among older or more curious students
 - Has potential to throw off the interaction
 - Basic questions might be too basic that they might fall into the realm of common knowledge
 - Complicated ones might be unsuited for beginners
 - Appropriate questions paramount to success
- Knowledge gaps on one's own discipline an issue
 - "What if I don't know?"
 - Lowers participation
 - Search engines proposed to fix this issue
- Even though there are no teammates to discuss message building with, users still put much consideration to them, initiating multiple rewrites for each message sent.
- Lay-language attempted to be used as much as possible
 - Large amount of effort had to be invested.

Appendix C5 Interview Transcriptions

Test Session 1 (Psychology Student 1)

Interviewer:	Alright so what are you studying and which year are you in?
Interviewee:	Alright so I'm studying Bachelor of Psychological Science and I just finished my third year.
Interviewer:	So...what was your overall experience with the system? So was it difficult to learn?
Interviewee:	It was pretty easy to use, didn't have much difficulty at all.
Interviewer:	Uhh...any reason as to why it felt easy to use?
Interviewee:	I mean...It was fairly simple design and yeah I've seen a chatbox before so I know how to use that.
Interviewer:	Alright...
Interviewee:	Yeah...And I've taken plenty of online quizzes which were very similar to the format style of it so...
Interviewer:	Fair enough uhm...what other experiences did you have during your interaction with the system?
Interviewee:	Hmm...I liked it, I thought it was...I actually found it quite enjoyable learning from other students about what they were...sort of...their area of expertise was. It made it pretty easy to understand I guess...
Interviewer:	How did it change your understanding of Information Technology, if at all?
Interviewee:	Uhm...Just confirmed my suspicions on how complicated it is *laughs*. I don't...It's like another language...like...yeah...
Interviewer:	Uhh...Would you use this uhm...I guess application on a regular basis if you had access to it?
Interviewee:	Uhm...In terms of like specific circumstances if I needed to...like learn about anything IT related I'd probably use it 'cause it's like...hands-on like sort of one-on-one I actually get to talk to someone who is using it. I found it probably more... 'cause you can actually ask questions whereas if you're googling it you can't really ask questions so you gotta sift through all the information and stuff...yeah.

Interviewer:	Uhh...alright...would you be more likely to use this if it was deployed in a different context? So...instead of a strictly online only environment if it was say...deployed publicly would that change anything?
Interviewee:	I...don't...think so?
Interviewer:	Alright.
Interviewee:	I guess it is still specifically IT-laden. Uhm...I mean I'll probably use it about the same I guess?
Interviewer:	Do you feel like knowing more about IT people will help you communicate better with people of similar backgrounds in the future?
Interviewee:	Uhm...I guess? I'm not sure. I mean it will help me understand what they are talking about a bit. Most of the time I have no idea. Or if I had like a question that was IT related probably help me ask it better if I knew a little bit more about it.
Interviewer:	Alright...uh...Do you think that the university is affording you enough opportunities to work with individuals of different disciplines?
Interviewee:	I don't think so no. I have probably...I don't think I've ever worked with an IT student before so...or any really other disciplines apart from like when I was in a subject where a couple of people are taking as an elective but they were still doing psychology so it wasn't really like we were communicating from different fields.
Interviewer:	Uhh...do you see yourself benefitting from more of...more opportunities to work with...you know...other people from other disciplines.
Interviewee:	Yeah. I mean...it's always good to learn new things.
Interviewer:	Alright...so what difference do you think this application will make to the current university ecosystem if deployed to the public?
Interviewee:	I mean I guess it would help people sort of like expand their knowledge to not just their own particular fields that you can actually like...learn things pretty easily about other things and become more integrated in that way 'cause there's more communication between people and people will know a little bit more more about everyone else's fields and probably stop the separation of the fields as much so...

Interviewer:	Uh...do you have any feedback you want to give regarding the system? So...like the user interface, what features would be nice to have that kind of stuff.
Interviewee:	Uhm...I mean, I don't think you can do anything about it but the symbols and stuff coming up blank was a bit confusing if you didn't know what was happening so...that's probably all I can think of.
Interviewer:	Alright...fair enough. Awesome. Thank you.

