

Designing and Evaluating an Interface System to Combat Loneliness and Isolation Among Non- Native Speakers of English

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Abstract

International students are among the many groups of people who move away from their personal networks to a completely new environment for extended periods of time (Matook, Cummings, & Bala, 2015). In a new environment, international students can find themselves experiencing difficulties interacting with other people, which could lead to loneliness and social isolation. This research aimed to investigate how interactive technology can be used as a possible platform that could help combat loneliness and social isolation among international students in universities. A Grounded Theory approach was adopted to gather and analyse the data needed to meet the objective of this research. In all stages of the research, simulation and hypothetical scenarios were used to meet the requirements of the Australian National University (ANU) Human Research Ethics Committee, such that participants did not have to disclose sensitive personal issues.

The first stage of this research involved data collection through individual interviews with university students in the ANU. Common themes gathered from the individual interviews were used to create ideas for a prototype. To verify these ideas, focus group sessions were conducted with university students in the ANU. While findings from the focus group have indicated the feasibility and approval for these ideas, a deeper analysis revealed an underlying theme that is associated with international students' loneliness and social isolation. A lack of cultural competence was observed to be the underlying issue that might have caused difficulties for international students to interact with other people, which may eventually cause loneliness and social isolation. This conclusion, combined with conclusions about the ideas discussed in the focus group, developed into the ideation of a prototype that could help combat loneliness and social isolation among international students by familiarising themselves with the new area, culture, and ways of communication to develop cultural competence. The prototype was designed as a role-playing interface system that simulates common scenarios in Australia to build familiarity in these three aspects. The prototype was also designed to encourage international students to approach real people and real events in the real world, to apply what they have learned in the prototype and build real life connections.

The second stage of this research involves the use of user studies as a method of exploring whether newly-arrived international students would find the features in this prototype useful as a self-management tool to increase their cultural competence. The user studies were done with current or former international students from the ANU. Analysis from the results of the user studies gave rise to the conclusions of this research.

Three conclusions can be made at the end of this research.

1. Lack of cultural competence was revealed to be an underlying issue behind international students' loneliness and social isolation, as it may restrict the quality and quantity of social interaction.
2. Simulation and hypothetical scenarios involving cultural competence can be employed in interactive technology to help prevent loneliness and social isolation.
3. Simulation and hypothetical scenarios appeared to have successfully handled the ethical barriers to investigating the themes associated with this issue.

Ideas for future work in this area are discussed.

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1. Introduction

1.1 Context

“In contemporary society, many people move away from their personal networks for extended periods to reach professional and/or educational goals” (Matook, Cummings, & Bala, 2015, p. 278). The chosen new environment is not necessarily far-off, but in most observations, people have migrated to other cities, province, or even countries to reach this objective. A prominent example of such instances is international students studying overseas, mostly coming from countries where the quality of education is not as high as that of the receiving host country, in hopes of economic benefit in the future (Byram & Feng, 2006). In Australia in 2018, there is a grand total of more than 6.5 million international students’ enrolment across different educational levels, coming from more than 200 countries around the globe (Australian Government Department of Education and Training, 2018).

Although studying overseas comes with benefits, such as education and career attainment, personal development, and intercultural development (Dwyer & Peters, n.d.), there are challenges associated with moving away from a social environment that the individual finds comforting and is already familiar with (Matook et al., 2015). It can be difficult especially for first-time international students to live in and adapt to the host country “due to the lack of social networks, deficient communication skills, and different value and belief systems” (Wang & Sun, 2009, p. 81). Such challenges can sometimes lead to the difficulty for these students to interact with others, especially with residents of the host country.

1.2 General Motivation and Objective

Without a sufficient level of social interaction, international students can experience loneliness and social isolation. The terms ‘loneliness’ and ‘social isolation’ are closely related and often utilised interchangeably, but there is a key difference between these two concepts (Lauder, Mummery, Jones, & Caperchione, 2006). De Jong Gierveld and Kamphuis (1985) referred to loneliness as the subjective perceived experience of social isolation, which materialises when the quality of the relationships does not meet the individual’s expectation (De Jong Gierveld, 1998). On the other hand, social isolation occurs when there is an insufficient quantity in terms of the individual’s social contacts (Lauder et al., 2006). Despite this key difference, they are both categorised as a psychological experience that could lead to harmful effects on our health (Lauder et al., 2006; Cornwell & Waite, 2009). Loneliness and social isolation could lead to significant negative impacts on a person’s well-being to the extent that they were identified as a significant predictor of morbidity and mortality (Lauder et al., 2006).

However, reports have claimed that it is actually perceived social isolation (loneliness), rather than social isolation itself, that is the stronger determinant of health and well-being because a quality of social relationships is more important than its quantity (Stokes, 1985). More emphasis is hence placed on understanding and combating loneliness rather than social isolation when the objective is to facilitate people in managing a desirable level of social interaction. Loneliness was reported to have the highest incidence within the 18 to 24 years old age group (Brody, 2018), which is usually the time when an individual would undergo their university education. This indicates that among all international students, international students in university would in general experience the lowest quality of relationships, in addition to a limited network of social contacts due to the shift into a new social environment.

As an international student in university myself, I resonate with some of the challenges discussed here and wished to create a form of self-management tool that could prevent other international university students from finding themselves in similar situations. The use of interactive technology can be proposed as a possible platform that could help combat loneliness and social isolation for international university students, in ways that will be investigated in this research project.

To reach the main objective of this research, two sub-objectives will be focused on:

- To investigate in what ways can the use of interactive technology increase the quality of relationships (to ease loneliness)
- To investigate in what ways can the use of interactive technology increase the quantity of social contacts (to prevent social isolation)

Although this research aims to tackle both loneliness and isolation, more emphasis will be placed on combating loneliness following the focus of most existing literature that highlighted the importance of quality as opposed to the quantity of social contacts.

1.3 Research Approach

While concerns with the negative effects of loneliness and social isolation is the driving motivation behind this research, the proposed prototype is not specifically targeted towards only lonely students and is not designed to be used as a clinical intervention. It was instead designed to be used as a platform to help international students manage a healthy level of social interaction independently and freely, even before any feeling of loneliness and/or social isolation is developed.

1.4 Pronouns

Unless specifically stated, all participants are referred with the pronouns they/their/them when attributing an action or quote anonymously, to avoid disclosing the gender of the participant. Participant would only be referred to with the pronouns he or she if they have given permission to disclose their full name in this thesis.

1.5 Research Structure

This research was completed in four successive components which utilised methods of qualitative data collection and analysis. In order of completion, these components were the individual interviews, focus group, prototype design and implementation, and finally user studies.

Stage I (Part A): Individual Interviews

As the first part of the data collection process, individual interviews were done with 11 university students or recent graduates from the Australian National University (ANU) to gain a deeper understanding on loneliness and social isolation in the context of international university students.

Stage I (Part B): Focus Group

Following the individual interviews, focus group sessions were run with 10 university students or recent graduates from the ANU to verify and improve on the ideas extracted from the analysis of the individual interviews results.

Prototype Design and Implementation

A prototype was designed and implemented based on the analysis of the focus group results. The prototype was designed as a role-playing interface system that would simulate common scenarios in Australia to help international students familiarise themselves with the area around the ANU campus and Canberra, the local culture, and ways of communication among Australians. The prototype would also introduce international students to avenues in which they could interact and mingle with other people to increase the quality of their relationship and quantity of social contacts in real life.

Stage II: User Studies

Utilising the prototype that had been designed and implemented, user studies were run with 5 international students to evaluate whether international students would enjoy and benefit from the prototype, in particular to prevent loneliness and social isolation.

1.6 Thesis Outline

Section 1: Introduction

This section presents the context, motivation, and objective of this research. A summary of the research structure and thesis outline are also provided.

Section 2: Literature Review

This section discusses existing literature involving the main topics around loneliness and social isolation, including their effects on physical and mental well-being, existing suggestions to combat them, and relationship with online social networks (OSN).

Section 3: Overview of Research Methods

This section describes and explains the chosen research methods and how they would be utilised in this research.

Section 4: Stage I (Part A): Individual Interviews

This section describes and discusses the individual interview process in detail. This includes the motivation and objective of the individual interviews, a step-by-step procedure for the individual interviews, results from the individual interviews, and analysis of the individual interviews results. This section then discusses the gaps from the individual interviews' results and how this leads to the focus group sessions.

Section 5: Stage I (Part B): Focus Group

This section describes and discusses the focus group process in detail. This includes the motivation and objective of the focus group, a step-by-step procedure for the focus group, results from the focus group, and analysis of the focus group results. This section then discusses how the analysis of the focus group results led to the ideation of a prototype that would be designed and implemented.

Section 6: Prototype Design and Implementation

This section describes the process of designing and implementing the prototype, as well as a detailed description on the content and features of the prototype. All screenshots of the prototype were provided in this section, such that the reader could simulate the act of using the prototype just from the screenshots.

Section 7: Stage II: User Studies

This section describes and discusses the user studies process in detail. This includes the motivation and objective of the user studies, a step-by-step procedure for the user studies, results from the user studies, and analysis of the user studies' results.

Section 8: Review of Research Outcomes

This section provides a summary of the outcomes of the individual interviews, focus group, and user studies, including how analysis of the individual interviews results lead to the focus group and how analysis of the focus group results lead to ideas for a prototype that came to be utilised in the user studies.

Section 9: Conclusion and Future Work

This section summarises the key outcomes of this research and discusses possible future work in this area.

2. Literature Review

2.1 Effects of Loneliness and Social Isolation

Dr. Jeremy Nobel, founder of the UnLonely Project – whose aim is to raise awareness for the increasing rate of loneliness and its harmful effects and to reduce the stigma surrounding its discussion – stated that “[s]ocial connections, in a very real way, are keys to happiness and health” (Brody, 2018, p. 2). First and foremost, loneliness and social isolation are found to be key determinants of suicide (Brody, 2018). They could reduce an individual’s level of energy, productivity, and even their subjective quality of life self-appraisals (Brody, 2018; Lauder et al., 2006). Loneliness is also found to be associated with depression (Alpass & Neville, 2003), negative affectivity, social withdrawal, lack of trust in others, and a lower relationship satisfaction (Ernst & Cacioppo, 1999).

Loneliness and social isolation are not only harmful to our mental health, they could also be detrimental to our physical well-being. Their effects on the human body are comparable to smoking, high-blood pressure, obesity, and a lack of physical activity (House, Robbins, & Metzner, 1982). Loneliness, on its own, is also linked to a wide variety of health problems, such as heart disease (Heikkinen, Berg, Avlund, & Timo, 2002), and a significantly higher body mass index (BMI) when compared to non-lonely individuals despite no differences in their sedentary lifestyles (Lauder et al., 2006).

But how can psychological experiences like loneliness and isolation also lead to major biological effects like these? Research has shown that the connection between loneliness and poor well-being may perhaps have been due to a reduction in lonely individuals’ restorative power of sleep because they have poorer sleep efficiency (Cacioppo et al., 2002). In addition, loneliness and social isolation are also associated with impaired self-regulation (Lauder et al., 2006; Baumeister, DeWall, Ciarocco, & Twenge, 2005), which is defined as an individual’s ability to change and sustain their behaviour (Baumeister et al., 2005). This means that lonely individuals are less likely to make the requisite effort to change an existing bad habit and adopt a more desirable behaviour (Lauder et al., 2006). For example, lonely or socially isolated individuals who regularly consume junk food might have a lesser tendency to change their diet to a much healthier and more balanced one, which could eventually lead to health-related problems such as high-blood pressure. Given that social support has been attributed as a central contributor in health behaviour (Berkman & Glass, 2000), it is no surprise that they retain an impaired self-regulation as they lack the normative support to follow recommended lifestyle choices (Lauder et al., 2006).

2.2 Suggestions to Combat Loneliness and Social Isolation

2.2.1 General Suggestions

Loneliness and social isolation are caused by unsatisfying quality of social relationships and insufficient quantity of social contacts respectively (De Jong Gierveld, 1998; Lauder et al., 2006). Extending an individual’s network of social contacts to combat social isolation is relatively easy because there are now many platforms available to connect multiple individuals together. For example, a wide range of events are usually organised all year round in universities to connect multiple students together or at local establishments to connect individuals with different backgrounds together. However, raising the quality of social relationships is perhaps a trickier task as it can be difficult to determine what constitutes as a high-quality relationship for different individuals.

Baumeister and Leary (1995) argued that loneliness occurs when there is a lack of repeated interaction with the same individuals. It ensues when the individual does not interact frequently with their friends (Cutrona, 1982) and arises when the individual's social contacts fail to display supportive behaviours and helpfulness when the individual needed them most (Suh, Shin, Ahuja, & Kim, 2011). These claims suggest that in order to combat loneliness, or in other words to achieve a high-quality of social relationships, any individual should maintain frequent and repeated interaction with the same group of friends, whom the individual can rely on in times of need.

The first and most important step to this suggestion is perhaps to connect the individual with people they can maintain frequent and repeated interaction with. In the context of international university students, most students are usually busy with classes from morning to afternoon because they are required to study full-time under the international students visa condition (Australian Government Department of Home Affairs, 2018), making it difficult to sustain regular interaction or activities. Thus, a platform to facilitate and encourage regular meet-ups between multiple individuals might be needed to help achieve this first step.

Case study: Meetup.com

Meetup is an excellent example for an online platform that is designed to facilitate and encourage regular meet-ups between people of varying backgrounds, for a wide range of activities at local places. Users can choose to join an existing 'meet-up' or create a new one for others to join.

Explore by category

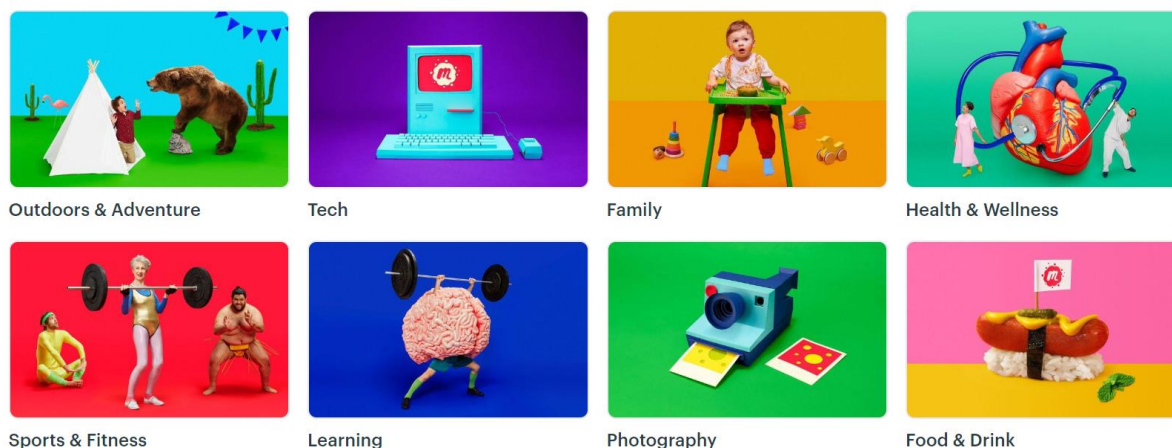


Figure 1. Some examples of the type of activities that are listed on Meetup's homepage.

Meetup has categorised its list of diverse activities into three groups, namely to 'Explore your city', 'Build your career', and 'Get creative' (Meetup, 2019). 'Explore your city' encourages its users to simply meet new people and visit local facilities or attractions, such as the museum or a new café in town. 'Build your career' consists of a range of activities that could help users expand their professional network, boost their career, or even start a new one. Lastly, 'Get creative' allows people to start a new hobby or develop an existing one while meeting like-minded individuals with the same interest. The diversity of activities provided on this platform shows that it is catered to everyone of all ages, background, and interest.

Another interesting feature that Meetup has is the ability for users to select from a selection of up to 15 languages. For international students with poor English comprehensive skills, this feature would still enable them to engage in the platform to form new relationships and maintain their interaction with others.

However, the effectiveness of Meetup has not been evaluated in any literature except online forums. A personal observation on the overall online ratings indicates great dissatisfaction among most of its users, who pointed out that while the whole concept is good, some users are taking advantage of the nature of the platform for their own benefits. Several users claimed that they have encountered and interacted with individuals who were only on the platform to promote their own business or even carry out criminal or illegal activities. Since anyone can create and host a meetup, the reliability of the platform is sometimes compromised. While its concept sounds appealing to many, stories of such incidents have caused people to be wary and deterred them from using the platform. Having a more controlled and monitored environment for the platform might prevent such behaviours and restore the platform to what it was intended to be.

2.2.2 Traditional Suggestions

Other suggestions to combat loneliness and social isolation usually involve more traditional methods. Brody (2018) reported that connections between people can be developed by going outside and taking part in creative and nurturing activities. Activities relating to creative arts, such as writing, music, visual arts, gardening, or textile arts, became something that is frequently suggested (Brody, 2018). Some suggestions also implied that activities that are organised regularly are even more impactful, such as synchronised swimming sessions or monthly potluck supper (Brody, 2018).

2.3 Online Social Networks and Loneliness

Online social networks (OSN) is defined as an interactive technological platform that allows users to interact by creating new or maintaining current relationships (Matook et al., 2015). A number of existing literatures have discussed the relationship between OSN and loneliness, with varied opinions whether the use of OSN exacerbates or mitigates loneliness among its users.

Positive affiliation

Matook et al. (2015) argued that the use of OSN can reduce and prevent loneliness due to its features that encourage users to interact with their social network contacts. They highlighted OSN's vital role in relationship creation, by creating new or restoring previously disregarded relationships, and in relationship maintenance, by developing current relationships and preventing those involved from drifting apart (Reis, Collins, & Berscheid, 2000). By having a platform to create and maintain their relationships, users can manage a desirable level of social interaction to reduce and prevent loneliness.

In the context of international university students, Matook et al. (2015, p. 301) also suggested that OSN can be used as a platform for universities to develop personal relationships with international students before arriving in the new environment, which could help prevent feelings of loneliness before "any development of social loneliness in an unfamiliar environment".

Negative affiliation

According to an interview with the Foundation for Art and Healing, Brody (2018) claims that internet and social media engagement aggravates the feeling of loneliness, depression, and anxiety because of the characteristics of a typical OSN post. A typical OSN post usually contains a form of entertainment or companionship (positive) and rarely discusses elements of grief and loneliness (negative). This means that people who lack the positive elements in their life tend to feel left out and would eventually experience negative emotions that they cannot freely talk about.

In addition, users of OSN who simply 'consume' information that others create and rarely produce their own (also referred to as passive users) tend to develop jealousy, emotional withdrawal, and loneliness (Krasnova, Wenninger, Widjaja, & Buxmann, 2013) because of their lack of interaction on the platform (Kraut et al., 1998). For example, people who use Facebook intensively are found to have a decrease in life satisfaction and well-being because they compare their lives with others based on the information they consume on the platform (Matook et al., 2015).

Discussions from these two opposing views indicate that the relationship between OSN and loneliness is dependent on how the user utilises the OSN. In the context of loneliness, it seemed that OSN features that simply involve the consumption of information regarding other people's positive social life are especially harmful and they increase the risk of developing feelings of loneliness. This should be a point to consider when developing a prototype whose objective is to prevent loneliness and social isolation among international students.

2.4 Summary of Literature Review

When looking at the literature for loneliness and social isolation, and interactive technology, I found that these two topics are usually discussed separately. While there has been an extensive amount of research on the causes and effects of loneliness and social isolation, and a growing interest in investigating how interactive technology could be beneficial in some contexts such as education, very few discuss them together. Some papers discussed the relationship between loneliness and online social networks (OSN), but these papers mainly discuss whether the use of OSN would cause loneliness among its users. There is a serious lack of literature discussing how the use of interactive technology could help combat loneliness and social isolation, and most suggestions stop at more traditional methods such as going outside or doing activities involved with the creative arts. In addition, there is a lack of literature discussing the themes surrounding loneliness and social isolation in the context of international students. This research project attempts to resolve some of these gaps.

