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A Career guidance mobile application based on personality

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A Career Guidance Mobile Application Based on Personality

Faith Too

Submitted in partial fulfilment of the requirements for the Degree of Master of Science in Mobile
Telecommunication and Innovation (MSc. MTI) at Strathmore University

Faculty of Information Technology Strathmore University Nairobi, Kenya

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ABSTRACT

Providing secondary school students with early and ongoing exposure to experiences, information necessary to make informed decisions when selecting a career that connects to academic preparation and future aspirations has been left to career counsellors. However, not all schools are privileged to have them and even those who have them, these career counsellors also have other subjects to teach and this leaves them with limited time to attend to all the students or even plan for activities or forums on career guidance. This has denied secondary school students adequate career guidance that ought to help them relate their academics and extra curriculum activities to their career goals.

This research provides a comprehensive study of the career guidance situation in the country and globally, the factors that ought to be considered for successful career guidance and the existing solutions. The collection of data was done using document reviews and questionnaires this was useful in identifying the improvements that need to be made in the way career guidance is done currently. Analysis of the data collected was done using Google analysis tool and the results used to come up with system requirements. Agile methodology was adopted as the software methodology for developing the application.

The solution is a mobile application that can be introduced to students early enough to enhance their understanding of personality types and what different careers involve to help in career planning, development and guidance. This will be achieved by use of Holland's instruments that is the Self Direct Search (SDS) and the Vocational Preference Inventory (VPI) to match students to career possibilities. A web based application was also developed to be used by professionals in offering guidance to students and for administrative purposes. Testing was carried by potential users of the application.

Keywords: Career, Career guidance, Personality

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ABBREVIATIONS

KCSE- Kenya Certificate of Secondary Education

MOSET- Ministry of Science Education Technology

JSON- JavaScript Object Notation

SDK- Software Development Kit

PHP- Hypertext Pre-processor

SQL- Server Query Language

XSS- Cross Site Scripting

UML- Unified Modelling Language

OECD- Organisation for Economic Cooperation and Development

APK- Android Package Kit

JKUAT- Jommo Kenyatta University of Agriculture and Technology

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

According to Wattles (2009), in this age of career advancement one has not only to make due career planning but also exhaustive career research before making a career choice. This helps in adjusting with the evolving socio-economic conditions and since a career choice is one of the most important decisions that one has to make in life. While some people are lucky enough to just know what they want to do and end up in satisfying careers without giving it much thought, most individuals are not. Many secondary school students do not put enough effort into choosing occupations or pick them for the wrong reasons. Others choose careers that seem secure or pay well and then they end up being unsatisfied.

There are developments that have been made in some countries with regards to career guidance and development. In Ukraine, secondary education has been extended from 11 to 12 years, the first Grade 12 school leavers graduated in 2013. A new curricular framework prepared aiming to ensure that studies are more relevant to demand in the economy and in the labour market and career guidance added as a topic (Zelloth, 2009). In Egypt, a new study plan for technical education was approved in 2007, whose implementation started in the school year 2008/09. This introduced secondary education elective subject matters and thus, academic counsellors have been appointed to assist students in selecting the academic subjects that would match their career aspirations (Zelloth, 2009).

Every secondary school in England has been given access to a new free tool to measure the effectiveness of their careers education and guidance, plotted against a series of nationally recognised benchmarks which are: A stable careers programme, learning from career and labour market information, addressing the needs of each pupil, linking curriculum learning to careers, encounters with employers and employees, experiences of workplaces, encounters with further and higher education, personal guidance. The benchmarks were developed following a 2013 Ofsted report that found 75% of schools they visited were not delivering effective careers advice to students (Finamore, 2016).

Darren (2013), gives multiple factors that influences career choice, they include: Employability after graduation or availability of jobs, academic performance, personality, socialization, role model, social support and available resources such as information, finances among many others depending on an individual. With personality being the factor which this study is going to focus on, it has been viewed as a source of person's attitude exhibited on the job workplace over the years, this translates to different kind of personality traits having relevance with the nature of job requirements and therefore prominent feature of personality traits can be successful in aligning with the particular job requirements (Holland J. L., 1992).

Studies that have been done in the past found that there is a relationship between personality types and career choice (Momborg, 2004; McPherson and Mench, 2007; Onoyase and Onoyase, 2009; Soo, 2013). These studies have been done in other countries but the study focused on Kenyan context by Soo (2013) indicates that there is need to for counsellor to assess the students' personality type early enough when they join school. This will ensure that the students are guided appropriately in their possible career paths and therefore this means that the students will be in a position to select the right subjects. The parents should also be made aware of their children's uniqueness that exists in their personality in order for them to respect and support these children in their preferences of career choice. Muigai (2007) recommended that a study be done in post-secondary level of education to establish course satisfaction.

