

# Using co-design to design a communication tool for a culinary school

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## ABSTRACT

In this paper, we present the results of a co-design project with the students and administrative staff (SAS) of Infinity Culinary School (ICT) in Cape Town. Through which we have developed ICTchefs, a prototype for a mobile application to help the graduates and current students of ICT to communicate any changes in their lives with the school's administrative team. We initiated the project using various co-design methods to empower the SAS to use their own knowledge and experiences to define our shared design and research agenda. We present our process and its outcomes while noting the importance of engaging with the school using techniques that considerate of their experience with design methodologies. Furthermore, we demonstrate how iterative co-design prototyping cycles give SAS time to develop confidence and experience around the use of technology in their work. We argue that when SASs are empowered to contribute their creativity and local experiences in this manner, the outcome is technology that is best suited for their unique context of work in ways that would not be achieved using conventional approaches to design. Finally, we present outcomes of the co-design efforts and articulate design requirements for ICTchefs.

## CCS Concepts

Human Centered Design.

## Keywords

Co-design, mobile development, communication, design process.

## 1. INTRODUCTION AND BACKGROUND

In every growing organization, managing communication across all members is an increasingly difficult task. As the organisation grows, the information about members becomes harder to update and the task of dispersing information to all members becomes more laborious. This is even more so in organizations that value building personal relationships with all their members [26]. Social media platforms are often used as a means for communities to communicate effectively since they do not leave communication to the administrative team. Information can be carried over by all members of the organisation [10]. However, when it comes to sharing personal information and maintain an updated record of each member, organisations need more specialised tools that can allow members to maintain and update their own record.

In organizations that have specialized requirements it is difficult to develop a tool that can effectively manage communication between the administrative team and the members [12]. It is often the job of the administrative team to manually maintain their member's database. In this project, we investigate ways to the reduce task of data management in

### 1.1 Infinity Culinary School

Infinity Culinary Training (ICT) is a non-profit organisation that equips young disadvantaged men and women with basic cooking skills to find employment. In addition to professional culinary skills, the organisation strives to foster life skills to encourage personal development and enable students to thrive in the catering industry [7]. Students who have been accepted to the program go through a 3-month intensive training program followed by a 1 month paid internship and a placement in the work field. After each class begins their internship placements a new group of students begins their training. Each class is made up of at least 20 students. ICT started in 2009 and has over 297 graduates to date.

One of the things that set ICT apart is their commitment to the personal development of students [7], even after they have graduated from the school. It is important for the organisation to remain in contact with their graduates to continue to support them on their professional journeys. However, the increase in the number of graduates has made this a more difficult task for the administrative staff which is made up of only 3 people.

The school uses a spreadsheet to keep record of all their student information. The spreadsheet is shared by everyone in the administrative team. Any changes to the student's information must be entered by the admin team manually. To put this into perspective, every time any of the 297 graduates changes their phone number someone in the admin team must find that student's record in the spreadsheet and update it.

### 1.2 Project Aims

This paper reports on the communication between ICT and its students to develop ICTchefs. We investigate the ways in which we can develop mobile application that will make it simpler for ICT to maintain an updated record of their students and allow the students to communicate with the school. We deployed various co design methods design tools to encourage the school take part in the design process. Through this project we demonstrate the importance for designers be considerate of their users' experience with technology when choosing a design process. Co-design techniques such as group discussions, focus groups and brainstorming sessions paired up with iterative design approach [22]. Our researched aimed to provide answers to the following research questions:

- How can the artefacts generated through the design process help with implementing a usable system for the school?
- What needs do former students identify in a platform that aims to encourage them to remain in contact with the school?
- How can we empower the SAS of ICT to actively contribute their knowledge and expertise to the design process?

This paper references supplementary material that can be accessed via UCT's Department of Computer Science online publications page at: <http://pubs.cs.uct.ac.za>. The project abbreviation used for this paper is 'NRFDB'. All references to appendices made in this paper refer to these online supplementary materials.

The rest of this paper reports on the iterative design approach we used to design ICTchefs for ICT to encourage alumni and current students to help the school maintain an updated record of their details. We discuss the co-design development process of ICTchefs. Section 3 is a discussion of successful co-design projects that are related to our project. In section 4 we present the methodology and method we deployed to develop a mobile application prototype. In section 5, we discuss the results from the project. In section 6, we discuss the lessons we have learnt over the course of this project.

## 2. RELATED WORK

There are many co-design projects in South Africa that focus on communication and data management in small organizations, and they show the importance of involving the organization in the design process [18]. However, there has not been a project that reports on a co-design journey with a culinary school in South Africa. This is the contribution that this paper seeks to bring, by documenting the process with which the culinary school co-designed a communication and data management tool for alumni and students of ICT.

There is however, research that focuses on how to involve people with no design skills and limited experience with technology in the design process. Maunder et al. advised that for organisations that have a limited prior exposure to technology, conventional design activities need to be altered because at the offset [5], such users will not be able to visualize the use of technology in their contexts or give any productive feedback as they have limited experience against which to judge a technology [14]. The authors therefore recommend, therefore, to first seek to empower users and improve their knowledge and understanding of the technology. One way in which this can be done is to introduce simple artefacts early in the design process, and progressively grow the experience of the users [15]. These and other related studies prove that when progressive design [16] techniques are used, the experience and expertise are built to a point where they can envision the use of technology in their work, and hence begin to contribute ideas on how it can be used further to meet their needs.

When working with an organization there are other stakeholders who may not necessarily use the final product but are affected by its functionality, it is thus important to identify them and involve them in the parts of the project that require their contribution [18]. Ng'ethe et al. recognizes that in the early stages of the project the various stakeholders need to be identified and their role in the design process need to be clearly outlined [3]. This will ensure that the product will not only meet the user's requirements but it will meet the requirements of the organization [10].