3. Overview of Research Methods

This section describes the qualitative research methods used for this research, including data collection and data analysis. Chen's (2017) work inspired the approach of using an interview-focus group-prototype-user study sequence in this research and inviting the same participants across these stages.

3.1 A Grounded Theory Approach

Grounded Theory is a specific methodology developed by Glaser and Strauss (1967) that builds theory from data (Corbin & Strauss, 2008). This research takes a Grounded Theory approach to collect data and build theory that could help achieve the objectives of this research. The data collection process in this research involved the notion of theoretical sampling, which is "a method of data collection based on concepts derived from data" (Corbin & Strauss, 2008, p. 144). Corbin and Strauss (2008, p. 144) highlighted the key points of theoretical sampling and what about its characteristics made it different yet powerful compared to conventional sampling methods:

What makes theoretical sampling different from conventional methods of sampling is that it is responsive to the data rather than established before the research begins. This responsive approach makes sampling open and flexible. Concepts are derived from data during analysis and questions about those concepts drive the next round of data collection. The research process feeds on itself. It simply keeps moving forward, driven by its own power.

Theoretical sampling can help the researcher discover relevant concepts and their properties and dimensions, instead of verifying or testing hypotheses about concepts. In theoretical sampling, the researcher generally cannot expect what is about to be discovered and it is common for the researcher to be surprised by the outcomes of the research. This method is especially useful when investigating something previously unexplored because of theoretical sampling's benefit of allowing discovery. The researcher "takes one step at a time", performing data collection, then analysis, then repeating the same sequence until "reaching the level of data "saturation"", "when no new categories or relevant themes are emerging" (Corbin & Strauss, 2008, p. 148).

3.2 Scenarios, Role-playing, and Personas

For all stages of this research, scenarios were used to create the settings for the interviews and user studies as part of the data collection process. Preece, Rogers, and Sharp (2002, p. 223) defined a scenario as follow:

A scenario is an "informal narrative description" (Carroll, 2000). It describes human activities or tasks in a story that allows exploration and discussion of contexts, needs, and requirements. It does not explicitly describe the use of software or other technological support to achieve a task.

Scenarios are useful because it enables people to explain what they are doing or how to achieve something to others easily through the use of stories (Preece et al., 2002). This allows the researcher not only to understand current behaviour of the target group that the researcher is interested in, but also to explore the constraints, contexts, irritations, facilitators, and other characteristics of the target group (Preece et al., 2002). Bødker et al. (1993) also concluded that "scenarios are meant to provoke new ideas" (Bødker, 2000, p. 64).

In her paper, Bødker (2000) proposed three main purposes for designing and utilising scenarios in design: (a) to present and situate solutions; (b) to illustrate alternative solutions; and (c) to identify potential problems. These purposes were applicable in her research because clear distinctions on what sort of specific issues needed to be solved have been made and that the researcher has chosen to employ the use of scenarios to solve these specific issues. On the other hand, these three purposes are not very applicable in this research because scenarios were used at the requirements gathering stage where it was still unclear which specific issues have to be solved. In this case, scenarios were used to identify these specific issues.

In this research, the use of scenarios involved specifically asking participants to speak in a hypothetical way and asking them not to disclose sensitive personal issues during the requirements gathering stage to protect participants from the potential risks associated with discussing sensitive issues. Beside the multiple benefits of scenarios, scenarios were also used in this research because I have an ethical obligation not to push participants into disclosing their personal experience with loneliness and social isolation. In this research, scenarios were coupled with personas that the participants were asked to role-play.

Role-play can be defined “as a range of techniques which deliberately create an approximation of real life in controlled conditions” (Matthews, Gay, & Doherty, 2014, p. 643). Matthews, Gay, and Doherty (2014) explained the situations in which role-play can be employed in Human-Computer Interaction (HCI):

When looking at the literature on the use of role-play in HCI, we can see a distinction between the use of role-play as a general technique in HCI and an emerging body of work where role-play and similar techniques have been used due to limitations accessing end users or the target environment.

The second situation is applicable to this research due to the ethical obligations I have and because there were restrictions in gathering data just from lonely or socially isolated individuals. In this research, role-play was used as a technique to overcome the limitations of access to target end users.

3.3 Interviews

Kahn & Cannell (1957) defined interviews as a “conversation with a purpose”. Especially in the requirements gathering stage, interviews can be “invaluable for understanding user needs and concerns” (Lazar, Feng, & Hochheiser, 2010). In interviews, requirements are gathered by asking how the participants would complete the investigated task traditionally and without technology (Lazar et al., 2010). This would then be translated into ideas for an interactive technology tool that could help to achieve the same task (Lazar et al., 2010).

Preece et al. (2002, p. 390) explained that there are different kinds of interviews, and which one is the most suitable would depend on the goal of the interview:

There are four main types of interviews: open-ended or unstructured, structured, semi-structured, and group interviews (Fontana & Frey, 1994). The first three types are named according to how much control the interviewer imposes on the conversation by following a predetermined set of questions. The fourth involves a small group guided by an interviewer who facilitates discussion of a specified set of topics.

In open-ended or unstructured interviews, participants are asked open questions (Preece et al., 2002). An open question means the format and content of the participants' answers are not decided beforehand and that both the interviewer and the participant can freely guide the direction of the interview (Preece et al., 2002). This gives the benefit of providing rich data when the participants revealed something that the researcher may previously never thought of (Preece et al., 2002).

On the other hand, participants are asked closed questions in structured interviews (Preece et al., 2002). A closed question means participants are required to answer precisely (Preece et al., 2002). It is advisable that structured interviews are conducted when the objectives of the study are well-defined and when the researcher knows which specific issues need to be discussed (Preece et al., 2002). Structured interviews are standardised by asking all participants the same set of questions (Preece et al., 2002).

Semi-structured interviews combine the features of structured and unstructured interviews, by utilising both closed and open questions (Preece et al., 2002). In semi-structured interviews, all participants are also asked with the same pre-planned questions for consistency (Preece et al., 2002). However, for each question, participants would be encouraged to share as many relevant responses as they can, until no further useful information was observed (Preece et al., 2002).

Finally, as the name suggests, group interviews are interviews that are run with multiple participants together. Among the different forms of group interviews, focus group is one of the most popular type of group interviews. Focus group is normally done with three to 10 participants and is beneficial because this method could help uncover diverse or sensitive issues that were previously not mentioned. Furthermore, focus groups are "low-cost, provide quick results, and can easily be scaled to gather more data" (Preece et al., 2002, p. 397). However, for a focus group to work, the participants must be comfortable sharing their opinion and develop conversations with other participants in a supportive environment. In addition, the focus group facilitator needed to guide and encourage discussions among participants, especially those who tend to be more shy or quiet (Preece et al., 2002).

In this research, semi-structured interviews were used to gather data to understand how loneliness and social isolation function in the context of international university students (see section 4). Semi-structured interviews were chosen for the first round of data collection because it was still unclear what sort of themes are associated with international students' loneliness and isolation, yet a consistency is desired among participants. For the second round of data collection, group interviews using focus group were run to verify and improve on the prototype ideas extracted from the analysis of the individual interviews results (see section 5). Focus groups were chosen to stimulate discussions between participants and to uncover any issue that might be overlooked in the semi-structured interviews.

3.4 User Studies

In one of their three principles of design, Gould and Lewis mentioned that "early in the development process, intended users should actually use simulations and prototypes to carry out real work, and their performance and reactions should be observed, recorded, and analysed" (1985, p.300). In this research, the concept of a user study is adapted to evaluate the prototype, with participants who represent and understand the target user group who will be role-playing a newly arrived international student (the target user group) (see section 7).

3.5 Coding as a Qualitative Analysis Method

Qualitative analysis is “a process of examining and interpreting data in order to elicit meaning, gain understanding, and develop empirical knowledge” (Corbin & Strauss, 2008, p. 1).

To analyse results from the data collection process in a grounded theory approach, a qualitative data analysis method called ‘coding’ is commonly used, where the researcher takes raw data and raises it to a conceptual level (Corbin & Strauss, 2008). Corbin and Strauss (2008, p. 66) thoroughly explained the process and complexity involved in good coding practice and why coding is a valuable qualitative analysis technique:

Coding is more than just a paraphrasing. It is more than just noting concepts in the margins of the field notes or making a list of codes as in a computer program. It involves interacting with data (analysis) using techniques such as asking questions about the data, making comparisons between data, and so on, and in doing so, deriving concepts to stand for those data, then developing those concepts in terms of their properties and dimensions. A researcher can think of coding as “mining” the data, digging beneath the surface to discover the hidden treasures contained within data.

Corbin and Strauss (2008) also provided some advice which could be useful for data analysis. The advice discussed here were applied in this research. Firstly, researchers are encouraged to ask themselves exploratory questions about the data that could reveal hidden meaning in the context of participants’ words. Asking questions leads to the questioning of more questions, enabling the researcher to “probe deeper into the data”, which is necessary to “avoid shallow and uninterested findings” (Corbin & Strauss, 2008, p. 71). Secondly, researchers are encouraged to do comparative analysis with ‘constant comparisons’, where each finding in the data is compared with other findings in terms of similarities and differences. Constant comparison is vital for all analysis because it allows for categories or themes to be distinguished from one another and identified in terms of its properties and dimensions. Thirdly, researchers are allowed to use their own personal experience when analysing data, because “certain elements of [their] experience may be similar” to the target group (Corbin & Strauss, 2008, p. 80). A researcher’s personal experience can open up new ideas to think about or even challenge their beliefs about a specific data. Fourth, the researcher should take note of the participants’ emotion and feelings during their interviews because they can indicate how the participant feels about certain situations. Finally, researchers should constantly ask themselves “so what?” when discovering findings. So what does it mean? So what if this is important? Answering questions like this can help the researcher gain a better understanding of the data or even findings at hand.

In this research, coding was used to analyse results from the data collection process across all stages. It was used to analyse the individual interview results in section 4 to derive meaningful themes associated with international university students’ loneliness and social isolation. It was used to analyse the focus group results in section 5 to discover underlying needs that international students might have when finding themselves in a new environment, and finally, it was used to analyse the user studies results in section 7 to the uncover highlights of the prototype.

4. Stage I (Part A): Individual Interviews

This section will discuss aspects of the individual interviews in detail. It will discuss the motivation and objective of the individual interviews, the materials needed to run the individual interviews, how the individual interviews were carried out, results from the individual interviews, analysis of these results, and how this analysis was eventually utilised.

4.1 General Overview and Motivation

The idea to run individual interviews first emerged when there were still many themes that I did not understand about loneliness and social isolation due to the limitations of existing literature (section 2.4). Very few literature papers discussed the themes surrounding loneliness and social isolation in the context of international university students, and existing suggestions to combat loneliness and social isolation did not consider the use of interactive technology as a possible solution. Before exploring how interactive technology can be used to combat loneliness and social isolation, more has to be understood regarding this issue in the context of international university students. Therefore, the objective of the individual interviews is to first fill in the gaps in our knowledge on how loneliness and social isolation function in the context of international university students.

4.2 Participant Recruitment

University students or recent graduates from the Australian National University (ANU) were invited to participate in individual interviews. The interviews were approved by the Australian National University Human Research Ethics Committee (Protocol 2018/576). Participants were recruited from two backgrounds, namely domestic students and international students with non-English speaking background. Recruiting participants from these two backgrounds was done in order to gain a good range of responses from a diverse group of people. The international students' perspectives are beneficial because they would have experienced some of what the non-native speakers have and can provide good insights regarding the situation, including challenges and difficulties of living in a new social environment with language barrier. The domestic students' responses are valuable because they might be able to give a wide range of responses and perspective that the international students might previously never have thought of. Their responses combined would give a richer pool of ideas to draw from when designing the prototype. Participants were required to be in the 18 to 24 years old age group, following previous literature findings, which state that this age group exhibited the highest rate of loneliness (Brody, 2018). Recruiting participants from this age group could help us understand what it is that made people in this category to be more susceptible to loneliness and what could have been done to prevent this issue from arising.

The initial plan was to recruit a total number of 20 participants for the interview, including 10 participants from each background. Throughout the interview process, however, it was found that enough of the same pattern had been observed among participants' responses, reaching a level of data saturation. The interview process was therefore stopped after interviewing the 11th participant. The final participants pool consists of seven international students, one permanent resident, and three domestic students.

4.3 Materials and Procedure

4.3.1 Materials

Three hypothetical personas and scenarios (dubbed ‘scene’) were created for the individual interviews. Each scene is accompanied with a similar set of questions relating to loneliness and social or living situations. For example, in each scene, participants were asked how often they would like to communicate with their families, or how they would try to make friends in a new environment.

The full description of each scene and the full list of questions can be found in Appendix C, but a summary of each scene is provided here for a quick reference.

Each persona was not assigned to any gender to avoid any biased or skewed responses based on the participant’s assumptions or knowledge of existing stereotypes about particular genders. As such, the pronoun ‘they’ is used to refer to each persona.

- Scene 1: A first-year international student from Shanghai (the persona) had just recently arrived in Australia to study at the ANU. It would be their first time living abroad and in Australia, without the company of any parent or relative. The student has decided to live in a single studio in UniLodge, a student accommodation which is located on campus. Each room in UniLodge has its own kitchen and bathroom, and thus this accommodation attracts students who value more privacy at home. The student has a full-time study requirement, wealthy background, and decent command of the English language, although the student experienced difficulties with understanding Australian accent and slang words.
- Scene 2: A first-year domestic student (the persona) had just recently arrived from a small town in rural New South Wales to study at the ANU, which is located in Canberra. The student has no relatives here and do not know anyone living in this city. The student has chosen to live in Burton & Garran hall (B&G), which is famous for its huge shared kitchen space and highly sociable environment. Each floor in B&G is equipped with shared bathrooms.
- Scene 3: A first-year domestic student who was born and raised in Canberra (the persona) had started studying at the ANU. The student’s parents were originally from Thailand but have now become Australian citizens. The student still lives with their parents and three younger siblings and is thus required to help around the house. The student’s parents are strict and sometimes have difficulties with the English language and understanding local accents and slangs.

4.3.2 Procedure

The individual interviews took place in a comfortable and well-lit room in the ANU that is equipped with tables and chairs. Participants were informed before the start of the individual interview that the purpose of the individual interview is to understand how different groups of people view loneliness and isolation in order to gain a rich pool of ideas to draw from to design an early-stage prototype that could help combat these issues. Participants were notified that the individual interview would make use of hypothetical personas and scenarios and were asked to answer the interview questions with hypothetical responses on how they think each persona might act or feel in such situations. Participants were also reassured that they will not be asked direct personal questions about their own situation. This was done to protect the participants by preventing them from engaging themselves in personal

discussions about their own experience with loneliness and social isolation, which might trigger certain undesirable memories or cause unpleasant repercussions to the participants.

Participants were finally informed that there will be a focus group as a follow-up to the interview, which would have happened once all interview data has been analysed, which they were invited to. Along with other important information especially regarding their rights, these were informed through the Participant Information Sheet (Appendix A).

Individual interviews were audio-recorded only if the participants consent to it. Otherwise, hand-written notes were taken by the researcher, following the participants' words and phrasing as closely as possible. Once the participant has given their consent to participate in the individual interview, the interview began.

1. Participant was narrated with one of the scenes. They were told to role-play the persona and were reminded to give their responses based on the perspective of the current persona they were role-playing.
2. Participant was asked to answer the set of questions one-by-one. If their answer was too short or vague, they were asked to elaborate their answer.
3. Once all questions have been asked, step 1 and 2 were repeated, but with a different scene until all three scenes have been done.

Originally, the sequence in which the scenes were given out to participants was intended to be consistently kept at 1-2-3. This means that participants would be given scene 1 first, followed by scene 2, and lastly scene 3. However, the third participant pointed out halfway during the individual interview that the participant's exposure to scene 1 subsequently affected the participant's answers on the next two scenes. The participant then suggested that I rotate the sequence of the scenes to have a more reliable result. Following this participant's suggestion, the sequence was rotated after every five participants. Participants 1 to 5 were given the 1-2-3 sequence, while participants 6 to 10 were given the 1-3-2 sequence. However, as interview process was unexpectedly ended on participant 11, only participant 11 had the 2-3-1 sequence. This disproportion could have made the total responses slightly unbalanced and is something that needs to be planned ahead more properly next time, but nevertheless, participant 11's responses were considered in the analysis of the individual interview results.

4.4 Results

The interview results were analysed using the process of coding, following the advices discussed in section 3.5. Through this process, a few common themes were observed.

4.4.1 Difficulties Dealing with Loneliness and Social Isolation

In the individual interviews, participants were asked hypothetical questions about loneliness and social isolation. One of them involved asking participants how they think the personas would cope with loneliness and social isolation in their respective situations, which gathered a variety of responses from participants. While some participants were able to suggest "organising something regularly with other people" as a general way to cope with loneliness and social isolation, some participants struggled to provide even just one response to this question.

Honestly, I don't know... I don't know how you'd cope with loneliness.

In Scene 3 where participants were asked to role-play a domestic student from Canberra who is still living with their parents, some participants responded that they would "approach [their] parents or friends to cope with loneliness". However, in the case of international students, most of the times the parents are not with the students and not all international students have a friend to confide to, especially during the students' first few weeks upon arriving in the country. This indicates that international students might experience raised difficulties in coping with loneliness and social isolation, as they do not always have their parents or friends nearby to confide their issues to.

In this same scene, participants were also informed that their persona had three younger siblings who still needed to be taken care of. Some participants responded that having the responsibility to take care of younger siblings would make it harder for them to socialise, as there is not enough time. Participants indicated that this situation would also make it harder for them to cope with loneliness:

I don't know who to talk to if I have no friends and my siblings are too young.

I can't talk about life (my own issues) if my siblings are too young.

From my personal observations, I observed that this situation pertains not just to local domestic students, but to some international students as well. Some international students came to Australia with a younger sibling who is generally still in school and needed to be taken care of, mostly with cleaning the house or preparing daily meals. This suggests that some international students experienced an increased difficulty in coping with loneliness and social isolation, due to a decreased social time with other individuals their age whom they can rely on for emotional support as they care for their younger siblings.

Overall, participants' responses indicate that some international students could have difficulties dealing with loneliness and social isolation, which might stem from different kinds of reasons.

4.4.2 Attachment to Online Social Network

Because findings from the literature review indicated that some elements of an Online Social Network (OSN) could be harmful and lead to feelings of loneliness, participants were asked whether they would prefer having a platform that provides useful information about living in Australia instead of an OSN. While two participants responded that "a platform to tell you about useful information might be good for first years since they would not know anything about Canberra yet", the majority of participants very clearly expressed their disapproval for such a platform to be made:

I want to see what my friends are up to, especially those who I haven't seen for a while. I want a social media for this. I might try this platform, but I will stick to the previous social media platform I've already used.

The proposed platform is useless. I can't make jokes.

Having useful information is good, but don't make it into a sole platform. Facebook groups like 'Stalkerspace' (ANU's Facebook group where students can interact and share information with other students) is good.

I want a social platform, not a wiki.

One participant suggested, “it is better to have options on what to limit, rather than removing some features of social media entirely”. For most participants, it seemed like social features in an OSN are important for them to keep in touch with others. Therefore, the idea to create a new social media platform that contains just useful information is discarded.

4.4.3 Difficulties Adapting to the Local Culture

From the individual interview results, all participants except one responded that they knew the rules and regulations of a country could be different in different countries. Participants claimed that they would usually find out “through movies, television shows, news articles, and social media”, “through observation of other people or friends”, “from experience and lessons”, or by simply “getting told off” by strangers who found their behaviour unacceptable in the local culture. The problem with this approach is that the information is not always available or reliable, and therefore might hinder international students’ effort to adapt to the local culture. Especially with the approach of “getting told off”, this might discourage international students from interacting with the local residents in fear of being judged or treated badly. The only participant who responded that they do not know the rules and regulations of a country could be different shared:

I didn’t know about this (rules and regulations of a country being different in different countries). I got told off and I felt quite misunderstood.