Despite the presence of school counsellors in most schools, majority of them have teaching responsibilities over and above counselling duties. This dual responsibility leaves the school counsellor with very limited time to provide effective counselling services to the whole population of students (Kamara, 2015; Mumiukha, 2011; Wambua & Wickman, 2011). It is on this note that this study is undertaken to establish an effective and efficient way of providing guidance in career matters through the use of technology in order to cater for the needs of a bigger population of students if not all.

1.2 Problem Statement

Choosing of career paths for students from their early stages of secondary school and thereafter as they join institutions of higher learning has had its inadequacies as most of these students lack adequate information such as personality characteristics, and proper information of the nature of work in a certain career (Kemboi et al., 2016). These factors are key and ought to be fully assessed before individuals can be deemed qualified to go into specific careers.

When the final examination results are released by the Ministry of Education, depending on the grades, students are then admitted to the universities based on their course choices that they had made while in high school. When these students graduate from universities, some of them get into occupations that are totally different from the ones they had chosen and trained for as shown in a study where 27% of medical major medical specialists opted for other careers (Gupta et al., 2010). Others struggle through a career because they lacked proper guidance at the time when they were choosing their career.

In a research carried out by Institution Policy Analysis Research in Kenya, it indicated that there were no effective career programmes in Kenya schools because of lack of appropriate policy and acute shortage of qualified and experienced personnel (IPRA, 2008). Maraya (2011) also shows that students in Kenya suffered indecision due to conflicting advice from various sources and made a conclusion that students' capacity to make highly informed decision on careers had not been attained as most students had a perception of having moderate information on career choice. This shows the need for a well-structured career guidance system that will enable secondary school students make informed career choices.

1.3 Research Objectives

1. To understand the challenges faced by students in choosing careers.
2. To understand the factors that should be considered when guiding students in choosing careers.
3. To understand the existing tools and methods used by students in career guidance.
4. To design, develop and test a mobile application that provides career guidance based on personality test scores.
5. To validate that the application provides accurate personality test and reliable career guidance.

1.4 Research Questions

1. What are the challenges faced by students in choosing careers?
2. What are the factors that should be considered when guiding students in choosing careers?
3. What are the existing tools and methods used by students in career guidance?
4. How can a personality testing and career guidance mobile application that provides be designed, developed and tested?
5. Does the application provide accurate personality testing and better career guidance?

1.5 Justification of the Research

Most secondary school students choose their careers based on various factors such as parental or peer influence, financial prestige associated with a career among many others while leaving out very important factors such as interest, intellectual ability, personality of the individual (Olufunmilayo & Salami, 2013). From the foregoing, it is clear that secondary school students need appropriate, usable and adequate information about their personality types and the world of work before they can choose their careers.

Wambu and Fisher (2015) recommend the establishment of a well-developed guidance and counselling services in secondary schools, to ensure that students choose degree programmes best fitted to their needs. Ultimately the benefits that can be reaped from this are: reduction in the increased number of students who end up studying degree programmes they neither like nor have passion, better decision-making skills, better awareness of learning opportunities, increased job exploration and information search activities and in the long run it is recognised that it can help improve labour market efficiency (OECD, 2007).

1.6 Scope and Limitations of the Research

The study was conducted in several universities both public and private universities namely: Strathmore University, Kabianga University, Jommo Kenyatta University of Agriculture and Technology, Egerton University. The research aimed at finding out their satisfaction levels of the courses they are pursuing, as these students have transitioned from high school and are undergoing

actual training in the careers they chose and the challenges they experienced while choosing their careers. The application was developed on the Android platform, therefore individuals who wish to use it must own Android phones.

1.7 Conclusions

This chapter puts across the problem that this study is solving, a brief description of what is already happening locally and globally with regards to the field of study in form of an introduction, the objectives of the study, justification of the study and its scope. In the following chapter the researcher is going to review literature that has already been written by other researchers in the area of career guidance.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This section of the study will give an in-depth description of the career selection and guidance process. It will comprise of three discussions. The first being the career selection process and the factors that ought to be considered. The second will be the challenges students experience when choosing a career, various propositions by past studies in line with career guidance. And finally, the existing tools being used for career guidance, the gaps proposed by them and solution necessary therefore.