This paper contributes to this growing body of knowledge by demonstrating how by employing different forms of communication and expression, and by starting the development process by building a relationship with the school, we could empower them to actively participate in a co-design process to develop a new tool that help them communicate and manage their data.

## 3. PROCEDURES AND METHODS

In this section, we will examine the procedures and methods that were in the design process. We will explain the approach we took and justify why that approach was chosen.

### 3.1 Methodology

In this project, we will use a co-design approach to design a system that addresses the needs of ICT. This approach places users at the core of development and provides methods that enable them to express their requirements [27]. This approach places users at the core of development and provides methods that enable them to express their requirements [22]. In a co-design approach, users are viewed as “experts of their experiences” [28], they are involved in a joint creation with designers to develop solutions to their problems. In this methodology users are not viewed as merely targeted end-users but they become co-designers and contribute actively in key design decisions [27]. A co-design approach is suitable for our research project because the success of the project will be determined by whether the needs of ICT have been catered for.

#### 3.1.1 Co-design

Co design is a design process in which designers and non-designers work collectively in a design development process [17]. A major challenge in software development is the gap between user requirements and the understanding of those requirements by researchers and/or designers during the design phase of software projects [14]. Literature shows that numerous projects have been successful at employing user-centered design and co-design methods to reduce this gap. Results from these projects point to the benefits of user participation, which include a better fit between the system and users' needs, improved system quality, improved user satisfaction, and improved mutual understanding [17,14,2]. Successful co-design projects have collaborated with children, elderly people, and employees from various sectors [17]. While there are projects that have developed applications for chefs and chef students, it appears that none of these have made attempts to include the chefs and students in the design process [23]. Thus, our research project sets out to collaborate with chef students and involve them in all significant stages of design to reap the benefits of co-design. We believe our research will contribute novel scientific knowledge about co-designing with chefs and chef students.

A co-design approach places its users at the core of development and provides methods that enable them to express their requirements [28]. This approach is suitable for our research project because the success of the project is determined by whether the needs of ICT have been catered for. In other words, user involvement is crucial to the project. Our initial meeting with members of ICT revealed that they have a strong understanding of their needs and what they expect from a new system that will address those needs, thus the decision to lean towards a co-design approach. Our design process was divided into two parts, the analysis and requirements phase in which we captured the user requirements and the prototyping phase in which we iteratively prototyped artefacts that meet those requirements.

#### 3.1.2 Analysis and requirements

In the analysis and requirement phase, we collect data about the school so that the developers can understand the current tools and methods of communication and data management at the school [1]. In co-design, it is important to select appropriate methods to use when engaging with users [21]. In the context of a co design project, this includes identifying stakeholders whose contributions are important to the project. Several techniques were applied to collect this information including one-on-one meetings and interviews, questionnaires, surveys and discussion [20]. The aim

of this phase was to design a mapping of the user requirements and technological affordance.

We identified all the important stakeholders of the school and interviewed them during the initial phase of the project. This included, observing the administrative team to learn about the tools they were using at the time and discussing with them what the pros and cons of those tools presented, interviewing their alumni and current students about their school experiences and how they communicate with the school. We took a special interest in how their alumni kept in contact with the school as this was crucial to the school maintaining an updated record.

### 3.1.3 Prototyping

We developed prototypes as part of the design process to model variations of the ICTchefs [18,28]. Prototypes allow designers to evaluate their designs while they are still in the formative stage. Which makes it possible to demonstrate the behaviour of an interface very early in development and test designs with actual users [21]. The prototyping phase of the project was made up of 3 iterations, the low-fidelity, a medium-fidelity, and high-fidelity prototype. Each iteration of design produced prototype which will be tested to evaluate whether they reflect user requirements. Methods for evaluating these prototypes are outlined later in this paper. The medium fidelity prototype artefact was designed using Microsoft PowerPoint while software prototype was designed using open source development tools [13].

Each Iteration had 3 steps (see figure A) namely; planning, developing and collecting feedback. In the planning step of the iteration we decided on the tools we would use for the prototype and analysed the data we had at the time to determine what the prototype should look like [21]. In the developing step of the iteration we made the prototype artefact. In the last step of the iteration we presented the prototype to the school and collected their feedback to improve and evaluate the prototype. The feedback from each iteration was used to develop a more polished prototype for the next iteration.

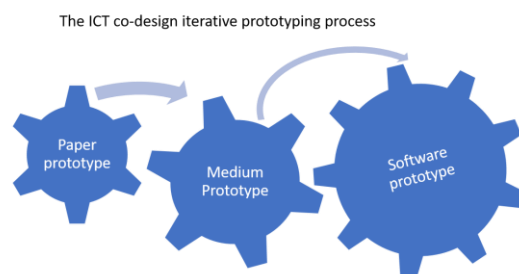


Figure 1- the co-design iterative prototyping process

## 3.2 Evaluation Methods

We used three methods in the user evaluations, a cognitive walkthrough of the prototype, a usability questionnaire and a heuristic test; Cognitive walkthroughs were conducted to examine how users interacted with the interfaces and enable us to determine whether users unfamiliar with the design can perform tasks with ease. The method was selected because it would enable us to put ourselves in the shoes of the user. The usability questionnaire was useful because it gave us the opportunity to enable participants to express their experiences and provide

recommendations about improvements [11]. The heuristic evaluation of the medium prototype was conducted to assess the usability of the interface against a set of predetermined heuristics or guidelines [19]. All three methods were appropriate for this project because they are cheap, easy and effective means of evaluating usability with a small number of participants.