Test Session 1 (Psychology Student 2)

Interviewer:	Alright first off...what are you studying and how far into your studies are you?
Interviewee:	Uhh...Psychology and Biomedical Science and I'm in my final year. That's uhh...fifth year.
Interviewer:	Okay...What was your overall experience with the system?
Interviewee:	Uhm...Yeah I thought it was pretty good. Pretty simple, straightforward, easy to use.
Interviewer:	Was it difficult to learn how to use the system or did you think there was like a learning curve involved or was it pretty intuitive?
Interviewee:	No I'd say yeah pretty intuitive. Uhm...no once you sort of just...yeah it's a simple chatbox really. Just...yeah...pretty easy.
Interviewer:	How did the interaction change your understanding of Information Technology, if at all?
Interviewee:	Uhm...Well I learnt...something new? Really I don't know much about IT or anything like that.
Interviewer:	Do you think that learning more about it will help you communicate better with IT people in the future?
Interviewee:	Uhm...Yeah I mean it might, actually. Yeah... I mean I've never really interacted with any IT students or anyone who does IT so...
Interviewer:	Alright...Would you use this on a regular basis if it was more accessible to the general public?
Interviewee:	Yeah perhaps...If I needed to find things out, ask questions, needed help for something yeah.

Interviewer:	Would you be more likely to use it if it was deployed say...in public as an installation kind of thing?
Interviewee:	I don't know I don't even use the city cycles. That's hard to say. If I'm on my home on the computer then...maybe.
Interviewer:	Do you think that the university is affording you enough opportunities to work with individuals of differing disciplines?
Interviewee:	No...no...not at all, no. I don't think I really talked to someone outside...you know... my faculty or my area.
Interviewer:	Alright...uhh...do you see yourself benefiting from using this product if it was deployed en-masse?
Interviewee:	Yeah actually I mean it probably could have helped with my biomed when I was doing some script writing for an assignment. Could have asked some IT students then.
Interviewer:	What difference do you think this application will make to the current university ecosystem if deployed?
Interviewee:	Uhm...maybe better collaboration between faculties and between students and you know...getting help if it's needed for some particular aspect of what you're doing and yeah...wider scope of people to engage with.
Interviewer:	Uhm...do you have any feedback on the system itself? What can be improved, that kind of thing.
Interviewee:	The fact that it didn't scroll. Otherwise, no it was pretty easy to use...yeah. But then some of the symbols aren't appearing as well so...that's about it.
Interviewer:	Alright cool, awesome. Thank you.

Test Session 1 (IT Student 1)

Interviewer:	What are you studying and what year are you in?
Interviewee:	Uhm...I'm doing a Bachelor's of IT majoring in Software Design. I guess I'm in third year but I took another year just because I wanted to ride it easy I guess.
Interviewer:	Yup yup...What was your experience with the system? Was it difficult to learn? What was like the learning curve? Was it easy to use?

Interviewee:	Initially it was difficult but after like learning how things happened I could use it just by recognition. Uhm...some of the elements in the page weren't like...needed I guess? I understand the contributors and seeing how many people were on there but I mean like it would be nice just to just answer the question that came up regardless of who they are but uhm...yeah that's pretty much it.
Interviewer:	Alright...so how did the interaction change your understanding of Psychology degrees or Psychology students, if at all?
Interviewee:	Uhm...Actually yeah no it did cause uhh...usually I just see people within my degree and I just think other people around me are just you know...not that smart because they don't know what I know but seeing what they know I'm just like ooh...okay maybe not. So I guess that kind of changed but um...other than that nothing really.
Interviewer:	Do you feel that knowing more about Psych will help you communicate better with them in the future?
Interviewee:	Uhm...when it comes to answering questions together...yeah. Uhm...I saw <i>IT Student 2</i> , the other...the person next to me uhh...when he knew something about stats, they were just exchanging ideas rather than asking "what is this?". They actually knew a little bit about but I couldn't participate really because I didn't know what they were talking about.
Interviewer:	Would you use this in say...a daily context?
Interviewee:	Uhm...depends on what kind of like...depends what context you mean as in...
Interviewer:	Uhm...you just log on at home, that kind of context.
Interviewee:	Do I...get paid?
Interviewer:	No. You get paid in knowledge.
Interviewee:	If I was exchanging between IT questions and also just Psych questions or any other degree's questions yeah 'cause like I'm able to like...teach people my knowledge but I'll also gain it as well.
Interviewer:	So it's kind of like a stack exchange kind of deal.
Interviewee:	Yeah.