Difficulties adapting to the local culture could lead to a misunderstanding or even conflict between international students and local residents, which in turn might limit the international students’ opportunity for social interactions. As lack of social interaction could lead to loneliness and social isolation (De Jong Gierveld, 1998; Lauder et al., 2006), it is important to help international students adapt to the local culture if we want to combat this issue.

Participants were then asked to provide some feedback on what they think could help the international student personas adapt to the local culture. The majority of participants seemed to suggest that being accepted and tolerated by the local residents play a huge part in adapting to the local culture, and that having a friend or mentor to share their difficulties with or to learn something from might put them more at ease.

Being able to share difficulties with others going through the same thing could help me adapt. I don’t want to be told off as well.

If I can take my time and won’t feel discriminated, [it can help me adapt better] ... Having kind support from others and friendly reminders [instead of being told off].

What would help [me] adapt to the cultural changes is more social time with those who are familiar with it ... Having a friend who is already familiar [with the local culture] who can tell me when I’m doing something wrong.

A mentor or tutor to inform me some potential rules would help.

In light of this finding, perhaps it is important to raise an awareness among Australians that people in Australia come from a diverse range of cultures whose rules and regulations might be different, and as such might have difficulties immediately fitting in with the rest of the local residents. Australians should

be more accepting and tolerating especially of newly-arrived international students, while the international students should strive to learn and respect the rules and regulation of Australia.

Finally, a few participants suggested having an “‘all-you-need-to-know’ international students’ guidebook” as a guide to help them adapt to the local culture. The guidebook would be designed to provide useful information to international students such as the rules and regulations to follow in Australia or important services to know about. While support and tolerance from other students are crucial to helping international students adapt to the local culture, perhaps there is a need for something more concrete as a first reference point for international students to learn from.

4.4.4 Preference to Mingle Through Similar Courses or Interests

Regardless of the scene (being an international student, rural domestic student, or local domestic student), all participants responded that the best way to meet new people and make new friends is through clubs and societies, where people with the same interests interact with each other during regular meet-ups or events. For some participants, the only drawback was that “some events run until late night” and thus making it difficult for them to attend.

The best way to meet new people is through clubs and societies. Weekly activities with social clubs are a good way to keep regular contact.

I assume that people who go to the same events [as I do] like the same interests.

Results from the individual interviews also indicate that regardless of the scene, many participants responded that they would try to meet new people from their university classes, especially if they look friendly. Participants claimed that there are many benefits to making friends from their classes:

I would rely on friends in the same course for study problems. [Having friends] in class [could] help each other study.

I picked courses [that are] related to my interest. [People doing the] same degree would most likely have the same interests [as I do] (and therefore be acquainted with people who have the same interest).

Study groups can enforce regular meet-ups and keep us in contact.

Based on the majority of the responses, most participants indicated that as an international student (role-playing scene 1), their highest priority would be studying. One participant even commented that they “won’t exercise [so they have enough time to] focus on performing well in school”. For international students, this shows that it is important for them to be acquainted with other students in their courses to receive both moral (having friends with similar interests to spend time with) and educational support (having friends who can help them when they face difficulties with their learning). Therefore, perhaps it would be worthwhile to consider having a feature that would group students together by similar courses or interests.

4.4.5 Eating and Exercising Habits

In the individual interviews, all three personas were inexperienced with cooking. Some of the hypothetical questions that follow involved asking participants about their opinion on cooking and eating habits.

Most participants, in all three scenes, agreed that they would like to be healthy, “especially if they have a family history of illnesses”. However, participants also responded that they are less likely to put effort into having healthy meals and eat more quickly if they were to eat alone.

If I eat alone, there’s nobody to judge or remind me to eat a balanced diet.

Since I can’t cook, I would buy ready-made meals. Eating out is expensive, sometimes I would just eat cereal or instant noodle. In addition, eating out alone feels lonely too.

Many participants also indicated that they like having company for meals and they would like to have a cooking group with other students who are learning how to cook as well. In a cooking group, students are able to split their cooking and cleaning duties, which could save time. In addition, it allows for the opportunity for students to interact with one another.

I want company for my meals because I’m used to eating with my family back home.

It is more fun to eat with others than to be isolated.

I can socialise through group meals or social or floor events where we are invited to cook.

Communal kitchen is a good place to make friends. But eating alone in a communal kitchen feels weird and I would feel left out.

One participant also reported that having “food from [their] home country might help with loneliness”. If any member of the cooking group is able to cook such dishes, international students’ loneliness could be alleviated.

Besides keeping a balanced diet to stay healthy, some participants also indicated that they would like to exercise because “having a better appearance equals to higher acceptance”, especially for men because there is “more societal expectation for men to be fit”. Not wanting to be “fat” is also a motivation for some participants to exercise, which seemed to be their idea of a better appearance. However, there are a few things that may restrict participants from being able to exercise freely:

Sometimes, there is no time to take care of my body because of stress from university work. I won’t exercise to focus performing well in school.

I don’t exercise because I have no friends or the motivation to. I’ve also heard about bad stories at the gym. I’m daunted by the number of people.

I’m shy of [joining] a sports club or going to the gym. I’m scared of the aggressiveness [among members of a sports club or people at the gym], especially because in Australian sports and culture they would scream.

I wouldn’t mind joining sports-based clubs and societies, but only if I am interested and the fees are affordable.

The participants’ responses (especially the second remark) implied that loneliness and social isolation could have a negative impact on international students’ health by preventing them from exercising. Participants indicated that without these issues, they would be interested in exercising through team-based sport because “it is good for social contact” or by going to the gym.

I prefer exercising in groups. It is more fun and gives me more motivation, especially when it is competitive.

Social sports make it less of a chore.

I want to be in good shape. I think [going to the] gym can help me achieve this while gaining friends.

When asked what else could motivate them to exercise, one participant commented that an “understanding of Australian sports can get [them] interested in joining it”.

Altogether, it seemed like loneliness and social isolation could have a negative impact on health by preventing individuals from developing a healthy eating habit or exercising regularly. However, the participants’ responses also showed that encouraging individuals to develop healthy eating habits and exercising regularly could help to combat loneliness and isolation by introducing individuals to other people, for example by forming a cooking group or exercising in groups as discussed. Thus, it might be a good idea to have a platform that could bring students together for cooking or exercising groups.

4.4.6 Difficulty Interacting or Mingling with Australians

The individual interview results indicate that sometimes it is hard for international students and domestic students to interact with each other due to some misunderstandings or existing routines.

I would want to mingle with Australians, but I might not be so comfortable ... Speaking with an accent is embarrassing ... I can’t express my feelings well in a foreign language.

I think there exists misconception among domestic students that international students do not want to mingle with Australians, but that’s not true.

For international students, their own doubt over their language ability played a part in preventing them from interacting and mingling with the Australians. From my own personal experience, it can be hard to understand what the domestic students are saying because it is difficult to pick up their accent. A few participants responded that “spending enough time to get used to the accent” could help them improve their language ability and increase their confidence in approaching the domestic students to interact with.

Some responses from scene 2 (role-playing rural domestic students) indicate that international students are not the only group facing difficulties mingling with the local domestic students. Domestic students who are used to living in a rural and small community reported that the city can feel “overwhelming” and hence they are not too confident networking with other people. Considering this point of view, international students who come from a rural community would face even greater difficulties mingling with the local domestic students.

From the local domestic students’ point of view, the responses indicate that sometimes it might be hard for them to meet international students due to an existing routine they might have. One participant gave an example of how this could happen:

If I’m already going to a sports club in my neighbourhood, it is unlikely for me to change to another sports club. My sports club might be filled with just local residents and this would make it hard to meet international students [in a sports context].

With limited interaction, international students can experience loneliness and social isolation. To curb this issue, some participants suggested having a small program that brings international students and domestic students together in a mentee-mentor relationship.

To improve interaction with Australians, [having] a small group that's willing to interact and teach about [Australian] cultures would be useful. However, the teachers should also be Australians. It won't make much of a difference if [the teacher] is an international student as well.

To improve interaction with Australians, [having] a more intimate conversation and environment [to mingle in] can also be beneficial, rather than being in a large group.

The participants' responses indicate that a buddy program with Australians might be useful to bring international students and domestic students together, which could increase the international students' opportunity to interact with other people to prevent loneliness and social isolation. As per the participants' suggestion, such buddy programs have to be done in small groups to ensure the quality of interaction.

4.5 Summary and Gaps in Individual Interview Results Analysis

Based on analysis of the individual interviews results, it seemed that international students might have difficulties dealing with loneliness and social isolation due to different reasons. This further emphasised the motivation for this research. Participants' responses also indicated that there is some sort of attachment to the social features of OSN and therefore it might not be a good idea to simply create an OSN without the social features that are thought to be harmful, in terms of inducing feelings of loneliness or social isolation.

Based on the analysis, four ideas that might be able to help prevent loneliness and social isolation among international students emerged:

1. Interactive international student guidebook
2. A platform to connect university students together by similar courses or interests
3. A platform to get students to form cooking or exercising group
4. Buddy program for international students with local Australians

However, these ideas have yet to be verified and hence a follow-up interview in the form of a focus group was arranged to see whether international students could truly benefit from these ideas in order to combat loneliness and social isolation. A list of questions was created for the focus group based on the four main findings from the analysis of the individual interviews results.

5. Stage I (Part B): Focus Group

This section will discuss aspects of the focus group in detail. It will discuss the motivation and objective of the focus group, the materials needed to run the focus group, how the focus group was carried out, results from the focus group, analysis of these results, and how this analysis was eventually utilised.

5.1 General Overview and Motivation

Results and analysis from the individual interviews have led to the ideation of a few prototype feature ideas. However, these ideas mainly came from the researcher's individual brainstorming session based on common themes gathered from the individual interviews, that were not verified yet. A follow-up of the individual interviews was hence needed to verify whether these prototype features would be something that international university students really want and need. Therefore, a focus group was designed to verify and improve on the prototype ideas extracted from the analysis of the individual interviews results.

5.2 Participant Recruitment

University students or recent graduate from the ANU who participated in the individual interviews (ex-participants) were invited again to participate in the focus groups. The focus group was approved under the same Protocol (Protocol 2018/576) by the Australian National University Human Research Ethics Committee. Additionally, the choice of participants' background and age group were also kept consistent with that of the individual interviews for the same reasons stated in section 4.2.

While the plan was to run the focus group with 10 participants, only eight ex-participants were available and agreed to participate in the focus group. Therefore, two more university students were recruited for the focus group. The final set of 10 participants consist of three international students, one permanent resident, and six domestic students.

5.3 Materials and Procedure

5.3.1 Materials

A list of 10 questions relating to the prototype ideas extracted from the individual interviews analysis was prepared for the focus group. These questions can be found in Appendix D.

5.3.2 Procedure

Instead of executing one single focus group with all 10 participants, participants were split into three different groups and each session was conducted separately.

1. Session one consists of three participants, including one international student, one permanent resident, and one domestic student. The domestic student did not participate in the individual interviews.
2. Session two consists of three participants, including one international student and two domestic students. All participants have participated in the individual interviews.

3. Session three consists of four participants, including one international student and three domestic students. Out of the three domestic students, one did not participate in the individual interviews.

In each focus group session, each participant was given a set of papers that contains all of the focus group questions and some empty space to write their answers in. Additionally, each participant was given a randomly-assigned number tag as a way to identify themselves in front of other participants. Participants were asked not to introduce themselves and were requested to refer to other participants only by their associated number, even if they knew each other before the focus group. For example, they would refer to the participant with the number tag '4' as “number four” when asking questions during the focus group. This was done to protect the identity of participants from other participants and was first introduced to meet the ethics committee’s request that the participants be kept anonymous.

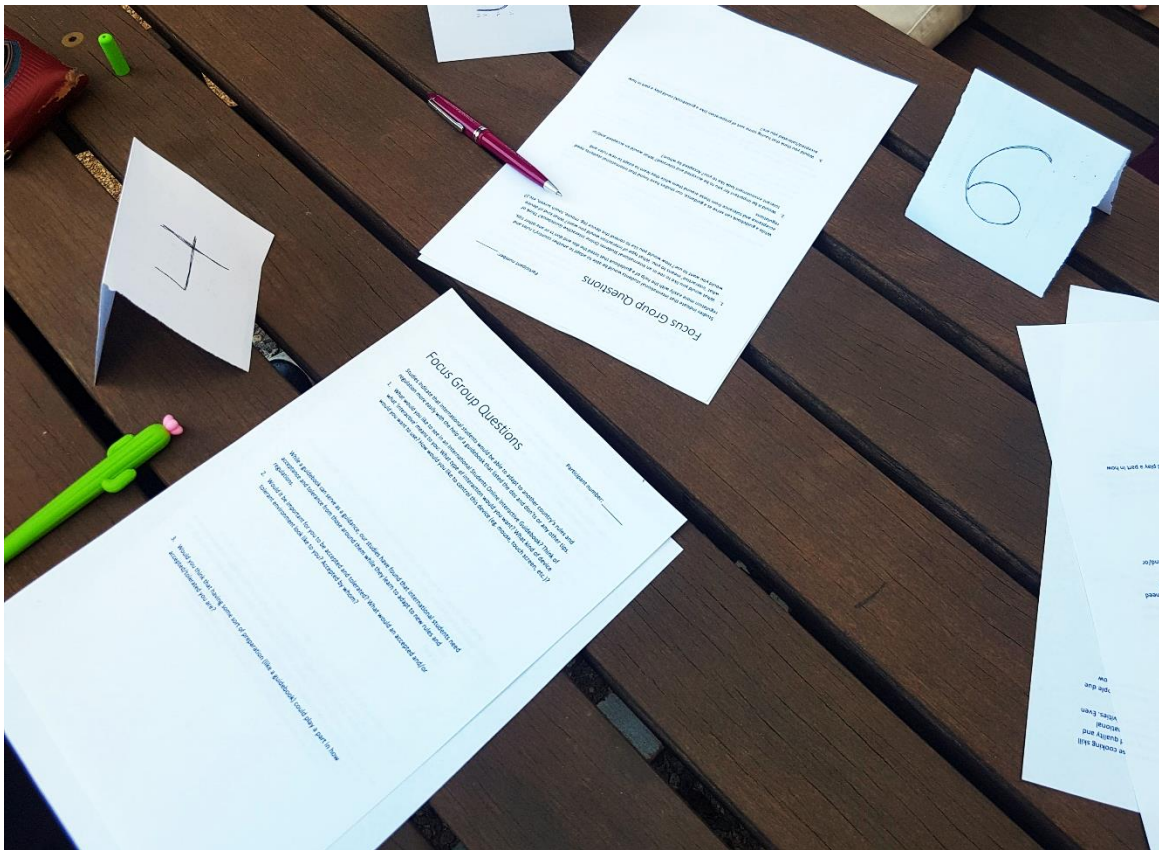


Figure 2. Focus group session two with participant 4, 5, and 6.

All focus group sessions were not audio-recorded. Only hand-written notes were taken by the researcher, where the participants’ choice of words and phrasing were followed as closely as possible. Once all participants in each focus group session has given their consent to participate in the focus group, the focus group session began.

1. Participants were verbally presented with one brief hypothetical persona and scenario, in which they were asked to portray the role of an international student who had just recently arrived in Australia to study at the ANU. Any other details were up to the participant’s interpretation of being a newly-arrived international student.

2. The researcher verbally narrated the first question and asked all participants to write their own answers on the piece of paper first without discussing it with other participants. Participants were given two minutes to write down their answers. If any participant did not finish in time, the group wait a little longer.
3. Once all participants have finished writing down their own answers, the researcher asked each participant to present their answer and explain their thought process to the group, one-by-one. The first participant to present is always rotated, which means the participant who presented first in question 1 would present last in question 2, while the participant who presented second in question 1 would present first in question 2. This rotation was done to ensure balance in the group dynamics.
4. Once all participants have presented their answers, the researcher allowed some time for a group discussion among the participants about each other's answers.
5. Repeat steps 2 to 4 for all subsequent questions until all questions have been exhausted.

The idea to let participants write their own answers first on a piece of paper before presenting and discussing it as a group was inspired by my own experience participating in a focus group for international students. This was done so that each participant will be able to contribute their own answers and thoughts, without being overpowered by the more extroverted participants. Even if the participants were shy or refuse to say much during group discussion, the researcher would still have a written copy of the participants' answers and thought processes that could be used in the analysis of the focus group.

5.4 Results

Focus group results were analysed using the process of coding, following the advices discussed in section 3.5. Through this process, a few common themes were observed.

5.4.1 Interactive Guidebook

Participants were introduced to the idea of having an interactive guidebook for international students that listed the rules and regulations to follow in Australia that could help them adapt to the Australian culture. They were then asked what kind of information they would like to see in the guidebook and how they would like to interact with the device that contains this interactive guidebook. Many participants quickly gave a variety of suggestions for the content of the guidebook, including "social and living advice", information about "transport, food, and the internet", "map", "translator", and even "a live chat".

While using their hand gesture to simulate the act of taking out a smartphone out of their pocket and using it, one participant in session two of the focus group shared:

I think it would be nice to implement the interactive guidebook on a smartphone. That way it's convenient because I can look through it wherever and whenever I want. It will be more interesting to see how such guidebook can be implemented in VR (virtual reality), but I think it won't be very inclusive because not everyone has [a] VR [device].

After this participant's remark, other participants in this focus group session nodded in approval. In other focus group sessions, it seemed like smartphone was the most popular device being chosen for such an interactive guidebook due to its convenience.

However, some participants pointed out some limitations of a guidebook and why they thought it would not be a very effective solution:

A guidebook would be useful if it is available, but I don't know if it would really help.

Even if I have a guidebook that contains useful information, I'm not sure I would actually read it.

A guidebook could make a difference, but the results would vary. It depends on the users, whether they are willing to make a change.

I don't think most people would know which information is important before they become necessary.

I would rather learn by socialising, but I won't mind an app compared to a book.

Guidebook is limited, active experience is better ... such as going to events. [Adapting to the cultures of a country] is more about immersion and [we] need the context to practice it on. You can't get this just from a guidebook. The best preparation is by going to organised events to [observe] and practice.

To combat these limitations, a few participants responded that they would like something more than just a conventional guidebook to "keep [their] interest going for a while". For this purpose, these participants suggested some ways in which they would like to interact with the guidebook.

I want some sort of user input or action-based interaction.

I want to be able to ask questions and listen to interactive noise and sound.

Instead of a normal guidebook, it would be nice to have common scenarios or question where you can click through [to learn about] the standard convention of doing things.

Instead of just having static information about Australian rules and regulations to read through, some participants also added that they would like to learn more on "how to better communicate" and get some "advice on how to deal with unfamiliar social situations and take the initiative to meet new people". Overall, the participants' responses indicate that the interactive guidebook idea could work, but only if it was made to be more interesting. To make the interactive guidebook more interesting, participants' suggestions would be taken into account, which means the user input, questions, interactive noise and sound, and common scenarios ideas would be considered.

5.4.2 Meeting New People Through a Platform

Based on the analysis of the individual interviews, most international students indicated that they would like to meet other people in the same courses as them or people with similar interests. This led to the ideation of having a mobile application feature that connects students by their university courses or interest. When asked for their opinion on this mobile application idea, there was a variety of responses from the participants:

It's good for people who prefer texting instead of face-to-face interaction.

It's a good idea but it would be hard to implement in a way that will promote healthy connections without too much invasion of privacy. It would need moderation for bullying as well.

An app is not the place to meet people. You need a platform and your own time to see each other in real life.

An app is okay, but not optimal. You need to learn how to interact without relying on apps.

Having similar interest and course doesn't guarantee being friends.