2.2 Career Selection Process in Kenya

In Kenya, the career selection process starts when students are required to choose subjects that they will specialise in. For some schools this process is done at the Form one level where a minor selection of some subjects offered by the school, at this stage these students have merely any information about these subjects, while most schools require students to do the major subject selection at the end of form two. The selected subjects then determine what courses one can pursue at the university which is an activity they get to undertake during their final year in high school (Kemboi et al., 2016).

After the releases of Kenya Certificate of Secondary Education (KCSE) examination results, students can revise their choices. On admission to the University they are given another opportunity to apply for inter-faculty change just in case there are students who find that the course they have been admitted to pursue does not suit them well. At this stage when students are required to make such crucial decisions pertaining their career most of them are most likely to make uninformed choices if not well guided as they do not have accurate information about occupational opportunities to help them make appropriate career choice (Kemboi et al., 2016).

At the stage when students join college, they believe there is one right answer for almost everything, with their major also included as discussed by Guido et al. (2010), these students believe there is one right major for them, and they tend to look to other individuals such as their

parents, peers and advisers for the answer instead of making conclusions based on their own research, personal goals, and self-reflection. Majority of the students are still attempting to get their own identity and having lived most of their lives under someone else's guidance, they may not yet be at a point able to utmost correct conclusions about themselves. However, higher learning institutions assume that students enter college prepared to make a decision regarding major and eventually their career path. While the reality is that students are most likely not developmentally prepared to do so. According to Freedman (2013) student development stages, students in their first-year experience dualism, in which the world around them is made up of dichotomies. This raises the concern, without knowing one's self, how can one effectively choose a major?

The 2005/2010 Kenya Education Sector support program by the Ministry of Science Engineering and Technology (2005) recommended the strengthening of guidance and counselling programs in school to reduce the number of learners with problems in school, less application to change university courses and improved examinations performance for all students. One of the national goals of education as by Ministry of Science Engineering and Technology (2005) is to promote social, economic, technological and industrial needs for national development and to promote individual development and self-fulfilment where guidance and counselling programme is expected to play a leading role.

However, despite the government's emphasis on the implementation of guidance and counselling program in Kenyan schools and a rapid increase in the number of trained school counsellors, the issues of lack of standardized training curriculums, ethical standards, counselling models, and role ambiguity persist (Wambu & Fisher, 2015). Kemboi et al. (2016) also adds that although a lot of efforts have been put in place for effective guidance and counselling services, the results has been too little to bring about significant career help among the learners. Most learners complete secondary education without a clear picture of which careers are best suited for them as indicated by the way secondary school graduates continuously revise their career opportunities even up to the time of joining or learning in university.

2.2 Factors to be Considered in Career Guidance

i. Interest in Field

Interest can be defined as the things that hold an individual's attention or arouse their curiosity (Beggs et al., 2008). Interests are a person's like or dislike and are characterised by a person's intensity of feeling about a subject or things (Hooley, 2012). Interests are developed one's surroundings and people like parents, schoolmates, friends, and from lifelong experiences. For instance, when one engages in various activities he reacts with specific feelings or attitudes. You may like or dislike those activities, you feel challenged or bored, competent or clumsy. These personal reactions and the feedbacks one receives about his performance help to shape and focus your interest. One continues to acquire interests throughout his life and this in return influences the reasoning and choices one makes including career choices (Hewitt, 2010).

Some students grow up knowing what they want to do in life. Majority of these students will go an extra mile to reach their dream job. These students will research their chosen career path and explore everything about it. The salary and benefits of that job do not play a role in this decision. In a research study the factor "match with interest" rated over job characteristics, major attributes, psychological and social benefits in importance when students choose a major (Beggs et al., 2008).

However, Hewitt (2010) argues that interest can change, as we experience life and meet more people we become interested in new things and discard some of our old interests. We also develop more complex thinking and understanding process, and we may even seek new interest and activities with the aim of improving ourselves and making life more exciting. Once the interest of one keeps changing so does the career choice of a person change. One seeks a career that meets their interest hence the career that one may have wished to take when they were young is not what they eventually do. According to Hewitt (2010), interest has become one of the most important factors in determining occupational selection as majority of people would like to work on something they enjoy.