Interviewer:	Would you be more likely to use this if it was deployed in a slightly different context such as as a public interaction?
Interviewee:	Uh...yeah sure. Uh...it'd be cool to have like 2 of the same set-up except for in 2 different sides of like...I don't know 2 different sides of Australia and then just talking about this one question and just having random people...That'll be so cool actually. This like...this one question that somebody recognizes and comes up to it and people are just talking on a global scale, yeah.
Interviewer:	Cool. Do you think that the university currently is affording you with enough opportunities to work with individuals of differing disciplines?
Interviewee:	Not...they are. They do include some disciplines but they are so close that the only time I thought I was working with two different types of degrees was when I was working with music students but other than that... Like software engineering and engineering and IT like they're all in the same group category. I know people who've done different degrees and aren't doing IT but I've never used their knowledge of business or whatever...to incorporate into my own studies.
Interviewer:	So when you say you've interacted with people from a music degree do you mean like you took a music elective or they took an IT elective that kind of thing?
Interviewee:	I've never done that. It was more like...testing-wise and also their knowledge based on the testing. Uhm...then also the whole entire...the project that I'm working on is based on music as well so it was really nice to get that. But um...I just haven't done many subjects that...I don't think that the university has that many subjects that incorporate 2 different types of degrees, like...completely different.
Interviewer:	Do you see yourself benefitting form a higher degree of interaction with people from differing disciplines?
Interviewee:	Definitely. I think, I mean...within an IT course it's really important to get other people's opinions I guess? And seeing that the internet of everything is a thing so we might as well just have subjects that are within different types of degrees.

Interviewer:	What difference do you think this application will make to the current university ecosystem if deployed on a larger scale?
Interviewee:	I mean...if its...so we're opening a live chat with live questions right?
Interviewer:	Yup.
Interviewee:	I guess...I guess this is a relation between stack overflow and then having people answering live and you being able to incorporate everything. I guess you'll learn more? Like more easily when somebody's there rather than just waiting for an answer to come to you you can actually just get an answer straight away and also ask questions about it.
Interviewer:	Uhh...what feedback do you want to give regarding the system itself?
Interviewee:	What I said before like...it would be nice to see what the names were. However other than all the weird bugs and stuff I think maybe...uhh...it's mostly just UI design and the chat functionality of course needs to be changed a bit but maybe adding new features based on like different types of questions of course but...other than that the system itself I think it worked pretty well. That's it yeah.
Interviewer:	Alright that is it thank you.

Test Session 1 (IT Student 2)

Interviewer:	So...what are you currently studying and what year of studies are you in?
Interviewee:	So I'm currently doing my master's in interaction design and I'm in my final year.
Interviewer:	So Is that fourth year? Or was it second?
Interviewee:	Yeah second year.
Interviewer:	Alright...so what was your overall experience with the system? Was it difficult to learn? Was it easy to use? Stuff like that.
Interviewee:	I think initially...so I'll just take you step by step so...
Interviewer:	Yup.
Interviewee:	First screen where you have the option to select whatever discipline you're in that's pretty decent. But because I'm an interaction designer I just expected that once I click on one it would move on to the next step so that was