It's good as long as it's not too intimidating to connect [with other students], but I would be concerned about my privacy. I'm scared of trolls as well. (A 'troll' can be defined as someone who "posts a deliberately provocative message to a newsgroup or message board with the intention of causing maximum disruption and argument" (Troll [Def. 2], 2002))

This app might seem harmless until some people pointed out about some possible concerns.

Based on the participants' mixed responses, it still seemed unclear whether having a platform that connects students based on similar courses or interests could help prevent loneliness and social isolation for international students. In addition, there seemed to be a few concerns from the participants, especially those involving privacy and abusive behaviour on the platform.

The same conclusion could be made for the idea of connecting students together to form cooking or exercising groups because of how similar these ideas are. Therefore, at this stage, it is still too soon for these ideas to be further explored or implemented.

5.4.3 Buddy Program

Participants were informed that international students might be able to adapt to a country's rules and regulations more easily if they have someone, who is already familiar with the rules and regulations, to guide them. People who fit into this category are usually citizens of the country, and therefore participants were introduced to the idea of having an Australian buddy for weekly organised interaction during their first few months as an international student. Participants were then asked for their opinion on this idea.

It could be nice having a buddy with similar interest doing weekly activities. It would be useful cause they are more accustomed.

I don't know how to encourage the locals to join [such a buddy program].

I could gain experience from someone familiar to the country, but I'd wonder if the locals can relate to my issues.

It could help, but I'd be more comfortable having a buddy [that was originally] from my hometown that has stayed in Canberra.

It's easier and more comfortable if it's someone from my own culture, or at least closer to my culture.

I don't like [this idea]. I prefer to meet the locals by myself.

It can lead to more social interaction, but I must be able to relate [myself] to [the buddies].

Although it seemed like this idea could be useful, most participants were not too interested in it. There was also concern among the participants how they would encourage the locals to join this buddy program. While this idea could be further explored in the future, at this stage it did not seem like something international students could benefit from and therefore would not be implemented yet.

5.4.4 Patience and Acceptance

Besides the discussions surrounding the four prototype ideas from section 4, there were some other common themes that emerged from the focus group sessions.

One of the most common themes observed from the participants' discussion revolved around the idea of patience and acceptance. Participants indicated that they would highly appreciate "patience [from the domestic students] with communication and interaction". They would like for the domestic students to have "patience with [the international students' ability in] English" and to "teach [them] Australian etiquette".

Participants also mentioned that they would like to be around domestic students who are "willing to explain [acceptable] social behaviour patiently". Participants claimed they would not want to be "left out" or "treated as an alien or foreigner completely" and hoped that they would "be pardoned and explained to about what [they] did wrong, so [they] can learn". Overall, participants hoped to feel comfortable in a new environment, not be fearful, and not be afraid to ask questions. This should be heavily considered when designing and implementing the mobile prototype.

5.4.5 Crucial First Few Weeks

During the focus group, participants were informed that the first two weeks in university are crucial for new students to get into a good routine for their new life in university. Participants were first asked what could help them achieve a good routine during these two crucial weeks.

It would help when someone else is involved ... peers, groups of peers, mentors ...

It would be nice to have some resources and example on how to plan [my new life in university]

Market day could help, perhaps make timetable or have workshops. Orientation activities and attending social events would be nice.

We need some ways to get familiar with the place and a checklist on what goals to have and tips how to achieve them.

In the ANU and many other universities, the orientation week (O-week) is organised one week before any teaching activity commenced at the university. During O-week, students are given the opportunity to settle in, relax, and get to know more about the university and other students through a wide range of organised events throughout the week. Participants were asked what they think the role of O-week is.

It gives me insight into what the university and the local culture is like.

It lets me find activities to engage and communicate with others and develop courage [to live an independent live at the university] and find people with similar interest.

It allows me to have some familiarity with the area and culture without stressing about university classes.

It gives me the chance to meet people with similar interest and get used to things here since I'm new to the country and away from home.

The O-week lets me get into a daily routine so there isn't too much shock [about university and international students' life] at once.

I can find communities to be comfortable in, be comfortable with the place I live in, and get to know the university services.

Market day is a one-day event that happens every semester during orientation day. It is an event where clubs and societies set up stalls around a designated area in the ANU to promote their own activities to other students. Participants were asked to share their opinion on market day.

There's a lot of fun promotional products and free stuff. But sometimes it could be quite overwhelming as there are many unfamiliar things.

I'm surprised with the large variety. The previous year students seemed to have made the event good.

There's lots of reading and talking in English.

I'm a little intimidated as most people have friends. It's best to go in groups... introverts may be scared [to approach the stalls]

From the participants' responses, it seemed like newly-arrived international students found market day to be interesting, but feel intimidated by the sheer amount of interaction expected during the event and overwhelmed by the number of unfamiliar things around them. Participants responded they feel even more overwhelmed when they are expected to talk and read in English, when their English ability might not be fully developed yet as they had just arrived in Australia. Thus, even if a platform was made that would allow international students to meet and interact with new people over similar interest, these international students still would have difficulty interacting with new people if they are feel intimidated or overwhelmed with the things they are unfamiliar with. While the market day could be a great avenue for international students to meet and interact with new people, there is a higher need to start familiarising themselves with their surrounding first.

5.5 Summary of Focus Group Findings and Prototype Ideation

Analysis of the focus group results indicated a few things:

1. An interactive guidebook could work but only if it was made more interesting
2. The idea to have a platform that connects students together based on similar courses or interest and the idea to connect students to form cooking or exercising groups together could be useful, but with existing concerns and limitation it should not be implemented yet.
3. A buddy program might sound useful and effective from the outside, but it seemed like it might not be an interesting enough idea for international students.

4. Patience and acceptance from others are incredibly important for international students to adapt to a new environment.
5. Participants should be given enough opportunity to familiarise themselves in the environment especially during the first few crucial weeks upon arriving in university.

A closer observation at the focus group results also revealed an underlying theme that might be responsible for international students' difficulty in developing social interactions in a new environment. In many of the participants' responses across these five observed common themes, participants indicated that it is important for them to be familiar with the new environment. In particular, participants indicated that they needed to familiarise themselves with the area in their new environment and the local culture, and to learn how most people socialise and interact with each other in this local culture, in other words, to develop cultural competence in the new environment. This seemed to be especially critical during the first few weeks upon the international student's arrival, as this would be the period when most students could interact and mingle with each other through university-organised events, especially during orientation week. In addition, students would not have to be burdened by other commitments such as university work, and hence could have more time to solely focus on adapting to the new environment. This focus group has shown that to combat loneliness and social isolation, the more important issue to deal with is actually to develop cultural competence during the first few critical weeks upon the international students' arrival.

This conclusion, combined with the list of viable ideas, has developed into the ideation of a prototype that could help combat loneliness and social isolation among international students, by helping them familiarise themselves with the new environment. Based on participants' ideas and following the hypothetical approach of the ethics approval, this prototype would be designed as a role-playing interface system that would simulate common scenarios in Australia, that would act as a more interesting and interactive guidebook. These hypothetical yet common scenarios would be designed to build international students' familiarity with the area of their new environment, the local culture, and local residents' ways of communication. However, following the participants' suggestions, this prototype would not be a platform where international students interact with each other, but would be a platform that encourages international students to approach real people and real events in the real world to interact comfortably. The idea was to let the international students develop familiarity and slowly try to expand out of their comfort zone.

In summary, the prototype that would be developed is a role-playing interface system simulating common scenarios in Australia, to build familiarity with area, culture, and ways of communication before introducing users to the avenues in which they could interact with other people in real life. This prototype would be designed and implemented on a smartphone, following participants' remarks about convenience and inclusivity.

6. Prototype Design and Implementation

6.1 Prototyping Tool Utilised: Proto.io

Based on the conclusion formed from the analysis of the focus group results, a prototype was designed and implemented using Proto.io, which is a rapid prototyping tool that can be used for smart phones, tablets, web desktops, or even smart watches. Among other prototyping tools, Proto.io was chosen because of its extensive library containing standard and customisable user interface (UI) elements (Mat, 2015). Among other prototyping tools, it is also one of the few tools that enables creators to implement multiple pages within a single project (Mat, 2015), which is necessary for the creation of this prototype.

The process of using proto.io is to use a website on a desktop to create prototypes. Those prototypes are then exported to a smartphone for use in user studies.

6.2 Summary of Prototype Features

The prototype would be a role-playing interface system that simulates common scenarios in Australia to build international students' familiarity with the area of their new environment (in particular, the ANU and Canberra), local Australian culture, and how Australians interact with one another. Once familiarity for these concepts were achieved, this prototype would encourage international students to interact and mingle with other people in real life by introducing them to the ways in which they could do so.

Thus, this prototype was split into three stages, which should be followed in order to achieve the maximum effect intended.

- Stage I: This stage would be designed to help international students familiarise themselves with the area around ANU and Canberra, and the local culture of Australia. This would be done by creating modules that simulate common scenarios regarding the area and local culture that international students could learn about.
- Stage II: This stage would be designed to help international students familiarise themselves with how Australians interact. This would be done by creating modules that simulate common scenarios regarding ways of communication that international students could learn from.
- Stage III: This stage would be called 'personal development'. It would be designed as a way to direct international students to avenues in which they could meet and interact with new people in real life through whatever similarity they might choose, such as existing clubs and societies, study groups, or anything else that could enable social interaction among students.

At this early stage of the investigation, it was sufficient to build a prototype that has only one example of each categories (Stage I to III). This is because the purpose of the prototype is not to evaluate the specifics of the example, but to evaluate the overall concept of a smartphone application that contains these three stages.

6.3 The Prototype

This section describes each component of the prototype in the intended order of viewing: Introduction, Stage I, Stage II, then Stage III.

6.3.1 Introduction to the Prototype

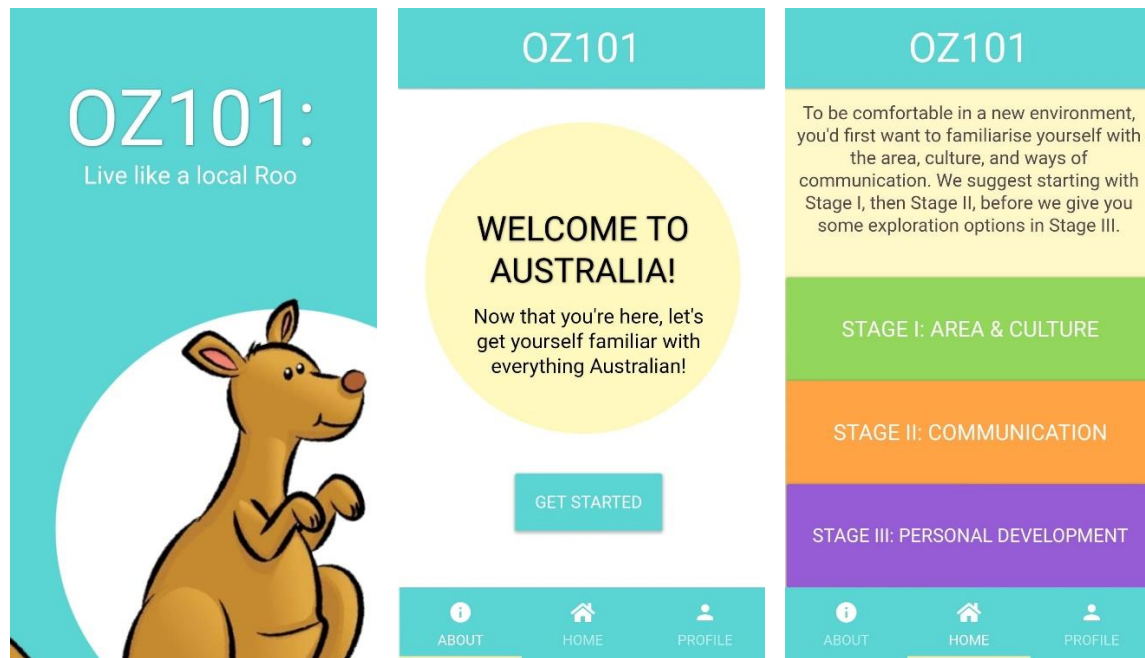


Figure 3. From left to right: the prototype’s title page (left), about page (middle), and home page (right).

Upon launching the prototype, users are greeted with a title page that is captioned with the prototype’s temporary name, “OZ101: Live like a local Roo [an Australian slang word for kangaroo]”. This title page automatically transitions into the “about” page after a few seconds, without expecting any interaction from the user.

The “about” page briefly introduces users to what the prototype is about (to familiarise users with everything Australian), and then prompts them to start using the prototype by tapping the “GET STARTED” button. This will direct users to the “home” page, which can also be accessed at any point in time by tapping the “home” tab at the bottom of the screen.

Finally, the “home” page explains to users how the prototype will guide them to familiarise themselves with ‘everything Australian’: by familiarising themselves first with the area (around the ANU and Canberra), culture, and ways of communication. Users are given a suggestion of the sequence that they should follow, namely Stage I, Stage II, then Stage III. By tapping on any of these stages, the prototype will direct users to the stage’s respective page.

These pages and its following ones represent the prototype interpretation of the concepts that emerged from the focus group. They have been designed to be more intuitive as well to ease users with their experience.

6.3.2 Stage I: Familiarity with Area and Culture

When the user tapped on “Stage I” from the “home” page, the user will be directed to this page. The text in the green circle is placed to remind users of the purpose of “Stage I” of this prototype. Users are given the option to choose between mastering (familiarising themselves with) either the “Area” (around the ANU campus and Canberra) or the local “Culture” first, by tapping the respective button they prefer. The reason for “Area” and “Culture” to be placed together in Stage I is because they are of equal importance based on the analysis of the focus group results, where participants of the focus group were observed to mention familiarity with area and culture together as an important focus during their first few weeks upon arrival. To have familiarity with the area, sometimes some cultural knowledge is needed to move around locations. Similarly, to achieve familiarity with the culture, sometimes knowledge of the area is required as well. For example, in the process of walking around a neighbourhood to familiarise themselves with the area, sometimes people need to have an understanding of the culture of road rules in the country. Likewise, in the process of learning the dining etiquette of a certain country to familiarise themselves with the culture, sometimes people need to have some familiarity with the area regarding where the dining places are.



Figure 4. Stage I main page.

Area

If the “Area” button is tapped, the user is directed to a page that lists the modules that can be chosen. Each module is meant to guide the user to be familiar with different “areas” in Canberra and the ANU. However, for the simplicity of the prototype and the user study, only one module is made available, namely “Finding your way to classes”. Hence, it is the only one that the user can select in this version of the prototype. Tapping on this module, or any other available module, directs users to an information page about that module. By tapping “Start”, the user can begin the module.

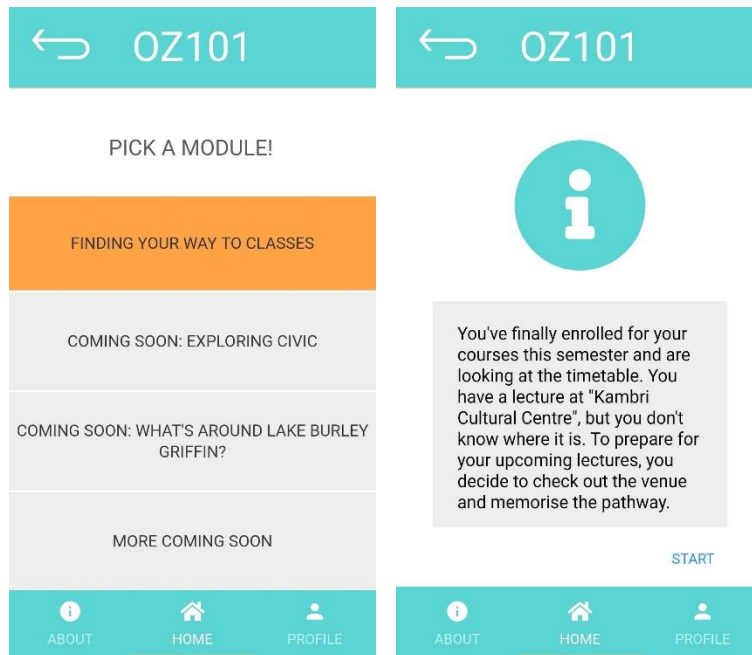
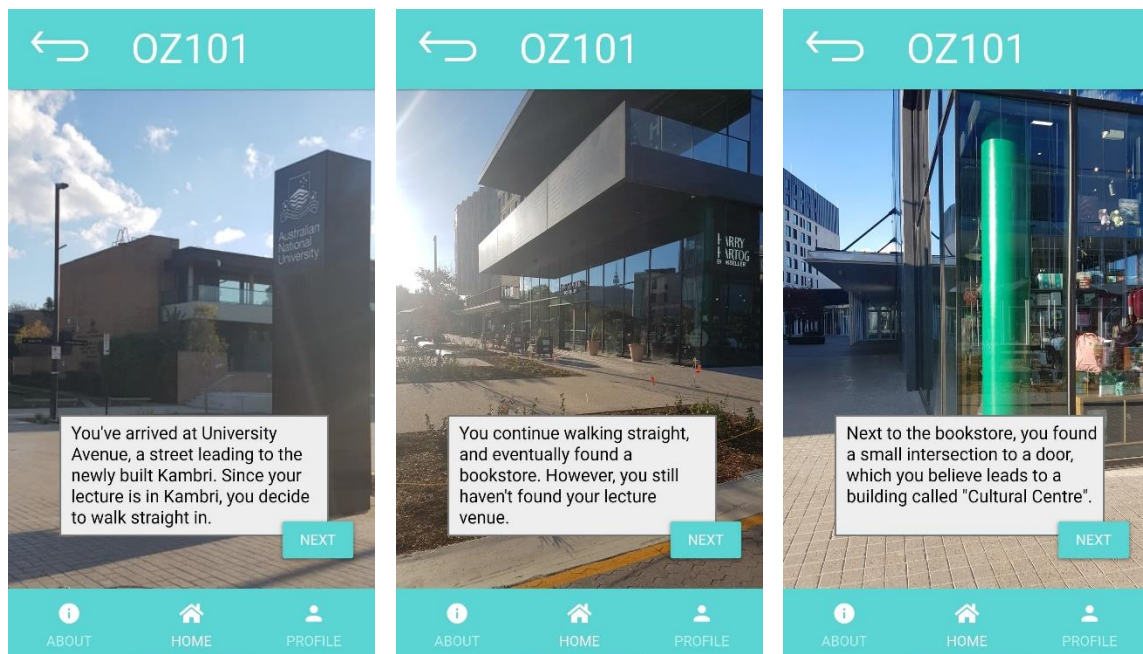


Figure 5. List of modules for “Area” (left) and the information page for the only available module (right).

In this module, users run through a step-by-step simulation of walking through the ANU campus to get to a particular lecture theatre. The user has to read through the simulation and no user input is expected. Once the user is done, the user will be redirected to the page that lists a list of modules.