The participants of the low fidelity, commonly called a paper prototype were teachers and the administrative staff. The evaluation was conducted in a group setting, each participant was asked to perform the tasks in the cognitive walkthrough questionnaire (appendix A). After the walkthrough we had a group discussion with the participants to obtain feedback from them about the functionality of the application.

In the medium prototype the admin team and students were the participants, they walked through the application with them and then had a discussion with them about the heuristics of the application. This included the visibility of the menu drawer, the consistency of the application, the general look and feel of the application.

For the final evaluation we only chose participants that had not participated in any of the evaluations, so that we could get honest feedback from new users. The evaluation took place in the following order:

- Giving the participant a brief overview of the project
- Allowing them to explore the prototype without assistance
- Asking them to perform a series of tasks using the prototype
- Asking them to fill in a cognitive walkthrough feedback questionnaire and a usability questionnaire (Appendix A).

## 3.3 Empowering for Co-design

One of the goals of this study was to find the best ways to engage the schools in the process of designing a working on a data management tool, or rather, how to empower the school to participate in the design and research process [6]. Most of the school's members have little or no experience designing digital technology. Our goal in empowering them to participate in the design and research process, was to build in them the freedom and confidence to articulate their needs and devise or propose technical solutions [4].

## 4. RESULTS

In this section, we will examine the procedures and methods that were in the design process. We will explain the approach we took and justify why that approach was chosen.

### 4.1 Phase 1: Understanding User Requirements

In our initial interaction with the school we were trying to understand their needs and the current tools that use to communicate. This phase was meant to foster a discussion around the existing solution and possibilities for improvement.

#### 4.1.1 Results

In the first engagement with the school we had a group discussion with all the teachers at ICT, administrative team we had a discussion with all the teachers, current students and alumni to find out more about their roles at ICT. We investigated how each of them communicate with the staff at ICT and other stakeholders.

### Teachers

The teachers are not involved in the application and data management process. They work very closely with each other to ensure that their teachings are consistent. The classroom lessons only last for 3 months so the teachers maximize their teaching by coordinating their lessons.

Outside of the classroom the students communicate with the teachers using WhatsApp. There is a group chat for the whole class for staff can make announcements and the students can ask questions. Most of the students have smartphones and the teachers confirmed that it is quite rare for a student to not have a smart phone. The teachers are in direct contact with the students they have been assigned to mentor. Mentor-mentee groups consist of a few students (depending on the class size) and one teachers. These groups are more intimate spaces for the students to build relationships with the teachers and for the staff to provide personal support to the students. After graduation, the students report to the administrative team about their professional journeys.

The teachers report that the mentor mentoring system helps the students build trust with the school. A lot of the students come from conservative backgrounds, so they struggle to communicate their needs to the school.

### Students

We interviewed 2 students who are currently on the program. They were finding the school “exciting” because they were learning new skills and “frustrating” due to the intense pressure of working in professional kitchen. The students are required to complete homework for the weekend, a lot of the time this requires them to find information online and access to the internet is still a challenge for some of them.

### Alumni

We had a discussion with two alumni of ICT. They both found it very simple to find jobs after graduating because of the school’s strong reputation. They were happy to come visit the school whenever they could but they had to call first and sometimes the administrative team is too busy to speak on the phone with them. One of them noted that when they worked outside of town they found it difficult to stay in contact with the school and when they lost their phone with all their contacts they had to wait until they could come to Cape Town to inform the school.

When one class begins their internships, a new class starts their training, this means that the teachers now have new mentor-mentee groups. The students you are interning must begin reporting the administrative team, who they have seen very little of during their training. This makes it difficult for them to know who to contact when they need assistance from the school.

### Administrative staff

The administrative team is not in direct contact with the students during training. They are responsible to keeping in contact with the students after training and sometimes they must generate CVs to help them find jobs. Each student is captured into the spreadsheet manually after they are accepted to the school. When a student changes any of their personal details they must inform admin personally. The administrative team is currently struggling to analyse all the information in their spreadsheet, it often takes

long to find a student as some students do not remember the year they graduated. They are also responsible for attracting sponsors to the school. They excel functions to aggregate their data and make graphs for their sponsors.

#### 4.1.2 Analysis of user requirements

The students at ICT have developed their own data management tools from the resources that they have available to them, however as the school grows it has become increasingly difficult for their tools to scale. The school values their personal relationship with all their graduates and they want to maintain that value. The school wants to be informed of any major developments or setbacks in their graduate’s careers and they want to encourage them to be comfortable talking about any problems that they are facing. The tools they currently use to keep track of the students is inefficient and makes it difficult for them to maintain relationships. The school needs a data management tool that will allow them to effectively manage their data by allowing the students to maintain their own profiles [8].

At the end of this phase we concluded that the school needs a data management application, a statistics application and a mobile application. The data management application is a web application for the administrative team to comprehensively view all their student’s information, the statistics application is a component of the data management application that allows the administrative team to visualise the school’s statistics, the mobile application is designed to all the students to update their information personally. This paper reports on ICTchefs, the mobile application prototype designed to meet the students and administrative team’s requirements.

We now had a clear understanding of ICT and their requirements, from this we could draw a stakeholder map (Figure 2) of the important stakeholders at ICT. The stakeholders that play a role in the development of ICTchefs are the teachers, graduates, students and the administrative team. All the key stakeholders have been involved in various stages of developing ICTchefs.