	<p>something that stuck out. But I think it is fine also as is because say if you accidentally click something which you are not a part of you need that kind of control. Uhm...in the next frame, it took me a bit of time to figure out where I was and what I was looking at. So...the question was pretty evident because it was right in your face. Uhm...the role was very unclear as to whether you were the person answering or not. So I feel like that was something that could have been made clearer. I think with the chat area it was slightly difficult to traverse because it was a little down there and I think after...because I was talking to <i>IT Student 1</i>, and it took me...as in I realized that the other team was talking to us later on, just because I didn't notice them...the notifications pop-up. And the user names were also not very clear so that was something that sort of...yeah... Anyway I think the panel on the right which was the contributors, that was sort of...felt unnecessary? I mean I'm sure you do want to know who you're talking to but because the rest of the system was unfamiliar to be I didn't really see much value in that at that point because at that point I just assumed I was talking to someone else.</p>
Interviewer:	<p>Uhm...so how did the interaction change your understanding of the psych students?</p>
Interviewee:	<p>Uh...okay so...I think at the start when they were answering questions about IT, I don't...I mean...I feel like the questions were devised as such that me and <i>IT student 1</i> couldn't decipher them. They asked us questions but...yeah one interesting thing was that they did not start the discussion, we felt obliged to because we knew they were on the other end. I think there were some rules of engagement that were there that we weren't supposed to give them the answer, but then we had issues figuring out the answer was and when we did we had to figure out how to disseminate them. I feel like they were pretty easily able to understand but I think to whatever degree you can over like 3 lines of text-based chat uhm...yeah. So I think they were okay in terms of understanding what we were trying to do.</p>
Interviewer:	<p>Do you think that knowing more about psych will help you communicate better with other psych students in the future?</p>

Interviewee:	<p>Hmm...I guess? I mean to a certain degree you should know the nomenclature and things that are discussed in psychology. But I've done a bit of organizational based psychology earlier so the terms that were used in the questions to me they weren't very psych specific like I was expecting things like classical conditioning and you know...things like that. So this was a little bit more statistical.</p>
Interviewer:	<p>Would you use this interaction in I guess a regular basis?</p>
Interviewee:	<p>Hm....probably not because I think it depends on what the purpose of the interaction is. So if like...I need access to talk to a psych student for something that was of value to me and this was the only portal accessible to me I would. But right now its purpose in my life seems a little bit vague to me so it needs to be more developed towards me and I guess that is just something that will happen over multiple iterations of it.</p>
Interviewer:	<p>Do you think that the university is affording you enough opportunities to collaborate with students of differing disciplines?</p>
Interviewee:	<p>I want to say no... Not that it's stopping me from working with people in different disciplines. I think that the programs I was a part of have sort of been skewed or structured in a way that there is not a lot of interdisciplinary interaction. Like because I'm doing interaction design and it falls under a multitude of different fields it would be really cool to be able to work with people with psychology but I haven't had the opportunity to. The only times I had it was when I picked an elective which was another school.</p>
Interviewer:	<p>Uhh...so...do you see yourself benefiting from having more opportunities to work with other disciplines?</p>
Interviewee:	<p>Yeah definitely. I think so because uhm...I mean I personally believe that the more diverse the group of people you interact with the more you learn uhm...you pick up on things, you pick up on terms, concepts and it's just more accretive to learning than just sitting in your own little group talking about the same things over and over. So...yeah I definitely think there's value in it.</p>
Interviewer:	<p>Uhh...what difference do you think this application will make to the current university ecosystem if deployed to the public?</p>

Interviewee:	<p>So I think it depends on how it's positioned. I've got a background as a marketer as well so I'm a little skewed towards "fit for purpose". I think it could be beneficial definitely if it's positioned correctly so say this is a way to communicate between uhm...if this is a way to get different respondent groups or access to them and you're able to put in the questions as well because I feel like because it was structured in a way that there were predefined questions and it wasn't just a communication tool uhm..."Why would I use it to learn?" is one question so let's just say that, hypothetically if there's someone in the business school and they want to learn how to design websites, would this be more beneficial to them or would...say access to the web design slides or lecture recordings would that be more beneficial to them? So...what would that actual scenario be where this would be deployed. That's something that needs to be explored so if...in...where do you find value in interacting with subject content versus interacting with people from that particular area. One of the issues that I've faced during my program because it is very user-testing oriented is the fact that there is very little access to users either because uhm...we don't have a structured way to go about it or because uhm...people are just lazy and introverted. So...uhm...I think if it's used as a channel to recruit people that would be really cool because you know...day-in day-out you see notice board pin-ups about people trying to recruit people for their thesis, for different studies they're doing...so I think if it's channeled that way it would be interesting if it's just channeled towards a UQ-based communication tool that would also be pretty cool. Uhm...yeah.</p>
Interviewer:	<p>Uhm...so lastly, it's kind of overlapping with the second question but what feedback do you want to give with regards to the system itself? So UX/UI, functionality, that kind of stuff.</p>
Interviewee:	<p>Okay. Uhm...so just starting off with I think...in terms of content. The content needs to be purposeful. I understand this was a test and they were put in there to try and understand the dynamics around it but I think uhm...in this particular case, because its purpose is to be centered on the content that needs to be explored further. I think in terms of the UI and UX let's start with the UI for instance, I think the interface is simplistic and minimalistic which is</p>