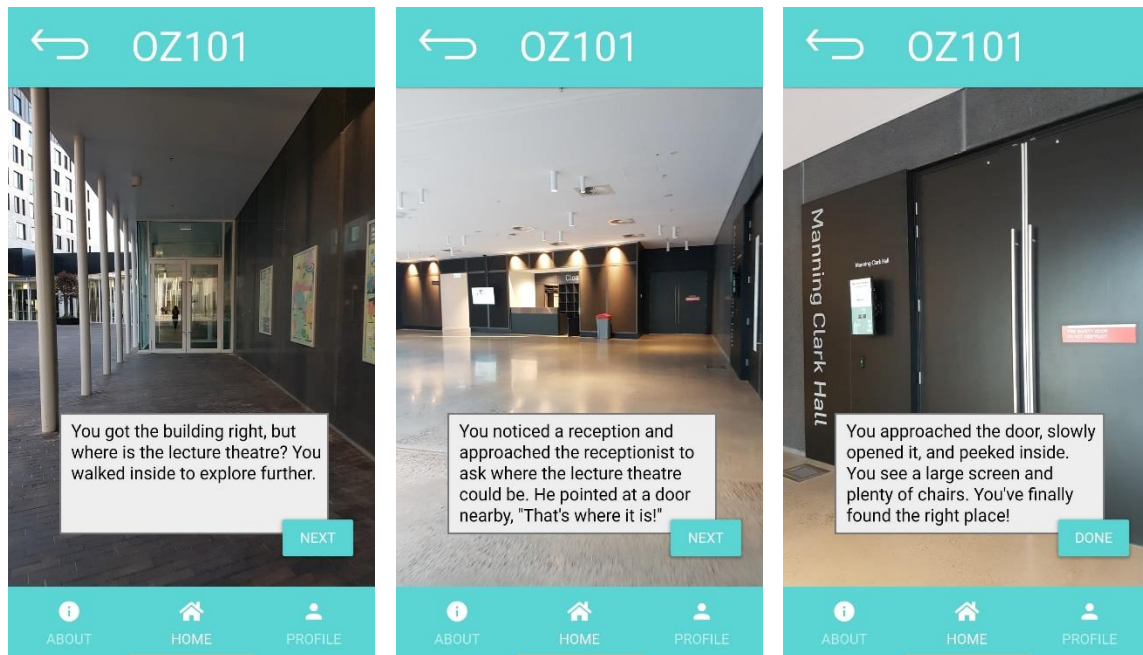


Figure 6. Screenshots of the content of the 'area' module, from start to finish (left to right, top to bottom).

Culture

For culture, one module has been implemented in this prototype to illustrate the concept of guiding a user through aspects of the Australian culture.

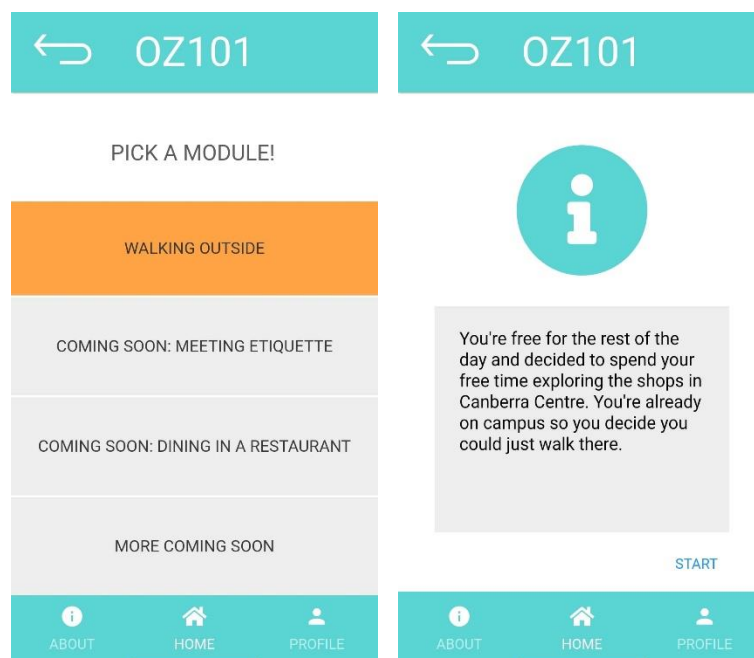


Figure 7. List of modules for "Culture" (left) and the information page for the only available module (right).

In this module, users run through a step-by-step simulation of walking to Canberra Centre (a mall in Canberra) from the ANU campus. Users are now expected to input their own answers in some parts of the simulation, either by 'typing' on the text field on the prototype or by 'speaking' to the device. For this prototype, this feature is simulated by asking the user to write their answer on a piece of paper if they decide to 'type' their answers and asked to verbally tell the researcher their answer if they choose to speak into the device, which the researcher will then note down. Regardless of the user's answers, the simulation will progress with the same pre-outlined action. For example, in this module the user is asked what they would do when they see a pedestrian traffic light turning red while they are not many cars.

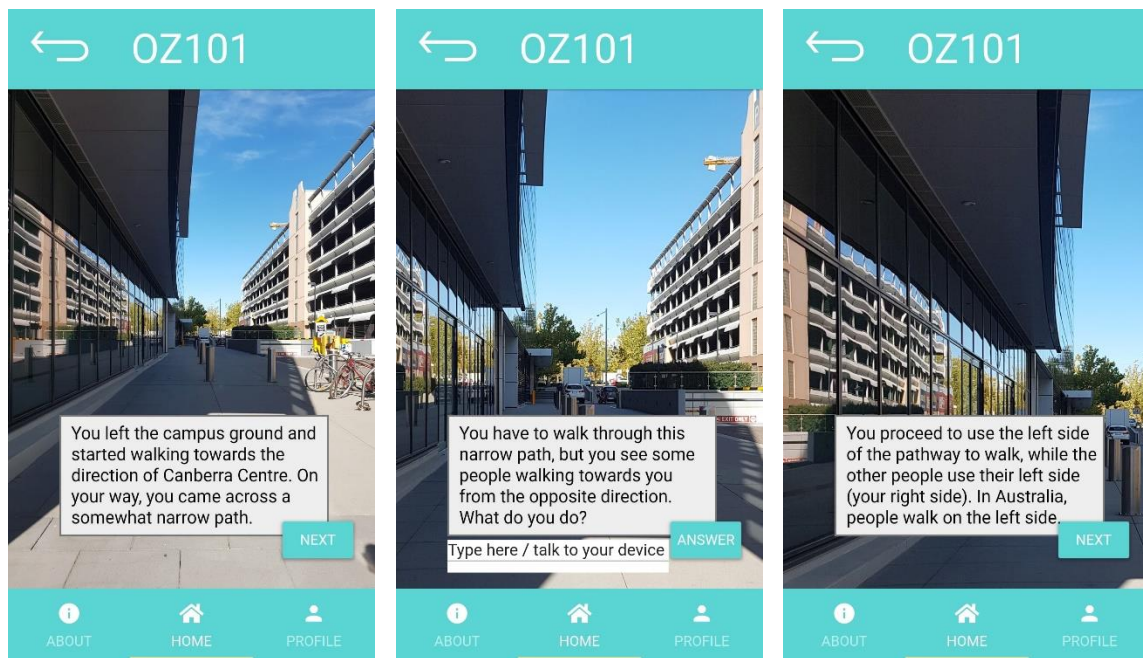




Figure 8. Screenshots of the content of the 'culture' module, from start to finish (left to right, top to bottom).

6.3.3 Stage II: Familiarity with Ways of Communication

When the user tapped on "Stage II" from the "home" page, the user will be directed to this page. The text in the orange circle is placed to remind users of the purpose of "Stage II" of the prototype and that it should be done once they have familiarised themselves with area and culture. Similar to "Stage I", there is only one module available in this stage, where users run through a step-by-step simulation of

talking to a random student in the lecture before the lecturer arrives. Once again, the user is expected to provide user inputs in some parts of the simulation.

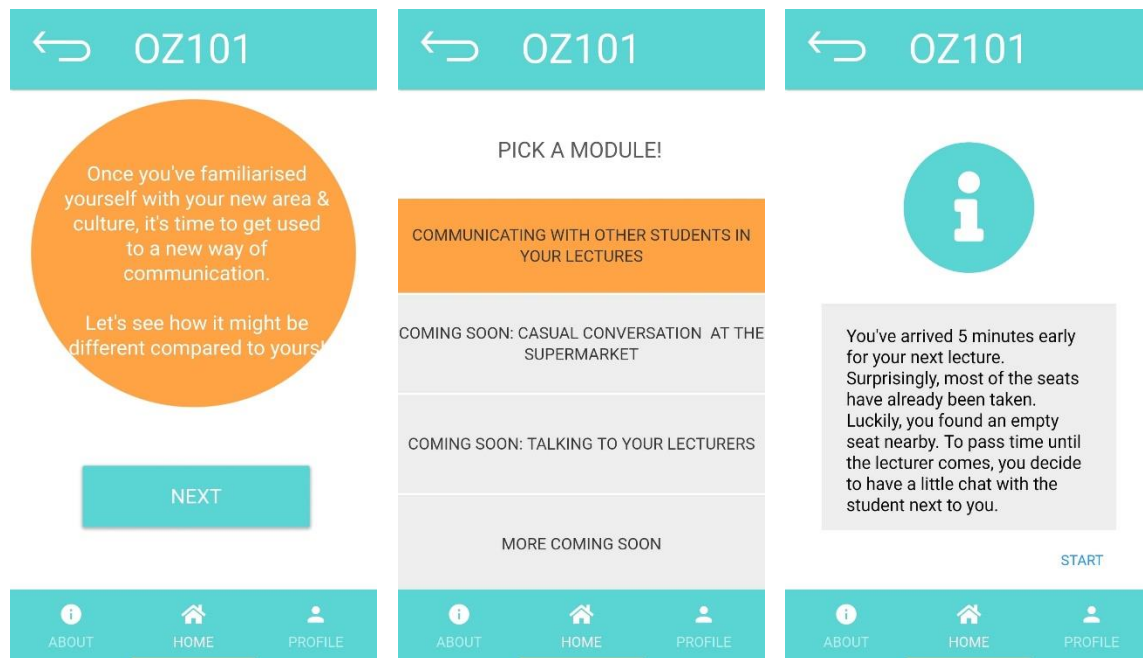
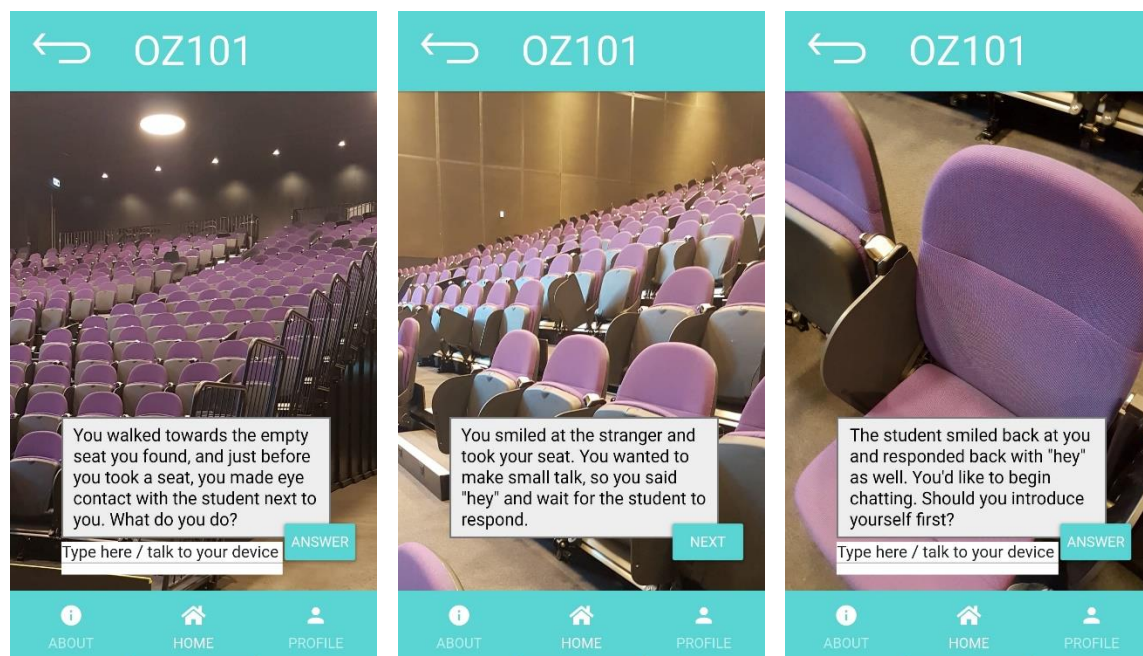


Figure 9. Stage II main page (left), list of modules for “Culture”, (middle) and the information page for the only available module (right).



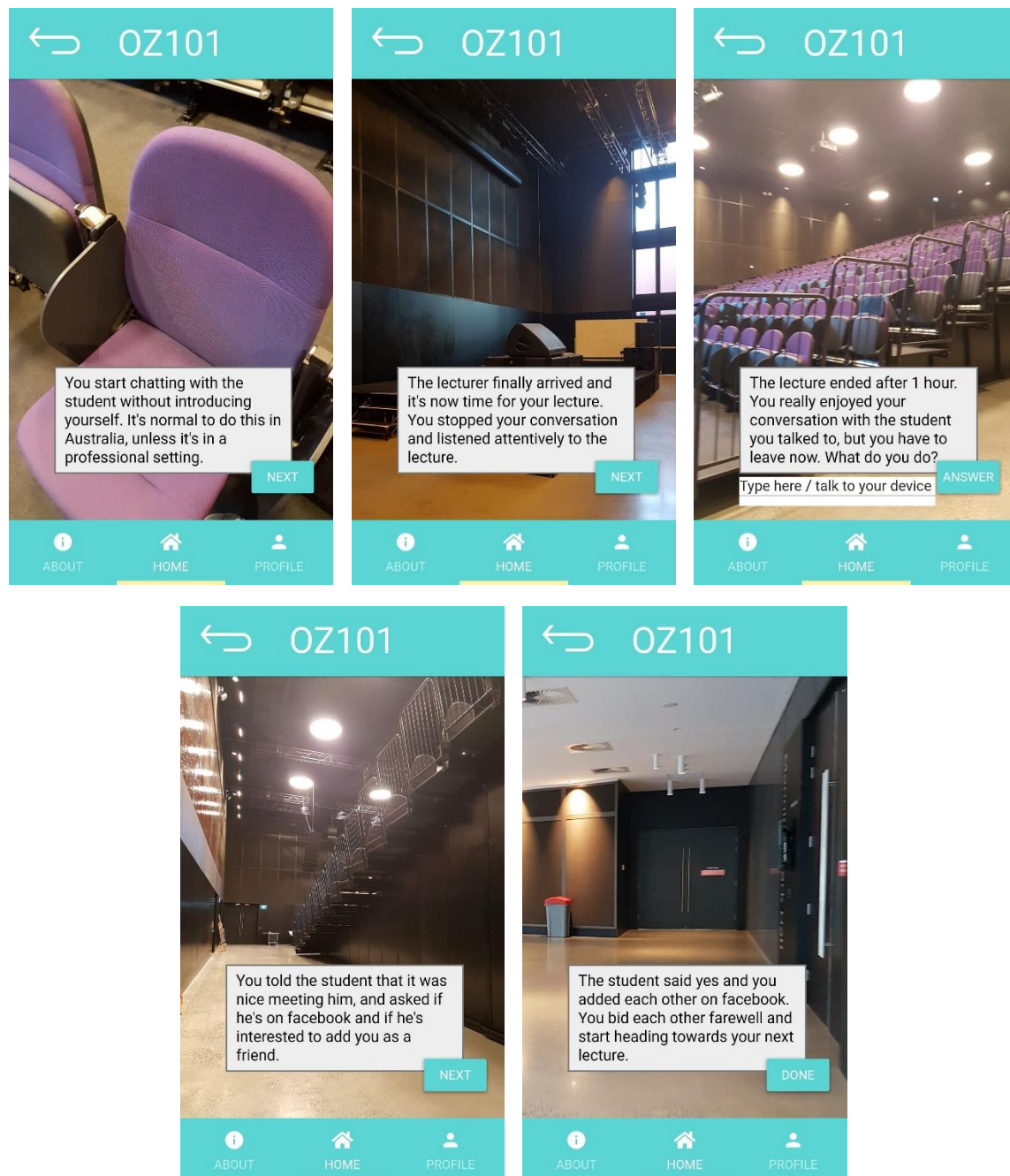


Figure 10. Screenshots of the content of the 'communication' module, from start to finish (left to right, top to bottom).

6.3.4 Stage III: Personal Development

When the user tapped on "Stage III" from the "home" page, the user will be directed to the page with the purple circle. Unlike "Stage I" and "Stage II", "Stage III" is not a simulation. It is called "Personal Development" because this is the starting point for users to find the right avenue to put their familiarity in area, culture, and ways of communication into practice. When the user tapped on the "START

EXPLORING” button, they will be presented with a list of clubs, societies, or groups in Canberra or the ANU. Tapping on any of the existing clubs, societies, or groups directs users to a placeholder information page about that respective club, society, or group. The exact detail is not included in this prototype.

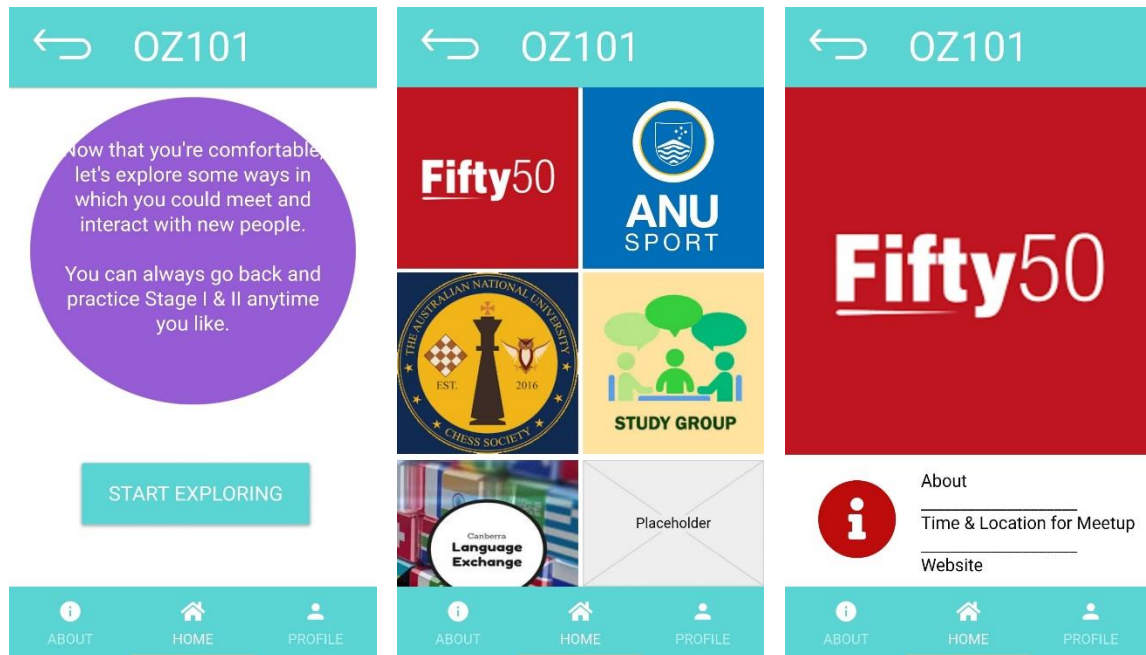


Figure 11. Stage III main page (left), list of clubs, societies, or groups (middle), and a placeholder information page for “Fifty50”, which is a society in the ANU (right).

7. Stage II: User Studies

This section will discuss aspects of the user studies in detail. It will discuss the motivation and objective of the user studies, the materials needed to run the user studies, how the user studies were carried out, results from the user studies, and analysis of these results.

7.1 General Overview and Motivation

The last part of this research is to check what international students think about the prototype, by running user studies. The objective is to find out whether newly-arrived international students would find the features in this prototype useful as a self-management tool to increase their cultural competence or not. For this purpose, participants of the user study were asked to imagine themselves as they were when they first arrived in Canberra. This was kept consistent with the hypothetical approach of the individual interviews and focus group, to align the user study with the approach that was presented in the application for human ethics approval.

7.2 Participant Recruitment

University students or recent graduates from the ANU who participated in the individual interviews or focus group (ex-participants) were invited again to participate in the user studies. The user study was approved after submitting a variation to the same Protocol (Protocol 2018/576) by the Australian National University Human Research Ethics Committee. Participants' age group were kept consistent with the individual interviews' and focus groups' requirement for the same reasons previously discussed in section 4.2. However, all participants are required to have an international students background. Only international students were invited to take part in the user study because the aim is to see whether the international students, who are the target group of this prototype, would enjoy or benefit from the prototype.