According to Gordon and Sears (2011), interest inventories have been developed to help identify interests and relate them to career and occupations. By measuring interests of successful and

satisfied people in an occupation, researchers have developed scales that compare the interests of individuals to the interests of people who are certain about what they want to do. It is believed that these occupational scales are effective in predicting career and occupational satisfaction.

ii. Academic Ability and Aptitude

Many students choose their major based on their academic ability (Beggs et al., 2008). For students who do not have the ability or the work habits to succeed in some majors that may require more study than other fields of studies. These students may find a better fit in a less work intensive major that requires fewer difficult classes. Other students have the ability to handle majors with greater workloads and therefore can choose a career path that will lead to a job requiring more education.

iii. Personality

Brown et al. (1984) argues the primary assumptions that drive trait and factor theory are: every individual has a unique set of traits that can be measured reliably and validly, occupations require that workers possess certain traits for success in the work place, although a worker with a rather wide range of characteristics can be successful in a given job, the choice of an occupation is a rather straightforward process, and matching is possible and hence the closer the match between personal characteristics and job requirements, the greater the likelihood for success, productivity, and satisfaction. A widely used tool is the Holland's career typology theory of vocational behaviour, which assumes that each person has an identifiable set of traits and that most workers must possess an identifiable set of characteristics to be successful at that job (Holland, 1992).

According to Mihyeon (2009) students should choose a career that they think will fit their personality type. Everyone is characterised by a unique pattern of capabilities and potential. These traits and capabilities can be correlated with the requirements of specific jobs, and successful people in any given job will tend to possess those traits and capabilities.

Hooker (2010) explains that the costs of making bad hiring decisions and the difficulties of getting meaningful information from reference checks of prospective employees have led many employers to use personality tests as part of their hiring process. These test covers a broad range of attributes,

including tests of cognitive ability and personality tests. Cognitive ability or aptitude tests attempt to measure the potential of an individual to learn a specific body of knowledge. In a Canadian study, researchers followed 80,574 students in eighty-seven colleges during a five-year period and showed that good grades are related to having a major close to one's personality (Jones & Jones, 2012).

iv. Opportunities After Graduation

In today's world, it is getting harder for college graduates to automatically get jobs in their field of interest. Students get discouraged when entering the workforce if they cannot find a job related to their major. Sometimes the economy limits the number of jobs that are available for recent college students (Nabi, 2003). Students may have to wait long periods of time for a job in their chosen field, settling for jobs that are lower paying and out of their field of interest.

While in college, students often do not have a job. This leads to a lack of experience and students have to take lower level positions when starting out in their careers. There are many students who do land a great job when graduating from college. This happens if a student has worked for a company for a long period during college. Students who get great jobs may also be highly qualified for the job, or the job may be in a field with high demand. Research shows that students who find internships in their career field secure jobs in their major more than students who do not (Callanan & Benzing, 2004).

Employers are becoming more selective in their search for new employees, often requiring more experience in the work force (Lee, 2008). Students often expect to start out with a high paying position. In contrast, most newly graduated students have to start from the bottom as interns and work up.

2.4 The Disconnect in What Should be Done Versus What is Being Done

Holland's theory (1982) suggests that not having personality characteristics consistent with one's career will be associated with students pursuing careers alternatives to the one studied, to achieve a better fit between aspects of their personality and their chosen career, avoiding a poor fit therein

will be of great importance. According to Beggs and Taylor (2008) a survey of more than 800 students who were asked to elaborate on their career decision-making process, factors that played a role included a general interest the student had in the subject he or she chose, family and peer influence, assumptions about introductory courses, potential job characteristics and characteristics of the major. While these may be valid factors to a degree, the study ultimately implied that students are choosing a major based on influence and assumption rather than through an understanding of their own personal goals and values.

Onoyase and Onyase (2009) indicate that a great number of students showed interest in prestigious career like Medicine, Law and Engineering instead of those that match their personality type and ability. And also, the fact that many students are still ignorant of the relationship between personality types and career choice in secondary schools, this therefore leads to students not selecting the proper subject combinations that lead to the career that fits with their personality.

Furthermore, an approximate of 20 to 50 percent of students enter college as not fully decide on what they would want to major in and that an estimated 75 percent of students change their major at least once before graduation (Gordon and Sears, 2011). With these statistics, it is obvious that choosing a major is not an easy decision for many students, not just for the undecided ones but also for the decided students, since most of them do not necessarily base their decision of a career on factual research and self-reflection.

2.5 Challenges Faced by Students in Choosing Careers

According to a study by Lugulu and Kipkoech (2011) the findings indicated that there are career guidance and counselling programs in most secondary schools, however, not all of them were active. Students in schools without or with inactive career guidance offices were likely to be disadvantaged in deciding for degree programme to pursue. Furthermore, the Ministry of Education and Teachers Service Commission have no measures put in place to monitor the provision of career guidance and counselling in secondary schools, it is always assumed that all students are provided with career information.