	<p>fine but at the same time how do you link it back to the purpose like if I'm using it to learn more about a field that I don't know of uhm...the curriculum that is being disseminated, do I get access to different topics or do I just get a broad view of everything within the field? If I'm looking at psychology do I look at you know...behavioral psychology or organizational psychology...so on and so forth. Do I get that kind of control of the system? I had no idea who I was...I mean this was a test but I had no idea who I was talking to actually even with the test I didn't know who they were so...uhm...that and also the system assumes that I had certain degree of knowledge pertaining to my field, which maybe I didn't, maybe I did uhm...maybe I'd forgotten. So...I think this could be used for let's say uhm...I see a lot of different people trying to come up with tutor-based applications or like...you can get help with your assignments and whatever. Uhm...which would have been pretty decent and well-received within the UQ space. I was over at startup weekend a few months ago and quite a few apps were looking towards helping students with their studies. So I think if the purpose is predefined or uhm...if it's sort of within a specific context, it would help augment the interactions further. From a chat point of view it felt pretty fluid like uhm...like the way that we were talking to the other group it felt organic, didn't feel like we were trying to uhm... make things up other than trying to restrict giving the answer...yeah. Uhm...yeah so I think overall it all boils down to what you're trying to achieve with it and that's something that should be explored. As an application it's decent, I think it could fit multiple purposes but what that purpose should be is something that needs exploring.</p>
Interviewer:	Alright thank you.

Test Session 2 (Psychology Student)

Interviewer:	What are you studying at the moment and what year are you in?
Interviewee:	I am in first year psychological science.
Interviewer:	Is that...is this your second semester?

Interviewee:	Yeah my second semester but I've...I did IB before this so I...took psych as one of my courses.
Interviewer:	Right...did you take any web or computer related courses in IB?
Interviewee:	No but I did a little bit of self-study.
Interviewer:	What was your general experience with the system so...was there like a learning curve to it? Did you enjoy it did you not?
Interviewee:	Uhm...in terms of the learning curve definitely not. I think anyone who knows how to use a computer can definitely use that. I liked it because it's kind of...you're learning but it's not super formal so I don't feel intimidated or up-tight about it at all.
Interviewer:	How did your experience change your understanding of IT if at all?
Interviewee:	Uhm...didn't really change it but I would say that integrating this into the education system would be good like...it's just another good use of technology for learning...like collaborative learning.
Interviewer:	Uhh...would you use this in an online-only context where you just go home and log into the application?
Interviewee:	Sorry could you say that again?
Interviewer:	So...would you use this on a regular basis?
Interviewee:	Oh uhm...I don't see why not. Especially in preparation for quizzes and tests and whatnot. But I don't see why you would need to answer multidisciplinary questions unless you're doing like a double degree or something? I guess it's helpful for both parties but I mean...I don't see why I couldn't do it with another psych student and then we could both be benefiting from all the questions as opposed to me doing this with an IT student. While it is fun to learn IT stuff like...facts about a different field I feel like half of the time for me would be...like I said while it's fun I don't consider it beneficial academically for me.
Interviewer:	Yeah. So I guess you see very little personal gain to have from it.
Interviewee:	Yeah. I just think that if...for fun it would be really cool but if I wanted to use it as a...to complement my studies, I would rather do...it's a good app but I would