While the plan was to run the user studies with five participants, only three ex-participants were available and agreed to participate in the user study. Therefore, two more university students or recent graduates were recruited for the user studies. In total, five participants, who are current or former international students at the ANU, participated in the user study. In particular, there were four current international students and one permanent resident who used to be an international student.

7.3 Materials and Procedure

7.3.1 Materials

A smartphone that has the prototype downloaded was prepared for the user studies. In addition, a piece of paper and pen were prepared to allow the participants to write down their user inputs in case they choose to 'type' their answers instead of speaking into the device.

The exit interview at the end of the user studies is intended to be an unstructured interview. However, a short list of questions was prepared in case the participants were reluctant to or had some difficulties starting the discussion.

1. How do you find this app?
2. As an international student, do you think this app would help you? In what way?

3. Would you download and use this application (when it is completed) if it was free?
4. Would you download and use this application (when it is completed) if you have to pay \$1?
5. How do you feel about the user input feature?
6. Do you have any last suggestion or feedback?

Question 3 and 4 were included after a suggestion by the participant of the pilot user study.

7.3.2 Procedure

The user studies took place in a comfortable and well-lit room in the ANU. Participants were first informed through the participant information sheet (Appendix E) that in the previous stage of this research, individual interviews and a focus group have been conducted, which have provided the researcher with a rich pool of ideas to design an early-stage prototype and helped to validate and improve on the prototype ideas respectively. Results from the interviews and focus groups showed that the lack of cultural competence was identified as an important potential factor towards loneliness and social isolation among international students. Therefore, participants were informed that the prototype focuses on this factor. Lastly, participants were told that the purpose of the user studies is to evaluate the interactive ideas that are presented in the interactive mobile prototype.

Once the participant has given their consent to participate in the user studies, the user study began.

1. At the start of the user study, the participant was asked to imagine being a first-time and newly-arrived international student in Australia
2. A smartphone that has the prototype downloaded was handed over to the participant. It was ensured that the smartphone has a sufficient amount of battery left. The smartphone was already unlocked, with Proto.io's project page opened since the prototype can only be accessed from the Proto.io mobile application. By tapping on the play button on the specific project, the prototype will be launched.

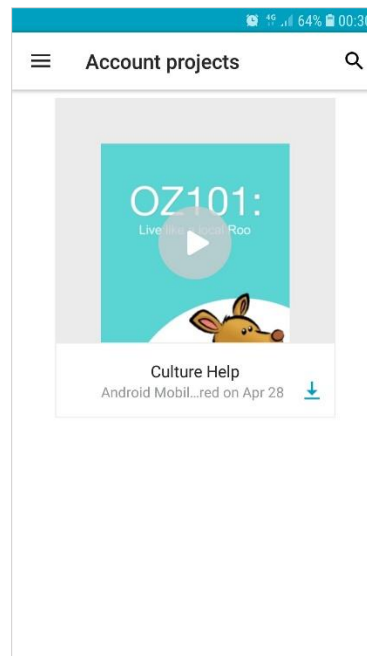


Figure 12. Proto.io project page. The prototype can only be accessed from here.

3. The participant was told to explore the prototype on their own and was encouraged to voice out their actions or decisions. The researcher quietly observed the participant in case the participant needed help with the prototype.
4. When the participant reached the part of the simulation where they are required to put in a user input, the researcher explains that this feature is not implemented in the prototype and that the two possible input modes will be simulated with pen-and-paper (to type) and talking-to-the-researcher (to speak). The researcher then asks the participant if they prefer typing or speaking into the device to write their answer.
 - If the participant chose 'typing', a piece of paper and a pen are handed over to the participant and the participant is then asked to write their answers there.
 - If the participant chose 'speaking', the researcher then asks the participant to tell the researcher their own answers and the researcher will then write it down, following the participants' words and phrasing as closely as possible.
5. Once the participant has finished exploring the prototype, the exit interview begins.

7.4 Results

Participant 1: Did not participate in individual interviews or focus group

The first participant was an international student who very recently graduated from the ANU and will soon commence postgraduate studies as an international student again. This participant did not participate in the individual interviews or focus group but was very vocal throughout the user study. For the user input, this participant chose to 'type' into the device.

During the participant's engagement with the 'area' simulation (see Section 6.3.2), the participant was quick to ask what the advantage of this simulation over Google Maps would be. When I replied that the simulation in this prototype takes its users not just to the building, but also the specific location inside the building, the participant said:

I guess having a step-by-step guide inside the building is good, but if I need a step-by-step guide outside, I will just use Google Maps.

The participant then asked if there would be more modules in the future catering to other areas, seemingly becoming interested in the simulation.

During the participant's engagement with the 'culture' simulation (Section 6.3.2), the participant was very visibly shocked that the prototype disregarded his chosen user input and that the simulation progressed with something that he did not choose to do.

What? That's not what I said! ... I think it is useless that my answers were disregarded. But actually, I prefer if it [the simulation] is just purely script, without any question [user input]. Instant feedback would be good, but giving options make me confused about which one to remember.

Despite the participant's discontent with the user input feature, the participant complimented the idea of using simulation and scenarios in the prototype, which would be especially useful for newly-arrived international students:

This would be useful for people who come to Australia for the first time. Scenarios are good because I usually don't know what keywords to search for, so having the script is good. For example, I don't know what the pedestrian crossing is called and hence I wouldn't even know what to 'google' to learn more about its rules. I like that it's like a demo of the real life.

However, the participant suggested that the simulation and scenario would be good just for first time users. The participant suggested that there should be a way to review the simulation and scenario quickly without having to redo it again.

Some information in the simulation is really good, but right now there is no way to look at them again without redoing the entire simulation. Next time, I would like a wiki to quickly refer [to what I have learned], because redoing it is too long ... there's no time if you need to remember the rules quickly, like when you're outside.

When asked whether the participant would download and use this prototype once it reaches stage of completion, the participant responded "yes" if it was free, but "maybe no" if a small fee is incurred.

The first time you come here as an international student, you might not even have a payment method yet.

The participant ended the exit interview by casually suggesting that it "might be nice to have a day and night view" especially for the 'area' simulation, to be able to navigate through the surrounding easily even with a lack of illumination. However, even after the end of the user study, the participant contacted me again a few times to give more suggestions that the participant missed during the user study. These suggestions mainly involve the use of deep learning or natural language processing (NLP), which seemed to be the participant's main interests.

I would also want to search for things directly. Perhaps a fuzzy algorithm implementation would be nice to have. The first time [arriving] in Australia, [maybe I] don't know how to spell.

Some NLP stuff would be nice. So, if I can type "how do I ..." or "what is this thing that's yellow", it will direct me to the right scenario or wiki entry.

When the user searches for something, if there's a toggleable recommendation system (for similar / relevant items) that'd be nice, possibly based on what other users searches next after searching the current term.

Participant 2: Did not participate in individual interviews or focus group

The second participant is a current international student from the ANU, who requested to be identified by his full name, "Haniifan Muhammad Na'im". Haniifan did not participate in the individual interviews or focus group. He commented a lot about the appearance of the prototype, mostly about the choice of colour, "the colour could be better, I pay a lot of attention to the aesthetics". He also gave more suggestions for the user experience, for example regarding how the buttons should function. For the user input, Haniifan chose to 'talk' into the device.

He seemed impressed with the 'area' simulation in Stage I and began sharing his own experience.

Do you know that I spent 1 hour getting lost in the old Union Court (an area in the ANU) before?

However, he did not seem very impressed when his user input was disregarded by the prototype.

I'm appalled! I thought it's going to show what I talked about, but that's okay. It's already good to have the opportunity to have answers, since I'm going to be paying attention to my answers. It's important to maintain attention. If [I'm only required to] tap [and only tap], I won't really pay attention. Maybe it'll lead to a user error too where I accidentally tap too many times and missed something in the simulation.

Haniifan also indicated that he liked the idea of using simulation and scripts but signified that this idea was not immediately obvious to him when he first launched the prototype.

I prefer narrative, [it's] more fun and interactive. I can absorb better with story-telling. However, I don't know what to expect from this [prototype] at the start: Is it going to be a narrative or a wiki? At the start, I thought it's a wiki, but then I found out that it's narrative. This should have been told from the beginning.

He added that he thinks this prototype would be useful for international students, but would have preferred to have the feature implemented as separate prototypes.

I think I would rather have different applications for the different aspects. Area, culture, and others is very broad ... should split into multiple applications. If not, it feels overwhelming.

When asked whether he would download and use the prototype if it was completed, Haniifan replied with some very strong responses.

Yes, obviously [if it's free]. Honestly, I think there's a lack of application in Canberra and ANU for this kind of things. [If I have to pay \$1, then] no, because there's stigma against [paying for applications]. At least get it sponsored by ANU.

Finally, Haniifan ended the exit interview by repeating his suggestion about the colour scheme of the prototype.

Participant 3: Was a participant since the individual interviews

The third participant is a recent graduate from the ANU, who graduated at the same time as the first participant. This participant requested to be referred by a pseudonym, "IK". IK is the only user study participant who holds a permanent residency in Australia, but still had years of experience being an international student. IK was not very vocal during the user study and seemed to be a very objective person. IK had some problems with the smartphone's touch sensitivity.

IK began their feedback during the exit interview by saying that this prototype is "a work in progress". IK also "liked the simple and clear design".

When asked whether they think the prototype would be useful for international students, IK responded that some parts of the prototype would be useful, but some others are not so useful. In particular, IK found the 'communication' simulation and the personal development part useful, but not the 'area' simulation or the 'culture' simulation.

I can see how some parts would help me... the walking one ('culture' simulation) doesn't feel so useful. I feel like I already know the road rules, or at least it's easy to pick up. The one with [communication] is useful ... [you can] learn how people here interact. The navigation part ('area' simulation) isn't so useful too: re-enacting it on the phone, even if we do it, we'll still get lost. I'd just use Google Maps. But I guess it can at least tell me if I'm at the right spot, by checking the picture from the simulation to know if I'm at the right place. The club [and societies] page is pretty useful.

When asked how IK feels about the user input feature, the participant indicated that they were not too happy when their answer was not considered. However, IK did like the format of having user input.

I felt like this isn't me! [If] it's giving me options on how to act, [then] let me compare what I would do versus what the app suggest. So I would know, "Oh I guess this is what people do!". It would make me understand what normal people do. I think the format is good that we have to answer, because if not people won't really think about [the simulation]. [For the user input, I think] writing your own answer is better than having pre-existing options to choose from in the simulation.

IK also added that they would probably want to download and use the prototype, "assuming it's completed" and only if it is free. IK said that they would not do so if there is a \$1 fee incurred, because they "do not pay for apps".

Finally, when asked whether IK enjoyed the simulation over a traditional guidebook, IK responded by saying that we should "have both simulation and the traditional guidebook (wiki), [where the] wiki [is used] for reference".

Participant 4: Was a participant since the individual interviews

The fourth participant is a current international student from the ANU, who requested to be referred to by a pseudonym, KS. KS did not say much but seemed interested in the prototype. Just like participant 3 (IK), KS had some issues with the smartphone's touch sensitivity. For the user input, KS chose to 'type'.

During the exit interview, KS shared some positive opinion on the prototype.

[This would be] pretty good for new students. Yes, [it would be useful for international students], if it's completed. I think the parts that are useful are the personal development (Stage III) and social development (Stage II). It teaches me how to live in Australia while I'm a student.

When asked how KS feel when the prototype disregarded their user input, KS looked confused and shocked. KS did not even realise that the prototype disregarded their user inputs, thinking that next pages in the simulation were placed to correct their presumably-wrong user input.

I thought it gives you the answer to correct you. I prefer [to have] more choices, like a visual novel, [with] pre-existing choices plus the option to include my own answer if I don't see a choice I agree. [Especially] for social ('communication' module), I want routes, but for road rules and etiquette, direct answers are enough.

Visual novels can be defined as a type of novel "read as [a] game-like application on a computer", where the players can interact by "making certain choices at specific points in the game that decides which

branch of the storyline that the player will take” (Visual Novel [Def. 1], 2006). From this definition, KS suggested for the prototype to offer multiple choices at specific points in the simulation that would decide the outcome of choosing these specific choices in the simulation.

When asked whether KS would download and use this prototype if it is free, KS quickly said yes. However, KS started giving excuses not to download and use the prototype if there is a \$1 fee for downloading the prototype, “I would think about it. Can’t I just learn it by myself?”

Finally, KS ended the exit interview with their conclusive opinion and one last suggestion.

[The use of] simulation is better, [because it gets us] more involved ... [this prototype] needs to be complete... Maybe you could also add more interactive elements, like having audio [instead of visual text] for people that can’t see.

Participant 5: Was a participant since the individual interviews

The fifth participant is a current postgraduate international student who very recently graduated from the ANU. This participant was still an international student at the ANU during the individual interviews, but graduated just before the focus group commenced. For the user input, this participant chose to ‘talk’ into the device.

At the start of this participant’s exit interview, the participant began by suggesting some features they would like to see.

It’s better if someone can speak to explain the script and I don’t have to read. Instead of pushing the ‘NEXT’ button, I would prefer swiping right as well. Perhaps have a 360-degree view as well? But that might be too hard [to implement]. You should also have references to back up the things we are learning in the simulation, such as importance of learning familiarity.

The participant is then asked whether they think this prototype could benefit them as an international student. The participant responded:

Yes, it would help me as an international student... [it’s like] another way of practicing English. If there are other languages it is even better. It also teaches me to know a bit more about the area... It’ll be good if it can be combined with other university apps.

The participant indicated that they were “a little bit shocked” when they see their answer being disregarded by the prototype, but nevertheless continued with the progress of the simulation thinking it was just “instructions”. When asked what the participant would have preferred, they responded:

I prefer having multiple choices that lead to different routes, because it is more reasonable to me. Then, I would try to pick the best [option].

This participant, just like all the previous four participants, indicated that they would download and use this prototype if it was free, but not if they are required to pay a small fee.

Yes, I will get [the prototype] for free. Actually, I think it’s good if the university can advertise it to new students.

I wouldn't pay. It's still really basic and I can just find online resources or [join] Facebook groups [to help me], because there's actual communication in it (Facebook groups). I think this prototype would be good for people who are really shy or nervous.

Finally, the participant ended the exit interview with the suggestion that it would be good to "have some Facebook or useful website links in the prototype", which was actually something that is a part of "Stage III: Personal Development", but perhaps was not clear enough to the participant. The participant also added that they preferred to have the simulation especially for complex modules. However, a standard guide should be sufficient for more basic modules.

7.5 Summary of User Studies Results

The Three-stage Approach and Its Sequence

One of the key emphasis of this prototype is the three-stage approach used to slowly familiarise international students into aspects of the new environment (Stage I to II) before encouraging them to practice what they have learned in real life (Stage III).

All participants understood the use of stages and correctly followed the recommended sequence (Stage I, II, then III) during their respective user studies, after they read the instruction on the prototype's home page that suggested:

To be comfortable in a new environment, you'd first want to familiarise yourself with the area, culture, and ways of communication. We suggest starting with Stage I, then Stage II, before we give you some exploration options in Stage III.

None of the participants challenged this suggestion and seemed to comfortably proceed with the recommended sequence. Information regarding why the three stages were placed in that order was also included in the prototype, which made it easier for participants to understand and appreciate why they were asked to complete the stages in that sequence. The third participant, IK, also mentioned that they "think the format is good".

While the approach of using stages and the sequence order was clear, IK responded that they were confused why Stage III (Personal Development) was included in the prototype. After explaining the purpose of Stage III and why personal development only comes after familiarity with the new area and culture is developed, the participant finally understood why Stage III was included and agreed that it is important for Stage III to be in the prototype.

This finding indicates that the approach of using stages in a prototype is intuitive and enjoyable to participants, but sufficient explanation about the importance of each stage and explanation behind the sequence of the stages have to be included as well. The success of the three-stage approach might also imply that the development of cultural competence is not something that can easily be achieved in one step, but instead is something that can only be built in progression.

Positive reactions with the use of simulation and hypothetical scenarios

Results from the user studies indicated that all five participants enjoyed the use of simulation and hypothetical scenarios as a way to familiarise themselves with the various aspects that could help them adapt to a new environment in Australia, because it was “interesting”, helped to introduce new keywords, and “kept their attention throughout the learning process”. In a way, it even helped international students practice their English language, as indicated by the fifth participant. This indicates that the use of simulation and hypothetical scenarios is useful as a method that could help international students learn how to adapt in a new environment.

However, some participants, namely participant 1 and 5, also indicated a need for a ‘wiki’ as a reference guide to quickly refer to the main key points of the modules once they were completed. In addition, participant 5 mentioned that the use of simulation is only especially useful when the learning is complex and that a simple reference guide would be enough for more basic learning. Therefore, while the simulation and hypothetical scenarios are useful as a learning method, they should not be overused. The use of a simple reference guidebook should not be completely foregone as there are situations where it would be more useful and straightforward than simulations and hypothetical scenarios. Therefore, a simple reference guidebook (or ‘wiki’) could be implemented in the future as a feature that would work hand-in-hand with simulations and hypothetical scenarios to aid international students’ cultural competence.

Advantage of the Use of Simulation to Develop Familiarity with Area

Some participants, namely participant 1 and 3, asked what the ‘area’ simulation’s advantage over Google Maps was. To answer this question, the ‘area’ simulation in this prototype was designed and implemented to be more personal with the user, whereas the features of Google Maps felt more technical and computer generated. Firstly, Google Maps do not ask users questions or provide any sort of narrative for users while navigating them throughout the area. The use of Google Maps could depend heavily on the user’s ability to read a map, whereas the use of this prototype’s ‘area’ simulation would involve the user’s participation and observation. In addition, this prototype was designed to navigate users even to specific locations inside a building, whereas Google Maps do not. These advantages were explained to these participants, and they finally understood and agreed why this feature could not be replaced with just Google Maps. It seemed like the advantages of certain features were not immediately obvious to participants and hence some explanations might have to be included in certain features to allow participants to appreciate how these features might be able to help them.

Improving the User Input Feature

Most participants, except for participant 1, liked the idea of having to enter user inputs during the simulation of common scenarios. This was one of the main reason participants could easily maintain their attention while doing the simulation. However, most participants were not too happy when their user inputs were disregarded by the prototype. They mentioned being “appalled” (participant 2) or “shocked” (participant 5) when the simulation progressed with something they did not choose to do, and participant 1 felt that it made the user input feature “useless”. This was initially excluded because it was difficult to implement a prototype that would take into account participants’ user inputs in the progress of the simulation. It also seemed like a good idea at the start because it might reveal how much participants would care about their user inputs. While it indeed revealed how invested participants are

in their user inputs, it is perhaps not the right method of achieving this goal. Disregarding participants' user inputs should not have been done because it created unnecessary weakness in evaluating the prototype.

What should have been done is either to exclude the user input feature from this user study, or employ an alternative method that could still generate unique responses based on participants' user inputs in this prototype, with the latter being preferred. An example of such alternative method would be discussed in section 9 of this thesis.

This finding has shown that the implementation of user inputs could work very well in prototypes that make use of simulations and hypothetical scenarios if the participants' user inputs are actually considered.

Role of University

Finally, all participants responded that they would only download and use this prototype (once it reached completion) if there was no fee incurred. While there may be valid reasons such as the inability to pay something online when international students first come to Australia (as suggested by participant 1), most participants simply did not want to spend money on smartphone applications. This indicated that such prototype should not be marketed for profit, especially given its importance for the physical and mental well-being of international students. Participant 2 and 5 also responded that such prototype should be sponsored and advertised by the university to ensure international students' well-being because as it stands there is already a lack of such supports for international students. Therefore, in helping international students develop cultural competence in a new environment, universities must also play their part in ensuring enough resources would be dedicated to support them.

8. Review of Research Outcomes

As an overview of the overall research method, this diagram can be used to represent the progression of this research.