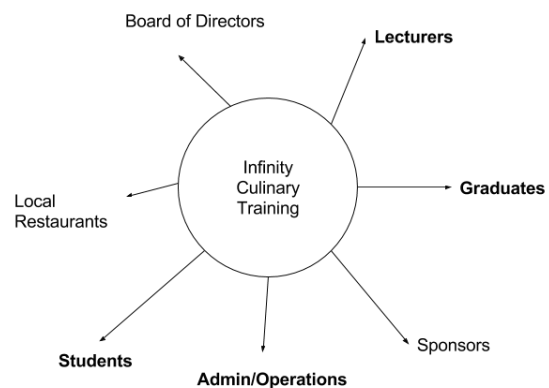


Figure 2: An overview of the important stakeholders at ICT

## 4.2 Phase 2: Prototyping

This section describes the findings made in the 3 iterations of the co-design prototyping of a mobile development application for the students at ICT.

The primary goal of the mobile application is to allow students to remain in contact with the school even if they lose their contacts. The application itself it not intended to be the main means of communication with the school but rather to simplify the

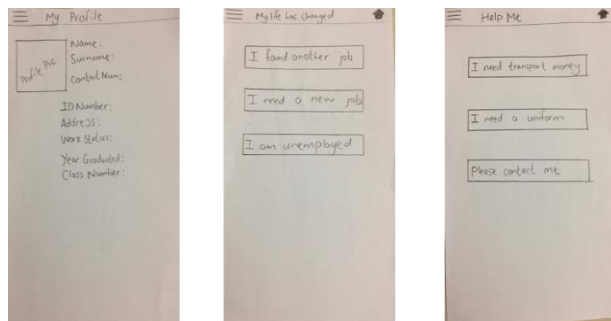
communication of sensitive information such as a change of employment details.

#### 4.2.1 Paper prototyping

The paper prototype was designed and developed by the designers, based on the school's requirements identified in section 5. Next, we describe the design of the paper prototype and the user's feedback

##### Design and walkthrough

The paper prototype was designed using paper and pencil (See figure 3). It was their first time designing a system, as such we wanted to use an artefact that would make them empowered enough to participate in the walkthrough and give us feedback without being intimidated [21]. The prototype was designed to meet the key needs of the school. It was made up of four main screens, the first screen was the home screen (Figure 3a), the second screen was the edit profile screen, the third screen was my life has changed screen (Figure 3b), and the fourth screen has the help me screen (Figure 3c). The prototype had a navigation drawer to navigate the between the screens.



**Figure 3 - From left (a) View Profile, (b) My life has changed, (c) Help me. See Appendix C for enlarged image**

The prototype was presented to the teachers and administrative staff in a cognitive walkthrough. We explained to them that a paper prototype was a drawn skeleton of the application and would serve the purpose of capturing the system requirements. The staff used the prototype to perform tasks while the designers noted their feedback and concerns. See appendix A for the full list of questions that we used in the evaluation

#### Results

In summary, the results from the cognitive walkthroughs and usability interviews were as follows:

- The participants found the application intuitive while others found it difficult to remember where the menu was located.
- Some participants felt that the *help me* screen (figure 3B) should have any other option that allows them to specify what they need help with.
- The administrative team wanted a screen for students to book a meeting with the school

#### Analysis

The paper prototype made the participants more confident about engaging with the prototype. One participant started making sticky notes on each screen so that they could write feedback and all the other participants began to write on the notes on the sticky notes too. The participants started discussing the notes and asking each other why certain changes should be added to the prototype.

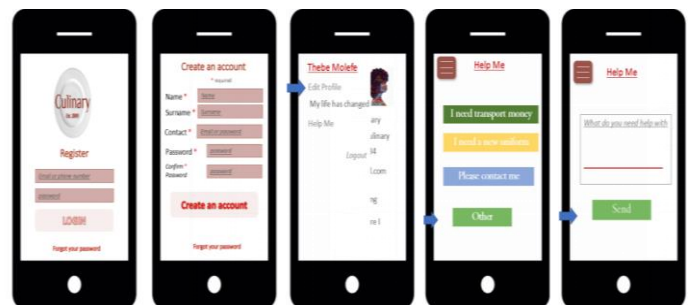
After the cognitive walkthrough the participants were confident that the application meets the school's requirements and would "save" them a lot of time. The participants raised concerns about some of the functionality and their main concern was how the options on the main menu would work. We initially thought we would make a database that would store every time a student sends a notification to the school, however the school preferred to receive the notifications via email and SMS. They suggested that and SMS should be sent to the administrative team when any of the help me options are used. In the same regards, it was suggested that for the My life has changed options an email should be sent to the school with the details of the change. This way the database will only be used to store and update the user's details.

#### 4.2.2 Medium prototyping

The medium fidelity prototype was designed and developed by the designers using Microsoft PowerPoint Presentation. We used the feedback from the previous iteration to design and polish it. Next, we describe the design of the mobile application and the user's feedback

##### Design and walkthrough

To design the second prototype, we considered all the feedback from the paper prototype. We carefully analysed how we could add use it to improve the prototype. The option to choose 'other' was added to the help me and my life has changed screens (figure 4c). The interface design was based on the school's colours (See figure 4). The medium prototype, unlike the paper prototype included the login (figure 4a) and register features (figure c).



**Figure 4 - From left (a) Login, (b) Create an account, (c) Navigation drawer, (d) help me, and (e) help me: other. See Appendix D for enlarged image.**

Due to the school's schedule for the second iteration we only had access to the administrative system. We started the cognitive walkthrough by explaining to the school that the prototype was designed using Microsoft PowerPoint, this is to encourage them to encourage them to give participate without being intimidated [21]. We completed the set of tasks that they performed on the mobile application and wrote down the feedback that they gave to us. After the walk through we asked them to fill in an evaluation form the co-design methods we used and for the mobile application.