	rather do it with someone from the same course who is doing the same stuff as me.
Interviewer:	Yeah...Uhh...do you think that the university is affording you enough opportunities to work with individuals of different disciplines?
Interviewee:	Not really. I don't think so...but that would be cool.
Interviewer:	Do you see yourself benefitting from having more opportunities to interact with individuals of different disciplines?
Interviewee:	Yeah. For sure. I think outside of academics it would just be cool to learn a lot of different new things, which is like a personal goal of mine as well so...yeah I think if I was provided with more opportunities I would definitely take it.
Interviewer:	What difference do you think this application will make to the current university ecosystem if deployed en masse?
Interviewee:	Like I said it just gives people more opportunities which is good. I just don't know if people would always consider it as something necessary? Uhm..But without a doubt there is a lot of people who are interested in learning about what other people are learning so...I feel like it would benefit them but that might be limited to hobbies.
Interviewer:	Fair enough. Do you have any feedback for the system? Just general usability stuff.
Interviewee:	Hmm...Not really. In terms of the system itself I think it's good. Having the questions and the chat right there together is good but other than that there's also the questions and whatnot but that's outside of your control kinda.
Interviewer:	Awesome thank you.

Test Session 2 (IT Student)

Interviewer:	What are you studying and what year are you in?
Interviewee:	Bachelor of IT, fourth year.
Interviewer:	What was your general experience with the application? So...what's the learning curve? How did you feel about interacting with it?

Interviewee:	Uhm...my general experience was pretty good. Like...it's easy to chat to someone about a specific topic. But I was very tempted consistently to just say the answer and save myself some hassle essentially trying to like dance around the answer without actually saying it.
Interviewer:	How did the interaction change your understanding of psychology if at all?
Interviewee:	Uhm...I guess a little bit, it changed it in the way of I did definitely learn some more stuff about it about certain terms and that kind of stuff and what...you know...it gave me a really good comparison I guess? To like...entry level IT stuff to entry level psych stuff. You know...I went through both of them essentially and comparing them side-by-side it's good to see.
Interviewer:	Do you feel like knowing more about IT or psych will help you communicate better with psych students in the future?
Interviewee:	Oh definitely. They use a lot of terminology that...you know...
Interviewer:	Yup...Would you use this regularly?
Interviewee:	Uhm...For the purposes of trying to learn psychology for instance?
Interviewer:	Yeah just to communicate with psych students in general. To learn more about them, establish common ground.
Interviewee:	Uh...personally probably not that much.
Interviewer:	Any reasoning behind that?
Interviewee:	Well...If I wanted to learn more about psychology, it would be for a reason, like a targeted kind of topics I want to learn about. So like the general focus of the quiz doesn't help me with that focused kind of approach.
Interviewer:	Do you think that the university is affording you enough opportunities to work with individuals of differing disciplines?
Interviewee:	It's weird I don't think they give us...well they give us barely any. But yeah the only one I did do was an elective and that was with another school that was with journalism. So yeah I think it's definitely not enough I feel like especially in the later years it's uhh...see what else is out there what people have been doing.
Interviewer:	Alright...So do you see yourself benefitting from having more opportunities to work with people in different disciplines and whatnot?

Interviewee:	Yeah probably almost certainly.
Interviewer:	What difference do you think this application will make to the current university ecosystem if it was deployed?
Interviewee:	How would the deployment be?
Interviewer:	An online chat box kind of thing.
Interviewee:	Is it just students who can use it?
Interviewer:	Yup.
Interviewee:	Or is it part of a curriculum?
Interviewer:	Just students for now.
Interviewee:	I think it would open up the university a bit. Especially in the early...I feel like a lot of first years would jump on that and yeah see what else is going on with other people's learning and it would let people see.
Interviewer:	Do you have any feedback with regards to the system?
Interviewee:	There was a few limitations in the system like...we were using the user names you gave us and the chat logs were from different people which is probably easily fixable. But the UI could definitely be better it's essentially just HTML what you have right now. Some of the questions were a bit...like the definition one? Is going to be...The questions need to be things that force the kind of explanation. If it's just like A,B or C you just kinda say...there's no real way I can explain it.
Interviewer:	Alright...cool. Thank you.

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