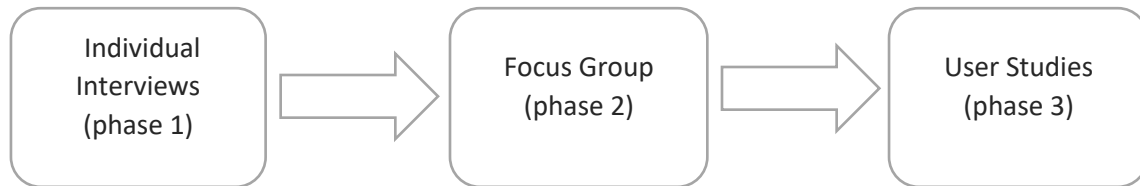


Figure 13. Research overview.

This section revisits the conclusions from each of the three phases in this research, namely the individual interviews, focus group, and user studies.

The first phase of the research involved the use of individual interviews with 11 participants. Participants were presented with hypothetical ‘scenes’ (scenarios and personas) and asked hypothetical questions relating to living situations, loneliness, and social isolation. The responses were based on how participants thought the personas would act and feel, and not based on the participants’ own experience. Analysis of the individual interview results indicated that loneliness and social isolation are not issues that international students might be comfortable dealing with. Due to participants’ attachment to the features of online social network (OSN), the initial thought of having an OSN without its social features was scrapped. Based on the analysis, four concepts that might be able to help prevent loneliness and social isolation among international students emerged, namely: (a) an interactive international student guidebook; (b) a platform to connect university students together by similar courses or interests; (c) a platform to get students to form cooking or exercising group; and (d) a buddy program for international students with local Australians. The ideation of these concepts led to a need for another data collection process to verify these concepts, which was done through a focus group. Based on the four concepts that emerged from the conclusion of the individual interviews, a list of focus group questions was created.

The second phase of this research involved focus group discussions about questions relating to these four concepts. There was a total of 10 participants for the focus group sessions, split into three smaller groups. Based on analysis of the focus group discussions, a few conclusions were made for each of the four concepts that emerged from the first phase of this research. Out of these four concepts, only the interactive guidebook idea was deemed to be viable and interesting enough at this stage of the research, and even then, this idea needed to be improved in some aspects, according to the participants’ responses. A deeper analysis of the focus group discussion results also revealed an underlying theme in the context of international university students’ loneliness and social isolation: an international student’s opportunity to interact with others may be restricted when the student has not developed enough familiarity with the new environment, with respect to the new area, culture, and ways of communication. Hence, the focus group concluded that international students’ loneliness and social isolation can be prevented by developing cultural competence early on upon their arrival in a new environment.

Participants' suggestions on the interactive guidebook improvements, combined with the conclusion about cultural competence, eventually developed into the ideation of a prototype that could help combat loneliness and social isolation among international students by developing their cultural competence. This prototype takes the form of a role-playing interface system that would simulate common scenarios in Australia, acting as a more interesting and interactive guidebook. These common scenarios were designed with the aim to build international students' familiarity with the area of their new environment, the local culture, and local ways of communication as a way to develop their cultural competence in a new environment.

Finally, the last phase of this research made use of user studies as a method of exploring whether newly-arrived international students would find the features in this prototype useful as a self-management tool to increase their cultural competence. All five participants of the user studies are current or former international students of the ANU. The main takeaway of the user studies is that the use of simulation and hypothetical scenarios was enjoyed and seen as a useful tool that could help international students adapt to their new environment in Australia. Analysis of the user studies also indicate that the university plays a role in the development of international students' cultural competence, and thus some form of cooperation with the university would be needed in the quest to prevent loneliness and social isolation among international students.

9. Conclusion and Future Work

9.1 Conclusions

In section 1.2, I established the objective of this research, which is to create a form of self-management tool that could prevent newly-arrived international university students from experiencing loneliness and social isolation in a new environment with the use of interactive technology. To reach this main objective, this research investigated how interactive technology can be used to increase the quality of relationships and quantity of social contacts.

There are three conclusions of this research.

1. **Lack of cultural competence was revealed to be an underlying issue behind international students' loneliness and social isolation, as it may restrict the quality and quantity of social interaction.** To develop cultural competence, this research suggests for international students to familiarise themselves with the new area, culture, and ways of communication.
2. **Simulation and hypothetical scenarios involving cultural competence can be employed in interactive technology to help prevent loneliness and social isolation.** This was demonstrated in the prototype through the use of modules to build international students' familiarity with new area, culture, and ways of communication.
3. **Simulation and hypothetical scenarios appeared to have successfully handled the ethical barriers to investigating the themes associated with this issue.** This is important because there tends to be limitations accessing end users or the target environment especially for research involving sensitive issues. This method thus provides researchers in similar situations with the means for data collection processes that the participants can also enjoy.

9.2 Future Work

Concerning other areas for improvement, in section 7.5, I mentioned that an alternative method that could generate unique responses based on participants' user inputs. As future work plans, an example of such alternative method might be the 'Wizard of Oz' method. The Wizard of Oz is a method where a human operator is employed to respond to the participants to simulate natural interaction with the prototype (Preece, Rogers, & Sharp, 2015). In the context of this research, a human operator can be employed to respond to the participants' user inputs with pre-prepared answers during the user studies. If the participant asks an unexpected question, the human operator can think of something on the spot to respond to the participant.

It might also be interesting to conduct the user studies out of a laboratory setting and to ask participants to act out the scenarios in the actual places on the ANU campus or Canberra where the pictures in the prototype were taken. The sense of reality that participants experience then can be used to examine whether the scenarios in the prototype are realistic or not.

Finally, the gender ratio for all stages of participant recruitment was not taken into account in this study, because the focus was the availability of participants. Therefore, one limitation of this study is that it does not consider the influence of gender in studies of experiments. This is important because depending on their gender, participants might give different insights regarding different situations. For example, there might be things that women might want to know that men had not thought off, such as

how to talk to a male professor. On the other hand, there are also things that men might want to know about that women had not thought off, like how to talk to a female manager, because perhaps in their culture, men do not talk to women if they are not a family member. Therefore, future work for this research should also take into account the gender ratio for all experiments.

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Appendix A: Participant Information Sheet (Stage I)



Participant Information Sheet

Researcher:

My name is Michelle Adiwangsa and I am the primary investigator for this research project. I am a Bachelor of Advanced Computing Honours student in the Research School of Computer Science (of the College of Engineering and Computer Science) at the Australian National University. My primary interest lies in Human Computer Interaction (HCI) area and I aim to find better ways in which technology can be used for the benefit of the society. This research is supervised by Dr Duncan Stevenson, who is an Honorary Associate Professor at the Research School of Computer Science.

Project Title: Designing and Evaluating an Interface System to Combat Loneliness and Isolation Among Non-Native Speakers of English

General Outline of the Project:

- **Description and Methodology:** Non-native English speakers living in an English-speaking country might have problems socialising with the native speakers to assimilate. The extent of loneliness and isolation can vary for different types of people, for example, depending on their current level of activeness or social interaction. The use of interactive technology can be proposed as a possible platform that could help combat loneliness and isolation for these people, in ways that will be investigated in this research project. In the first stage, we will conduct interviews to find out how you and different groups of people view loneliness and isolation to gain a rich pool of ideas to draw from to design an early-stage prototype. You will be invited again to participate in a focus group session happening in late February, to verify the researcher's analysis of the collected interview responses and design of the early-stage prototype. In the second stage, we will conduct a user study to evaluate the interaction ideas that are presented in the interactive prototype. This second stage will be run in 2019 as a separate study with a separate Ethics application and information sheet.
- **Participants:** Data from 20 participants (in the 18 – 24 years old group) will be collected (10 from domestic students and 10 from international students with non-English-speaking background) within the Australian National University for the interview. You will be invited again for the user study in the second stage of this research.

- **Use of Data and Feedback:** Data from the first stage of this study will be used to gather the main ideas to be developed in an early-stage prototype. The focus group will verify the researcher's analysis of the main takeaways from the interview responses, to validate and improve the design of the early-stage prototype. Feedback from the user study will be used to assess the usefulness of the ideas that are presented in the interactive prototype and to guide future research in this area. Findings will be presented in an Honours thesis for the Research School of Computer Science in the Australian National University and potentially in a future research conference. You will be informed during the debriefing session that you may opt to get feedback on the research findings at the end of the project.

Participant Involvement:

- **Voluntary Participation & Withdrawal:** You do not have to take part in this study. Participation in this study is voluntary and you are free to withdraw at any time before the cut-off date or refuse to answer any question without giving a reason and without experiencing any negative repercussions. If you do withdraw, your data will be destroyed. Responses for the interview can no longer be withdrawn after Friday, 7 December 2018. If you decide to participate in the focus group, your focus group responses can no longer be withdrawn after Thursday, 28 February 2019.
- **What does participation in the research entail?** In the first stage of this research, you will take part in an interview and a focus group to identify the issues involved in dealing with loneliness for the target group. You have been recruited because you belong to one of our target group of participants, namely international students with non-English-speaking backgrounds or domestic students. From the international students, I hope to learn your understanding of the international student community at the ANU, whereas from the domestic students, I hope to learn from your wider perspective of an Australian life on our ANU campus. For the interview, you will be presented with different hypothetical scenarios relating to being lonely and asked to give hypothetical responses on how you think that the persona might act or feel in such scenarios. You will not be asked direct personal questions about your own situation. However, you will be asked where you are originally from and how long you have lived in Canberra. For the focus group, you will be presented with an early-stage prototype and asked what you think of the researcher's analysis and choice of highlighted findings from the interview responses. There will be only one focus group for both the domestic and international students. Your personal details will not be shared with any other participants and you will only be identified with a number. If you choose to participate in the focus group, you are obligated to respect the privacy of other participants attending the focus group too. You must not share their responses or any form of personal details to others without their consent.

In the second stage of the research, an interactive prototype application will be developed, and a user study will be conducted to find out whether the prototype being developed is suitable or how it can be improved. Similar kinds of scenarios will be used for the user study, and if you choose to take part in the second phase of this research, you will be asked to comment on whether you think the features of that prototype would be useful to the international student personas in these scenarios.

Interviews will be audio-recorded by the researcher only if you consent to it. The researcher will use the audio recordings to refresh her memory of the interviews. Recordings will not be made public and will only be accessible to the researchers. If you choose to participate in the focus group, your responses to the focus group questions will not be audio recorded. Responses will only be recorded with handwritten notes.

- **Location and Duration:** This research will take place within the Australian National University campus. You will only be required to attend one interview session and will be contacted again for a focus group, which you may choose to opt out. The interview and the focus group will each take between 30 minutes and one hour.
- **Risks:** There is a risk of psychological harm in this study as the study deals with the issue of loneliness and isolation. However, measures have been taken to minimise the risk of psychological harm to you. The nature of the methodology of this research minimises your risk of experiencing discomfort during the study, by asking hypothetical questions and expecting hypothetical answers instead of direct personal questions about your own situation. However, in the case that discomfort still arises for you, an appropriate procedure will be followed. I will inform you that you can choose to opt out of the research at any point in time and be on the lookout for signs of distress that you may exhibit during the data collection process, for example due to loneliness that you might be experiencing. In the case that a sign of distress is observed, I will ask if you are okay and offer to stop the interview or user study. I will also inform you of the existence of the ANU counselling services, so that you would be aware of the existence of a professional help that they can seek. You may opt for your data to be anonymised, but there is still a possibility of third-party identification – that is, you might be identified by what you tell us despite our best efforts to hide your identity.
- **Benefits:** The research will contribute to the broader understanding of the possibilities of using modern mobile technologies to contribute to community well-being. There is no expectation of a direct benefit to you, but we aim for this research to benefit firstly the non-English-background international student community at the university and later the broader community by introducing a suitable interface that could help combat loneliness and isolation. We also expect for this research to improve both your and our understanding of loneliness and isolation, and how it can affect anyone in the community. Especially for the domestic students, we wish that this study can help them better sympathise with the challenges and difficulties that might be faced by an international student with non-English-background.

Exclusion criteria:

- **Participant Limitation:** For the interview, data will be gathered from 20 participants (10 domestic students and 10 international students with non-English-speaking background). You will be invited again to participate in the focus group. You should be within the 18 – 24 years old age group, which is our target audience as people in this age group has been reported to exhibit the highest rate of loneliness and isolation. While there is no other restriction for domestic students, international students will only be recruited if their native language is not English.

Confidentiality:

- **Confidentiality:** All data will be protected and remain confidential in so far as the law allows. Your name will not appear on any research documentation except the consent form and your data will be recorded in a de-identified form, by attaching a number to your responses. Data collected from this study may be aggregated with other participants' data when reported in the research thesis, but in the case of individual analysis of data, your information will be attributed with a pseudonym. If you decide to withdraw from the study, your data will be destroyed.

Privacy Notice:

In collecting your personal information within this research, the ANU must comply with the Privacy Act 1988. The ANU Privacy Policy is available at https://policies.anu.edu.au/ppl/document/ANUP_010007 and it contains information about how a person can:

- Access or seek correction to their personal information;
- Complain about a breach of an Australian Privacy Principle by ANU, and how ANU will handle the complaint.

Data Storage:

- **Where:** Electronic data will be kept secure in a password protected personal machine, whereas papers will be kept in a safe and secure storage. Only the primary investigator (Michelle Adiwangsa) and the supervisor (Dr Duncan Stevenson) will have access to this information.
- **How long:** All data and associated consent forms will be kept for at least 5 years from the time of publication.
- **Handling of Data following the required storage period:** Following the required storage period, data may be archived or retained in a de-identified format by the researcher and supervisor, as deemed fit whether it would be of further use. If and when consent forms are discarded, they will be securely destroyed by the supervisor or the university.

Queries and Concerns:

- **Contact Details for More Information:** If you have any questions or concerns about the study, please contact Michelle Adiwangsa michelle.adiwangsa@anu.edu.au, or Dr Duncan Stevenson duncan.stevenson@anu.edu.au
- **Contact Details if in Distress:** If you experience any distress during or after the study, please do not hesitate to notify the researcher and you can choose to opt out of the research at any point in time. The Australian National University also runs the ANU Counselling Centre, which promotes, supports, and enhances mental health and wellbeing within the University student community. It is a free, confidential, and non-diagnostic service available to all currently

enrolled ANU students. No referral or Mental Health Treatment Plan from a General Practitioner is required to attend appointments. You can contact the ANU Counselling Centre at +61261252442 or counselling.centre@anu.edu.au

- You may also contact Lifeline, a national charity providing everyone in Australia experiencing a personal crisis with access to 24-hour crisis support and suicide prevention services. Lifeline is committed to empowering Australians to be suicide-safe through connection, compassion, and hope. Lifeline will not ask for your name or seek identifying information unless they need it to adequately respond to your request or to assist you. You can contact Lifeline by phoning 13 11 14, or through their online chat which can be accessed from www.lifeline.org.au. If you feel that your life is in danger, call 000 (Emergency Services).

Ethics Committee Clearance:

The ethical aspects of this research have been approved by the ANU Human Research Ethics Committee (Protocol 2018/576). If you have any concerns or complaints about how this research has been conducted, please contact:

Ethics Manager
The ANU Human Research Ethics Committee
The Australian National University
Telephone: +61 2 6125 3427
Email: Human.Ethics.Officer@anu.edu.au

Appendix B: Consent Form (Stage I)



Australian
National
University

WRITTEN CONSENT for Participants

Designing and Evaluating an Interface System to Combat Loneliness and Isolation Among Non-Native Speakers of English

I have read and understood the Information Sheet you have given me about the research project, and I have had any questions and concerns about the project (listed here _____)

addressed to my satisfaction. I agree to participate in the project. YES ☐ NO ☐

I agree to this interview being audio-recorded YES ☐ NO ☐

I agree to be identified in the following way within research outputs:

Full name YES ☐ NO ☐

Pseudonym YES ☐ NO ☐

No attribution YES ☐ NO ☐

Print Name:

Signature:.....

Date:

The same consent form was used for both the interviews and the focus groups. However, I explicitly told my focus group participants before giving them the consent form that they have to choose “No” for the question that asks whether they “agree to this interview being audio-recorded”.

Appendix C: Scenarios and Questions for Interviews (Stage I)

Scene 1

Imagine you are a **first-year International Student from Shanghai**, studying environmental science in the College of Science in ANU. This is your first time in Australia and also your first time living abroad by yourself, without your parents or any relative. You decide to live in a single studio in UniLodge: a small but comfortable room just for yourself, including a kitchen and a personal bathroom. You have no roommate and you don't know anybody else in Australia.

Your command of the English language is good enough; it is not perfect, but you have no problems in terms of understanding the content of your lectures. You can communicate well enough in English, albeit with a noticeable Chinese accent. As you are not used to hearing it, you find it difficult to understand Australian accent and slang words.

Food is not catered in UniLodge, and you are not used to doing chores or cooking because back in Shanghai, your family has hired a house keeper to do them for you. Money is not an issue for you or your family, and as an International Student you are required to study full time.

Questions

1. As a student, you might be busy with studying, working, house chores, social life, and/or something else.
 - Given a total of 20 hours available time, how would you allocate your time for each commitment?
 - Studying:
 - Working:
 - House chores:
 - Social Life:
 - Down time (relaxing, watch tv, etc.):
 - Others (please mention):
2. Studies have shown that overseas students might be unfamiliar with the host country's social norms or culture, which could lead to a misunderstanding or even conflict among them. This can make it difficult for them to socialise with residents of the host country, which could lead to loneliness. For example, it is considered a social norm to walk on the left side of the road in Australia, but in other countries the norm is to walk on the right side of the road.

As an international student, you might not be familiar with the social conventions, rules, regulation, and norms in Australia. This might even include things like how to behave in sports or social clubs.

- Would you know that rules, regulation, or norms could be different in different countries?

- How do you/would you find out about them?
 - How would you adapt to these changes?
 - What do you think would be able to help you adapt?
3. Remember that your persona finds it difficult to understand Australian accent and slang words.
- Would you be comfortable approaching an Australian to socialise with?
 - Would you want to mingle with the Australians?
 - What do you think would be able to help you improve your interaction with the Australians?
4. People who are living in a new country by themselves might want to meet new people to make friends with. As an international student living in a new country (Australia) by yourself, and for the first time, you might also want to meet new people to make friends with.
- How would you feel about this idea? Would you want to meet new people? Tell me about it.
 - What would be your ideal number of friends?
 - If you want to meet new people, how would you do it?
 - What kind of activities would you want to do with your new friend?
 - How often would you prefer to meet?
 - How would you prefer to communicate?
 - Sometimes, you and your friends might be busy with your studies, work, or something else.
 - How would you make sure you don't eventually lose contact with your friend?
 - Would you want a shared calendar to know each other's schedule?
 - Studies have mentioned that a person's networking abilities could help with their social interaction.
 - How confident do you think you would be in your networking abilities?
 - Would you want to improve it? Why?
 - Studies have also mentioned that the number of friends you have could influence your social life.
 - What would be some possible ways in which you could make more friends?
 - How would you find people with the same interests as you have?
 - Once you find people with the same interests, would you go out of your way to introduce yourself and become friends?
 - Do you think that this persona would be interested in finding a romantic companion?
5. You live alone, and your family are all back in Shanghai.
- Would you want to have regular communication with your family? If so, how often?
 - What would be your preferred method of communication?
 - What do you think you would want to talk about?
6. Without catered meals in UniLodge, how would you get your meals? Remember that your persona is not used to cooking.