#### Results

The results of the cognitive feedback we had with the participants about the second prototype are as follows

- The participants struggled to remember that the navigation drawer was in fact the men, they were uncertain of when they could or could not return to it

- Most of the participants liked that the application used ICT's colours, however some participants were concerned about the use of multiple colours for the 'help me' (figure 4d) options
- The log out option is a menu option in the navigation drawer, some of the participants were concerned that they could press it by accident.
- The participants used the 'other' option to send emails to the school
- The admin team wants to be informed every time a new user creates an account

## Analysis

The second prototype addressed most of the issues with the first prototype, it allowed the participants and researchers to clear misunderstandings that they have about the application's functionality. The rich interface gave the participants a more realistic view of the application's navigation. The participants agreed that even though the navigation drawer worked well in the paper prototype it would not be helpful in the final prototype. They recommended that we replace it with a top menu bar that would use icons. This way the menu is always visible to the students. It was also suggested that all the 'help me' options have one colour as the varying colours might be a visual query to some users. Most of the participants found the 'other' option helpful, they also recommended that it include an option to allow the students to inform the school when they would like to meet. This will let them know how urgent the matter is to the student.

ICTchefs is an exclusive application in that only students of the school should have access to the application. The school needs to be able to ensure that every student who creates an account is in fact a member or graduate of the school. The recommendation is to include a prompt message for when a user attempts to create an account. The prompt will inform that the application is only for the students and graduates of ICT.

### 4.2.3 Paper prototyping

The software prototype of the mobile application was developed based on the feedback from the second iteration. It was built on android studio, it only works on android devices. Next, we describe the design process of the mobile application software prototype and the user evaluation.

### Design and Implementation

One of the things that make designing for ICT different is that most of their users are already captured in the database. The graduate's information is already stored in the database, when they register as new users they are in fact activating their existing records from the spreadsheet. The mobile application should be able to add students to the ICT database and edit their profiles.

ICT gave us access to a spreadsheet with all their student records. We converted the spreadsheet into a MYSQL database and made a web server using Django access the database from the mobile application.

The interface of the ICTchefs was designed to resemble the medium prototype with improvements based on the feedback from the previous iteration. The software prototype has a top menu bar (figure 5) that does not disappear. The top menu bar has a title bar on top of it that shows the name of the current screen. The icons on the top menu bar were suggested to the school and they approved them.



**Figure E - From left (a) home, (b) edit Profile, (c) my life has changed, (d) help me, and (e) request a meeting. See Appendix D for enlarged image**

When a user login in to the application a request is sent to the Django server with the student's username and password as parameters. The request then responds with that users details if the password and username match. When the use updates their details, a request is also sent to the server to update their details on the database which will also update the data management application and the statistics application.

The application makes use of sqlite to store the student's information so they will not have to login every time they use the application but they will still need to be connected to the internet to update their profiles and send emails. When the application sends an SMS, the user has the option to change the contact details they want the school to contact them on. The 'other' option allows them to also send an SMS to the school if they are not connected to the internet [20].

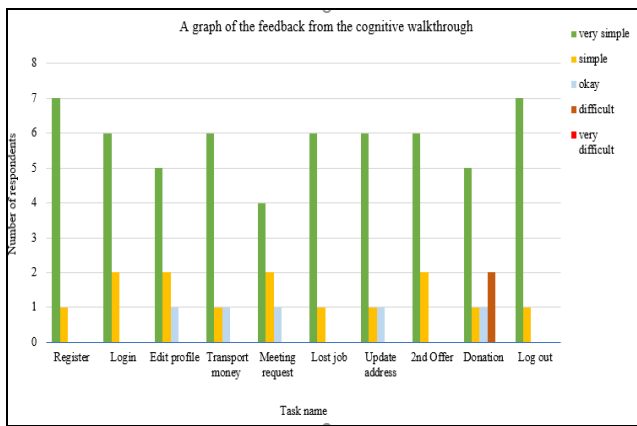
Although most of the functionality of the application works, it is still a prototype because it has not been tested in the real world. The paper prototype was evaluated in 2 sessions; the first session was with the administrative staff and the second session was with the students. We conducted a cognitive walkthrough in which they to test the functionality of the application. After the walkthrough with the administrative team we discussed the heuristic evaluation. We evaluated the prototype on 8 ICT students, four were the new students and another four were alumni of the school.

## Results

We collected the feedback from the cognitive walkthrough feedback questionnaire and usability questionnaire (see figure 5) with the students and alumni of ICT.

The login and logout tasks were the simplest to perform. For every task in the walkthrough a large majority of the students found it 'very simple' to perform. The task that had the highest variation in responses was the 'make a donation' task, it was also the only one that was marked 'difficult'. No participant marked any task as 'very difficult'. Some of the students tried to register through the login interface but realised later that they had to click on the register button first.





**Figure 5: A graph of the feedback from the cognitive walkthrough. See Appendix E for enlarged image**

## Results

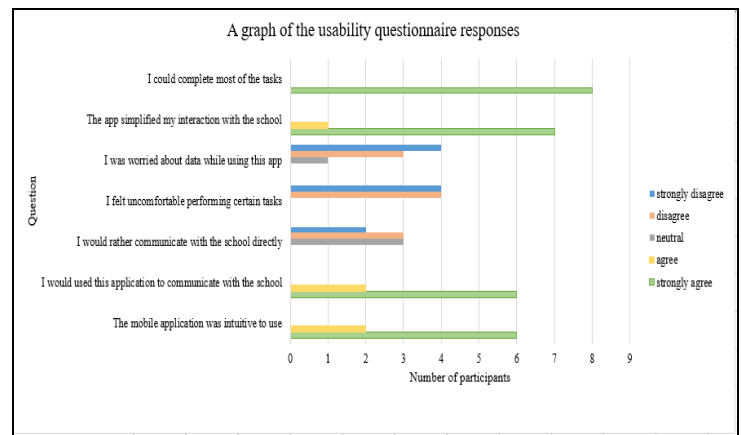
The following are the results from the heuristic evaluation discussion with the administrative staff at ICT after their cognitive walkthrough

In our discussion with the administrative staff about the application, they were pleased with of the layout and theme of the application. They want the application to have on swipe capabilities, as this will make it simpler for users. They also want the ‘Donation’ option to be removed from the application. For the application, we had created a separate email account for the email notifications but the school wants the emails to be sent to human resources directly. They also want an ‘I got a new job’ option to be added to the My life has changed screen.