- If answered cooking, would you prefer cooking in groups or alone?
 - Regardless of your preferred method of obtaining your meals, would you prefer eating by yourself, or with someone else for company? Why?
 - If answered with someone else, would eating alone affect your eating behaviour?
7. Would you care about staying in shape or keeping a healthy lifestyle by exercising?
- Why?
 - If answered yes, would you prefer exercising alone or in groups?
 - If answered in groups, would you still exercise if no one else is going to exercise with you?
 - How would your persona think about sporting or social clubs?
 - Would your persona be aware of using fitness activities and sports to make social contact?
8. Who would you rely on in terms of needs? Mention your persona's go-to person for each category:
- Personal issues:
 - Studies:
 - Financial issues:
 - Health issues:
9. What would your persona do when your persona is bored?
- If answered watching TV, being on social media, or the likes, what else would they do?
 - Would you think one can be lonely even with someone else around?
 - Conversely, would it be possible for you to not feel lonely, even when you are alone?
 - Would you consider the nature or animals as company?
 - Would you think of loneliness as a negative thing?
 - With your situation, do you think you would be lonely?
 - How would you rate your loneliness?
 - What would you do to cope with loneliness?
10. The following questions are related to social media use:
- Imagine that you are on Facebook, and you like posting on your friend's 'wall' or tagging them on funny videos. You know that your friend has seen them but is not sending you any reply. They appreciate them, but they do not think it is necessary in the context of your posts or tags.
 - How would you feel?
 - Would you dislike a social media platform that does not let you post or see your friends' activities? Why?
 - What would you think about limiting social media posting to just useful information sharing? For example, you will not be able to see your friend's recent trip to Paris, but you might share recent news on education policies, a new clinic opening, or recommended food places. Why?

Imagine you are a **first-year Domestic student from a small town in rural NSW**. You've lived there your whole life and are now moving to Canberra to study Law in the ANU. You are very close to your family, including your mom and dad, younger brother, and grandparents. Because it is a small town, you know most of the people living there too. However, you have no relatives in Canberra and you don't know anyone living here.

You decide to live in the Burton & Garran hall (B&G). You have a small but comfortable room just for yourself, which includes a bed, a desk, a small wardrobe, and a small sink. On every floor there is a shared bathroom (which you share with the other residents living in the same floor as you do), and you need to head down to the Ground floor if you want to go to the kitchen. Food is not catered in B&G, and you have almost no experience cooking because your grandma usually cooks for you and your family, while everyone else is at work or studying.

Questions

1. As a student, you might be busy with studying, working, house chores, social life, and/or something else.
 - Given a total of 20 hours, how would you allocate your time for each commitment?
 - Studying:
 - Working:
 - House chores:
 - Social Life:
 - Down time (relaxing, watch tv, etc.):
 - Others (please mention):
2. People who are living in a new city by themselves might want to meet new people to make friends with. As a domestic student living in a new city (Canberra) by yourself, and for the first time, you might also want to meet new people to make friends with.
 - How would you feel about this idea? Would you want to meet new people? Tell me about it.
 - What would be your ideal number of friends?
 - If you want to meet new people, how would you do it?
 - What kind of activities would you want to do with your new friend?
 - How often would you prefer to meet?
 - How would you prefer to communicate?
 - Sometimes, you and your friends might be busy with your studies, work, or something else.
 - How would you make sure you don't eventually lose contact with your friend?
 - Would you want a shared calendar to know each other's schedule?
 - Studies have mentioned that a person's networking abilities could help with their social interaction.
 - How confident do you think you would be in your networking abilities?

- Would you want to improve it? Why?
 - Studies have also mentioned that the number of friends you have could influence your social life.
 - What would be some possible ways in which you could make more friends?
 - How would you find people with the same interests as you have?
 - Once you find people with the same interests, would you go out of your way to introduce yourself and become friends?
 - Do you think that this persona would be interested in finding a romantic companion?
3. You live alone, and your family are all back in your hometown in rural NSW.
- Would you want to have regular communication with your family? If so, how often?
 - What would be your preferred method of communication?
 - What would you think you would want to talk about?
4. Without catered meals in B&G, how would you get your meals? Remember that your persona is not used to cooking.
- If answered cooking, would you prefer cooking in groups or alone?
 - Regardless of your preferred method of obtaining your meals, would you prefer eating by yourself, or with someone else for company? Why?
 - If answered with someone else, would eating alone affect your eating behaviour?
5. Would you care about staying in shape or keeping a healthy lifestyle by exercising?
- Why?
 - If answered yes, would you prefer exercising alone or in groups?
 - If answered in groups, would you still exercise if no one else is going to exercise with you?
 - How would your persona think about sporting or social clubs?
 - Would your persona be aware of using fitness activities and sports to make social contact?
6. Who would you rely on in terms of needs? Mention your go-to person for each category:
- Personal issues:
 - Studies:
 - Financial issues:
 - Health issues:
7. What would you do when you are bored?
- If answered watching TV, being on social media, or the likes, what else would you do?
 - Would you think one can be lonely even with someone else around?
 - Conversely, would it be possible for you to not feel lonely, even when you are alone?
 - Would you consider the nature or animals as company?
 - Would you think of loneliness as a negative thing?

- With your situation, do you think you would be lonely?
 - How would you rate your loneliness?
 - What would you do to cope with loneliness?
8. The following questions are related to social media use:
- Imagine that you are on Facebook, and you like posting on your friend's 'wall' or tagging them on funny videos. You know that your friend has seen them but is not sending you any reply. They appreciate them, but they do not think it is necessary in the context of your posts or tags.
 - How would you feel?
 - Would you dislike a social media platform that does not let you post or see your friends' activities? Why?
 - What would you think about limiting social media posting to just useful information sharing? For example, you will not be able to see your friend's recent trip to Paris, but you might share recent news on education policies, a new clinic opening, or recommended food places. Why?

Scene 3

Imagine you are a **first-year Domestic student from Canberra**. Your parents were originally from Thailand, but you were born and raised in Canberra after they became citizens here. While their command of the English language is good enough for professional work, they are not as good as you or any other local speakers (Australians). They sometimes have difficulties understanding local accents or slangs, and are quite limited in terms of their vocabulary.

You still live with your parents in a house in South Canberra. You don't really know how to cook, but thankfully, your mom cooks for you and your family, which also include your dad and your three younger sisters. Your parents really need you to help around the house with the chores, especially because your siblings are still at a quite young age. Even though you are turning 18 this year, your parents still expect you to be back home by at most 9pm.

Questions

1. As a student, you might be busy with studying, working, house chores, social life, and/or something else.
 - Given a total of 20 hours, how would you allocate your time for each commitment?
 - Studying:
 - Working:
 - House chores:
 - Social Life:
 - Down time (relaxing, watch tv, etc.):
 - Others (please mention):

2. People starting university might want to meet new people to make friends with. As a new university student, you might also want to meet new people to make friends with.
 - How would you feel about this idea? Would you want to meet new people? Tell me about it.
 - What would be your ideal number of friends?
 - If you want to meet new people, how would you do it?
 - What kind of activities would you want to do with your new friend?
 - How often would you prefer to meet?
 - How would you prefer to communicate?
 - Sometimes, you and your friends might be busy with your studies, work, or something else.
 - How would you make sure you don't eventually lose contact with your friend?
 - Would you want a shared calendar to know each other's schedule?
 - Studies have mentioned that a person's networking abilities could help with their social interaction.
 - How confident do you think you would be in your networking abilities?
 - Would you want to improve it? Why?
 - Studies have also mentioned that the number of friends you have could influence your social life.
 - What would be some possible ways in which you could make more friends?
 - How would you find people with the same interests as you have?
 - Once you find people with the same interests, would you go out of your way to introduce yourself and become friends?
 - Do you think that this persona would be interested in finding a romantic companion?
3. Some people might not communicate with their family much, even if they live together.
 - Would you want to have regular communication with your family? If so, how often?
 - What would be your preferred method of communication?
 - What do you think you would want to talk about?
4. Let's say your parents are away on a trip with your siblings, leaving you alone. Without anyone cooking for you, how would you get your meals? Remember that you are not used to cooking.
 - If answered cooking, would you prefer cooking in groups / on a roaster?
 - Regardless of your preferred method of obtaining your meals, would you prefer eating by yourself, or with someone else for company? Why?
 - If answered with someone else, would eating alone affect your eating behaviour?
5. Would you care about staying in shape or keeping a healthy lifestyle by exercising?
 - Why?
 - If answered yes, would you prefer exercising alone or in groups?
 - If answered in groups, would you still exercise if no one else is going to exercise with you?
 - How would your persona think about sporting or social clubs?

- Would your persona be aware of using fitness activities and sports to make social contact?
6. Who would you rely on in terms of needs? Mention your go-to person for each category:
- Personal issues:
 - Studies:
 - Financial issues:
 - Health issues:
7. What would you do when you are bored?
- If answered watching TV, being on social media, or the likes, what else would you do?
 - Would you think one can be lonely even with someone else around?
 - Conversely, would it be possible for you to not feel lonely, even when you are alone?
 - Would you consider the nature or animals as company?
 - Would you think of loneliness as a negative thing?
 - With your situation, do you think you would be lonely?
 - How would you rate your loneliness?
 - What would you do to cope with loneliness?
8. The following questions are related to social media use:
- Imagine that you are on Facebook, and you like posting on your friend's 'wall' or tagging them on funny videos. You know that your friend has seen them but is not sending you any reply. They appreciate them, but they do not think it is necessary in the context of your posts or tags.
 - How would you feel?
 - Would you dislike a social media platform that does not let you post or see your friends' activities? Why?
 - What would you think about limiting social media posting to just useful information sharing? For example, you will not be able to see your friend's recent trip to Paris, but you might share recent news on education policies, a new clinic opening, or recommended food places. Why?

Appendix D: Focus Group Questions (Stage I)

Participant number: _____

Focus Group Questions

Studies indicate that international students would be able to adapt to another country's rules and regulation more easily with the help of a guidebook that listed the dos and don'ts or any other tips.

1. What would you like to see in an International Students Online Interactive Guidebook? Think of what 'interactive' means to you: What type of interaction would you want? What kind of device would you want to use? How would you like to control this device (eg. mouse, touch screen, etc.)?

While a guidebook can serve as a guidance, our studies have found that international students need acceptance and tolerance from those around them while they learn to adapt to new rules and regulations.

2. Would it be important for you to be accepted and tolerated? What would an accepted and/or tolerant environment look like to you? Accepted by whom?
3. Would you think that having some sort of preparation (like a guidebook) could play a part in how accepted/tolerated you are?

The first two weeks in university are considered to be critical for new students, especially for them to get into a good routine for their new life in university.

4. What would you think could help you, as an international student, during your first two weeks of university to get into this routine?
5. What would you think the role of orientation week should be for international students?

Market Day is one of the key events during orientation week that lets students join clubs and societies based on their interest.

6. What would you think about the Market Day stalls? Do you think you would find many stalls that cater to your interests back in your home country? What would your first experience of Market Day be like?

Most international students expressed that they would like to meet other people in the same courses as them or people with similar interest. We think that having a mobile app feature that connects students by their university courses or interest could help.

7. What would you think of this idea? As an international student, would you think this is what you really want and need to make friends? Would you have any concern with this app?

Some students indicate that they would be embarrassed to cook with someone else whose cooking skill far exceeds their own. They might feel too conscious of the difference in the resulting food quality and don't want to be judged. This is just a specific example of an uncomfortable situation international students might go through due to not having the knowledge or skill to take part in some activities. Even if they are not embarrassed, they might still feel awkward regarding the situation.

8. How would you feel in similar situations (ie. not being able to do things as well as other people due to not having the knowledge or skill required)? Would you feel embarrassed or awkward? How would you deal with the embarrassment or awkwardness?
9. How would you feel in the context of going to the gym or playing sports? Would you be comfortable in joining a gym/sports that you are not very familiar with? If your answer is yes, what was it that made you comfortable to join these clubs?

Studies indicate that international students would also be able to adapt to country's rules and regulation more easily if they have someone who is already familiar with it. Citizens of a country would normally be the ones who are most familiar with their own country's rules and regulations.

10. As an international student in Canberra, would you like to have an Australian as a buddy during your first few months in Canberra for an organised weekly interaction? If so, what do you think could motivate Australians to sign-up for this buddy program? On the other hand, what would you contribute to your new buddy?

Appendix E: Participant Information Sheet (Stage II)



Participant Information Sheet

Researcher:

My name is Michelle Adiwangsa and I am the primary investigator for this research project. I am a Bachelor of Advanced Computing Honours student in the Research School of Computer Science (of the College of Engineering and Computer Science) at the Australian National University. My primary interest lies in Human Computer Interaction (HCI) area and I aim to find better ways in which technology can be used for the benefit of the society. This research is supervised by Dr Duncan Stevenson, who is an Honorary Associate Professor at the Research School of Computer Science.

Project Title: Designing and Evaluating an Interface System to Combat Loneliness and Isolation Among Non-Native Speakers of English

General Outline of the Project:

- **Description and Methodology:** Non-native English speakers living in an English-speaking country might have difficulties interacting with others, especially with local citizens of the country. Without a sufficient level of social interaction, they could experience loneliness and isolation, which could lead to harmful effects to both their physical and mental well-being. The use of interactive technology can be proposed as a possible platform that could help combat loneliness and isolation for these people, in ways that will be investigated in this research project. In the first stage of this research, we have conducted (a) individual interviews to find out how you and different groups of people view loneliness and isolation, to gain a rich pool of ideas to draw from to design an early-stage prototype; and (b) a focus group to validate and improve on the early-stage prototype ideas extracted from our interview analysis. We conclude that the root cause of loneliness and isolation among non-native English speakers could be the lack of cultural competence, and therefore our prototype ideas will focus on the ways in which we could assist non-native English speakers develop cultural competence in the English-speaking country they are currently living in. We are now in the second stage of this research, where we will begin conducting user studies to evaluate the interactive ideas that are presented in our proposed interactive mobile prototype.
- **Participants:** Data from 5 participants (in the 18 – 24 years old group) will be collected from international students with non-English-speaking background within the Australian National University for the interview.
- **Use of Data and Feedback:** Feedback from the user study will be used to assess the usefulness of the ideas that are presented in the proposed interactive mobile prototype and to guide future research in this area. Findings will be presented in an Honours thesis for the Research School of Computer Science in the Australian National University and potentially in a future research

conference. You will be informed during the debriefing session that you may opt to get feedback on the research findings at the end of the project.

Participant Involvement:

- **Voluntary Participation & Withdrawal:** You do not have to take part in this study. Participation in this study is voluntary and you are free to withdraw at any time before the cut-off date or refuse to answer any question without giving a reason and without experiencing any negative repercussions. If you do withdraw, your data will be destroyed. Responses for the user study can no longer be withdrawn after Friday, 26 April 2019.
- **What does participation in the research entail?** In the second stage of this research, you will take part in an individual user study to evaluate the interactive ideas that are presented in our proposed interactive mobile application (the prototype). You have been recruited because you are an international student in the ANU community with a non-English-speaking background, which is our target group for the interactive mobile prototype. I hope to learn whether the proposed mobile application could help you and other international students develop cultural competence more easily, and if not, what can be done to improve our proposed mobile prototype. For the user study, you will be presented with hypothetical yet common scenarios relating to living in Australia through the interactive mobile application, and then asked to role-play how you would respond or react in such scenarios as an international student who had just recently arrived in Australia.

Your responses will be audio-recorded by the researcher only if you consent to it. The researcher will use the audio recordings to refresh her memory of the user study. Recordings will not be made public and will only be accessible to the researchers.

- **Location and Duration:** This research will take place within the Australian National University campus. You will only be required to attend one user study. The user study will take between 30 minutes and one hour.
- **Risks:** There is a risk of psychological harm in this study as the study deals with the issue of loneliness and isolation. However, as the user study mainly deals with the issue of cultural competence instead of loneliness and isolation directly, we expect to minimise the risk of psychological harm to you. The nature of the methodology of this research also minimises your risk of experiencing discomfort during the study, by presenting you with hypothetical scenarios and using role-playing to gain your responses, instead of asking how the application would have affected you directly. However, in the case that discomfort still arises for you, an appropriate procedure will be followed. I will inform you that you can choose to opt out of the research at any point in time and be on the lookout for signs of distress that you may exhibit during the data collection process, for example due to loneliness that you might be experiencing. In the case that a sign of distress is observed, I will ask if you are okay and offer to stop the interview or user study. I will also inform you of the existence of the ANU counselling services, so that you would be aware of the existence of a professional help that they can seek. You may opt for your data to be anonymised, but there is still a possibility of third-party identification – that is, you might be identified by what you tell us despite our best efforts to hide your identity.

- **Benefits:** The research will contribute to the broader understanding of the possibilities of using modern mobile technologies to contribute to community well-being. There is no expectation of a direct benefit to you, but we aim for this research to benefit firstly the non-English-background international student community at the university and later the broader community by introducing a suitable interface that could help combat loneliness and isolation, by helping develop cultural competence. We also expect for this research to improve both your and our understanding of loneliness and isolation, and how it can affect anyone in the community. For domestic students or other local residents, we wish that the outcome of this study can help them better sympathise with the challenges and difficulties that might be faced by an international student with non-English-background.

Exclusion criteria:

- **Participant Limitation:** For the user study, data will be gathered from 5 international students with a non-English-speaking background. You should be within the 18 – 24 years old age group, which is our target audience as people in this age group has been reported to exhibit the highest rate of loneliness and isolation. International students will only be recruited if their native language is not English.

Confidentiality:

- **Confidentiality:** All data will be protected and remain confidential in so far as the law allows. Your name will not appear on any research documentation except the consent form and your data will be recorded in a de-identified form, by attaching a number to your responses. Data collected from this study may be aggregated with other participants' data when reported in the research thesis, but in the case of individual analysis of data, your information will be attributed with a pseudonym. If you decide to withdraw from the study, your data will be destroyed.

Privacy Notice:

In collecting your personal information within this research, the ANU must comply with the Privacy Act 1988. The ANU Privacy Policy is available at https://policies.anu.edu.au/ppl/document/ANUP_010007 and it contains information about how a person can:

- Access or seek correction to their personal information;
- Complain about a breach of an Australian Privacy Principle by ANU, and how ANU will handle the complaint.

Data Storage:

- **Where:** Electronic data will be kept secure in a password protected personal machine, whereas papers will be kept in a safe and secure storage. Only the primary investigator (Michelle Adiwangsa) and the supervisor (Dr Duncan Stevenson) will have access to this information.

- **How long:** All data and associated consent forms will be kept for at least 5 years from the time of publication.
- **Handling of Data following the required storage period:** Following the required storage period, data may be archived or retained in a de-identified format by the researcher and supervisor, as deemed fit whether it would be of further use. If and when consent forms are discarded, they will be securely destroyed by the supervisor or the university.

Queries and Concerns:

- **Contact Details for More Information:** If you have any questions or concerns about the study, please contact Michelle Adiwangsa michelle.adiwangsa@anu.edu.au, or Dr Duncan Stevenson duncan.stevenson@anu.edu.au
- **Contact Details if in Distress:** If you experience any distress during or after the study, please do not hesitate to notify the researcher and you can choose to opt out of the research at any point in time. The Australian National University also runs the ANU Counselling Centre, which promotes, supports, and enhances mental health and wellbeing within the University student community. It is a free, confidential, and non-diagnostic service available to all currently enrolled ANU students. No referral or Mental Health Treatment Plan from a General Practitioner is required to attend appointments. You can contact the ANU Counselling Centre at +61261252442 or counselling.centre@anu.edu.au

You may also contact Lifeline, a national charity providing everyone in Australia experiencing a personal crisis with access to 24-hour crisis support and suicide prevention services. Lifeline is committed to empowering Australians to be suicide-safe through connection, compassion, and hope. Lifeline will not ask for your name or seek identifying information unless they need it to adequately respond to your request or to assist you. You can contact Lifeline by phoning 13 11 14, or through their online chat which can be accessed from www.lifeline.org.au. If you feel that your life is in danger, call 000 (Emergency Services).

Ethics Committee Clearance:

The ethical aspects of this research have been approved by the ANU Human Research Ethics Committee (Protocol 2018/576). If you have any concerns or complaints about how this research has been conducted, please contact:

Ethics Manager
The ANU Human Research Ethics Committee
The Australian National University
Telephone: +61 2 6125 3427
Email: Human.Ethics.Officer@anu.edu.au