They noted that the login screen buttons look more like text than buttons so we should add a 3D feel to them. They did not like the dark burgundy colour of the application on the registration form, they suggested that we make the colour much brighter. They also suggested that the colour of the dialog boxed should be white and not the application’s theme colour.

## Analysis

All the functionality issues were fixed in the first prototype and the interface issues were resolved in the second prototype. As a result, all the participants could complete most of the tasks (figure 6). All the students that used the ICTchefs agreed that the application simplified their communication with the school. A few of the participants indicated that they are neutral about using the application as oppose to going to the school directly, however, most them agreed that they would use the application to communicate with the school. During the first phase of the project the administrative team told us that the students often struggle to inform them about any problems that they have. In the usability questionnaire (figure 6), all the students disagreed to being uncomfortable performing the tasks. None of the participants were concerned about their data or airtime being consumed while using the application. This will encourage the students to rather use the application to update their details instead of contacting the school directly [20]. The final prototype proves to be a user-friendly data management and communication tool that can help the school improve their efficiency.



**Figure 6- A graph of the feedback from the usability questionnaire. See Appendix F for enlarged image**

## 5. DISCUSSION

In this section, we present the lessons and implications for designing with and building for Infinity Culinary Training, that we learned over the course of this project, while co designing the student’s mobile application.

The brief for the project gave us the impression that the school needed a social media application to communicate with the students. However, through our discussions with the school we realised that the school used WhatsApp to communicate and they did not need a specialised social network. We then realised that they needed a data management tool for the school to maintain an updated record of each student. We also realised that the alumni had to come to the school or call the school each time they had a career development and this was straining on the school. We learnt that to build a tool that would be helpful to the school we needed to look at their current systems, acknowledge what works and find ways to help what the parts that do not work.

The students and staff at ICT are not designers and as such it is important to empower them to take part in the design process. We structured our interviews as informal discussions, asking them about their journey with ICT and how they adjusted to the environment. The informal nature of the discussions made them more open to sharing knowledge and expertise. Building a genuine relationship with the school helped us gain a better understanding of their requirements [24] and it empowered them to actively participate in the development process.

The participants were more engaged during the evaluation of the paper prototype, they focused more on the functionality than the navigation of the prototype. They were interested in how each functionality would work, they recommended changes that would make it simpler for the admin team to deal with all the information that would be coming in. The simplicity of a paper prototype empowers them to participate in the design process. We were able get constructive feedback from them and they were also able to make a valuable input to the project.

When we were evaluating the paper prototype we gave the student’s time to explore the application before asking them to perform a set of tasks. This gave them time to familiarize themselves with the application at their own pace. When they were done exploring they let us know what they were familiar with the application. We observed that even if the students did not remember where each feature was they knew how to navigate the

application, so when we asked them to perform the tasks they were confident.

After the cognitive walkthrough we asked the participant to move to another table and fill in the questionnaires, we asked them to not put their names on them. By giving the students their own space to respond to the survey we were encouraging them to take their time and reflect on their experience without any pressure. This also meant that they had the privacy to give us honest feedback. The students we tested the final prototype on have not seen the other prototypes we, as a result we got a good measure of how other new users will respond to the application.

We learned through the discussions with the school that from an early stage in development you must be honest with the organization about your goal as developers. This was a research in design project and as such the goal is to work with the school to develop a prototype that would meet their requirements. The school wanted a developed product that was ready to be shipped for use in the long run. In our first engagement with them they had already decided what they wanted from use and assumed that we deliver it to them. However, this was not possible as the project was limited to a time frame of less than a year. We had to inform that we would not be building a final product but rather a prototype, this ensured that there was no confusion at the end of the project.

## 6. FUTURE WORK

The mobile application displays the user's current work status and allows them to update it and inform the school of a change in their career.

Although the mobile application will make it easier for the students and the school to communicate, the school will still have to contact the students individually to make announcements. To help reduce this task the mobile application could include an announcement feature where the school can add announcements in the form of posts. If the announcement is for an event the students would then be able to RSVP.

When we interviewed the students, they seemed to have a closer relationship with the teachers than the administrative staff. This means that they may be more comfortable talking to the teachers than they are to the admin staff when it comes to sensitive matters. A possible improvement could be the option of allowing the students to decide which teacher gets their SMS or email when they send a message to the school. Alternatively, there could be a screen with all the teachers and their contact details in case the student would like to contact them directly

## 7. ETHICAL, PROFESSIONAL, AND LEGAL ISSUES

Ethical clearance was obtained from the Science Faculty Research Ethics Committee. Before taking part in the discussions and cognitive walkthroughs, participants were asked to sign a consent form informing them of the anonymity of their results. On completion of the usability study, users were compensated for their time with a standard hourly fee as specified by the Department.

## 8. CONCLUSION

We engaged in a co-design project with ICT with the purpose of designing ICTchef, a mobile application prototype to allow their current students and alumni that would allow them to effectively

communicate with the school. We included the admin, teachers, alumni and students in the co-design venture from the beginning, on the premise that by building a relationship with them we could gain a better understanding of their requirements and they would come to a point of being more empowered to contribute productively to the design process. The project was divided into two phases, the analysis and requirement phase. Our results confirm that building a relationship with the school helped us gain a better understanding of their requirements. Empowering the participants to take part in the design process increases the value of the user evaluations. We can also confirm that that iteratively development with extensive user testing ensures that the final prototype is user friendly and meets the needs of the school.

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## 10. APPENDIX A: Cognitive walkthrough feedback questionnaire

Please rate each of the tasks you have performed.

Task Name	Very simple	Simple	Ok	Difficult	Very difficult
Create a new account					
Login					
Update your profile					
Request money for transport					
Request a meeting with the school					
Inform the school that you have lost your job					
Update your address					
Inform the school that another company has made you a job offer					
Make a donation to the school					
Log out					

## 11. APPENDIX B: Usability feedback questionnaire

Please rate the usability of the application by indicating how you feel about the following statements

Questions	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
The mobile application intuitive to use					
I would use this application in future to communicate with the school					
I would rather just contact the school directly					
I felt uncomfortable performing certain tasks					
I was worried about my airtime/data while using app					
This application simplified my interactions with the school					
I could complete most of the tasks					

## 12. APPENDIX C: Paper Prototype Enlarged

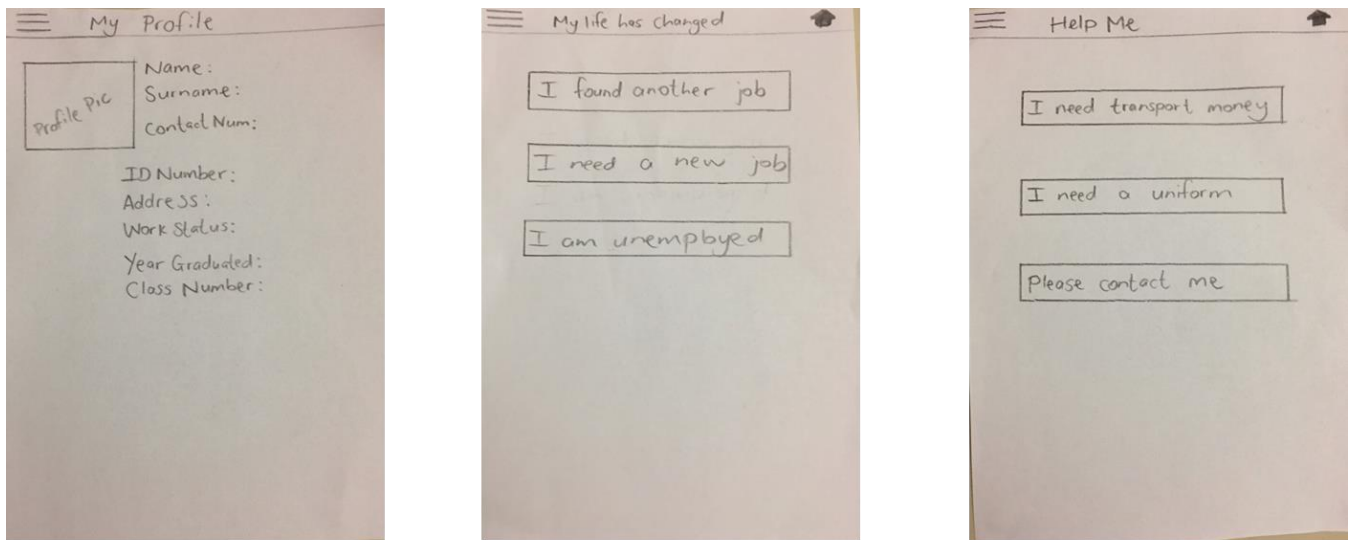


Figure 3 - From left (a) View Profile, (b) My life has changed, (c) Help me

### 13. APPENDIX D: Medium Prototype Enlarged

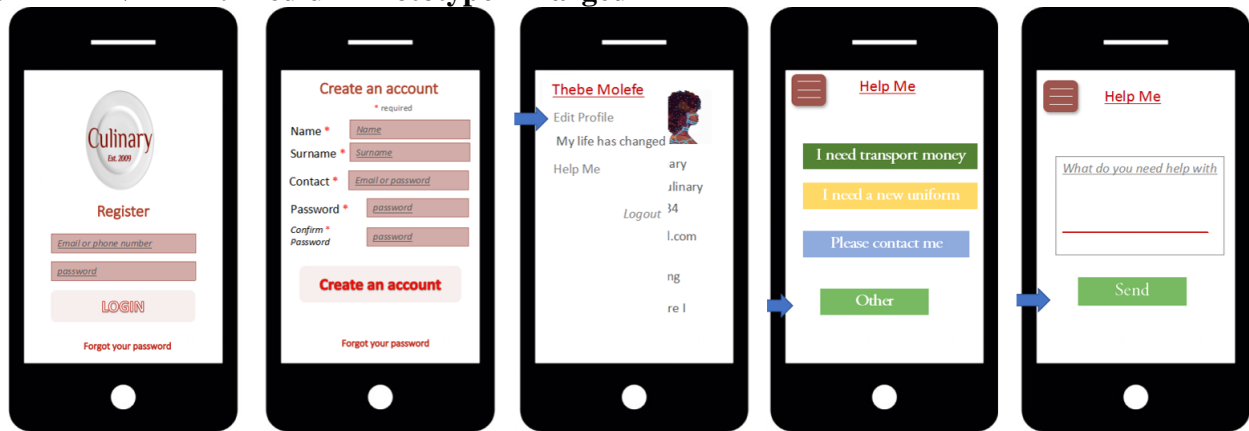


Figure 4 - From left (a) Login, (b) Create an account, (c) Navigation drawer, (d) help me, and (e) help me: other

### 14. APPENDIX E: Software Prototype Enlarged

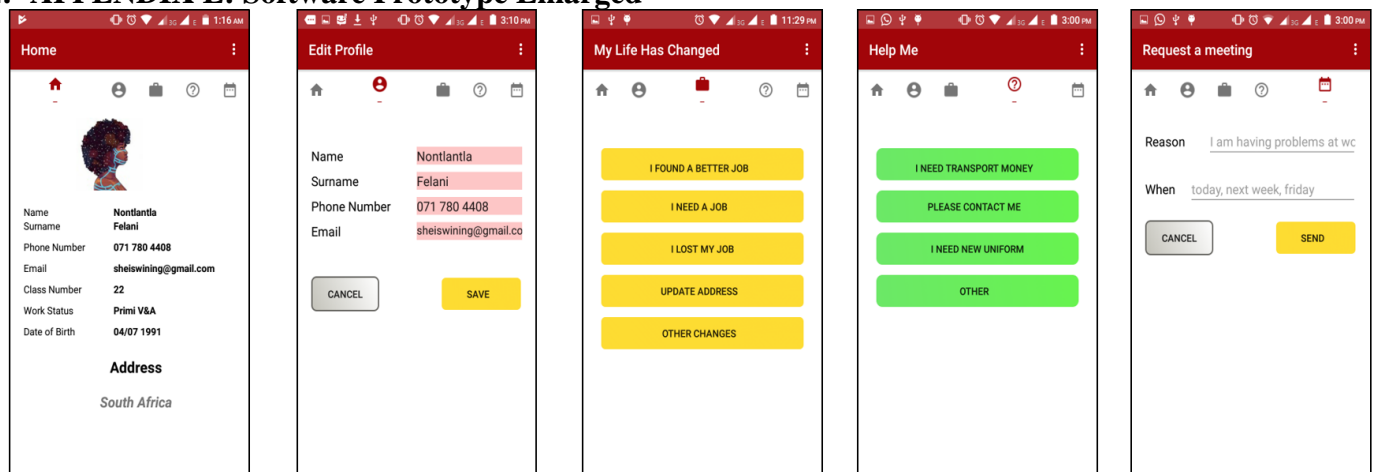
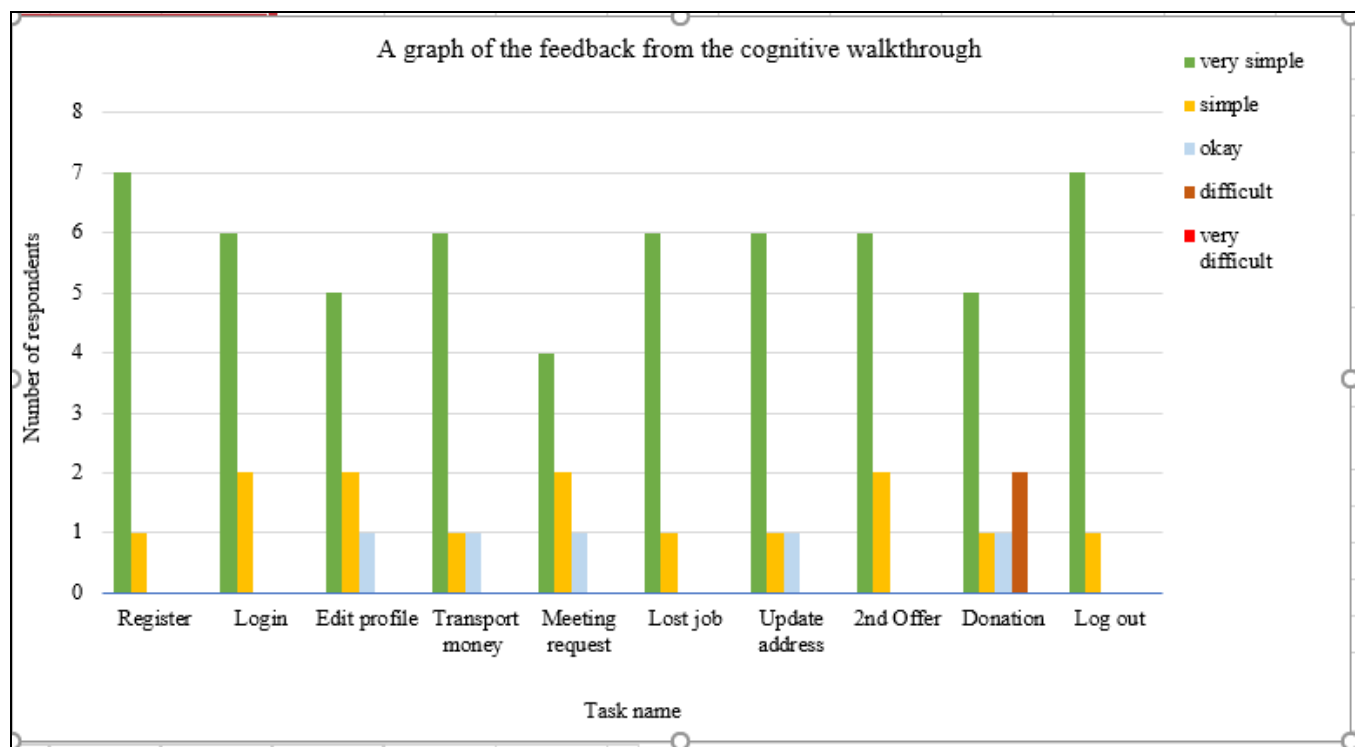


Figure 5 - From left (a) home, (b) edit Profile, (c) my life has changed, (d) help me, and (e) request a meeting

## 15. APPENDIX F: Cognitive walkthrough feedback questionnaire graph



## 16. APPENDIX F: Usability feedback questionnaire graph