A study intended to measure the influence of career guidance and counselling in schools on degree choices of students by Lugulu and Kipkoech (2011) revealed that although this service is available in schools, the majority of the participants 36.0% males and 33.0% females from public and 46.8% males and 32.1% from Private schools agreed that career services had minor influence in their decisions. One of the participants summarised the level of career services by saying that, “I was surprised that there were many courses when I made my application after the KCSE results were out, which teachers were not aware of, I cannot blame them, there is a lot of pressure on them to ensure that their subject are well performed in the national examinations. They have less time for career counselling to research for career information.” With the majority of the students 64.4% agreed that they did not have adequate information to make a degree programme decisions.

The choice of major can have a significant positive or negative effect on the student experience, affecting retention, engagement, student learning, academic standing, setting of academic and career goals, and more (Freedman, 2013). Some areas in the guidance programme relating to vocational needs are given minimal attention in schools, such as availability of career booklets and brochures, career mentoring, link between school work and world of work, as well as career placement and career clubs in school (Ngeno & Magut, 2014). This makes student’s experience difficulty in preparing and choosing careers hence they may not be well equipped to choose suitable careers when they are getting out of secondary schools to join university or tertiary institution or self-employment sector. This is why several researchers have come up with tools to help students in career choice as discussed in the following section.

2.6 Tools, Methods and Frameworks Used for Career Guidance

i. Media and Career Fairs

In a study to find out other sources of career information for students apart from their teachers (Lugulu & Kipkoech, 2011). The response showed that 29.2% and 48.3% of the males and female respectively in Public schools agreed that they were influenced by newspaper stories in chosen fields. Similarly, response from participants in Private schools. Some other activities that play a role in career guidance are career tours, career days and visits by professionals organised and

provided by schools (Lugulu, Kipkoech, 2011). However, response by students indicated that these activities were organised by schools on yearly basis than any other time. For career guidance and counselling to aid and equip students with decision-making skills, it should be provided more regularly in a year than the current practice. These activities give students a chance to understand the realities of various professions, their challenges, and the social skills like emotional maturity, time management, and confidence among others that are necessary to cope in work places.

ii. Suggested Frameworks

The Education Bureau of Hong Kong (2008) argues that given the importance of life planning education to the holistic development of students, it should be promoted as early as possible in a student’s school life and in a coordinated and systematic manner. Based on the identified needs of students, schools can design their implementation plan with different dimensions of career intervention, making use of the available school, government and community resources. Schools are advised to include the following six dimensions of career intervention as shown in Figure 2.1 refers in their life planning education plan.

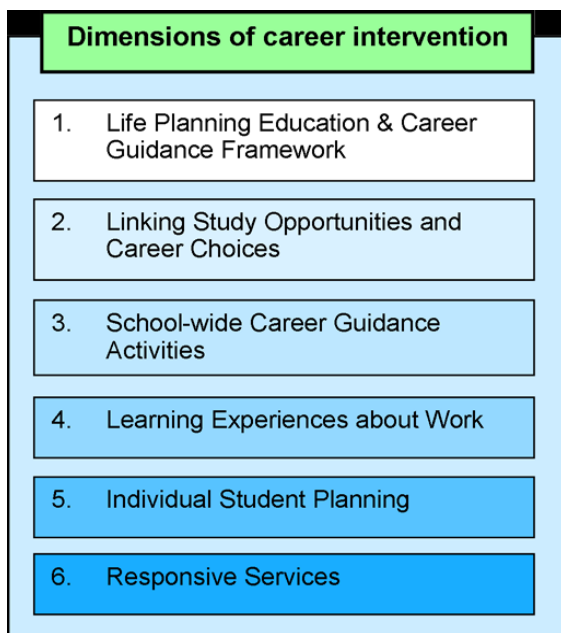


Figure 2.1 Six Dimensions of Career Intervention

Adapted from: The Education Bureau of Hong Kong (2008)

iii. A Pragmatic Model

According to the Education Bureau (2014) life planning education and career guidance support the whole- person development and life-long learning of students and are integral parts of the holistic school curriculum. They should be delivered in a coordinated and systematic manner geared towards the needs of all students irrespective of their abilities, orientations and developmental stages. Figure 2.2 is a proposed career development model consisting of three components: Self-understanding and Development, Career Exploration, and Career Planning and Management. The career related knowledge, life planning and work skills as well as work attitude that is expect from students can be expressed through the proposed model which suggests a positive relationship among its three components.



Figure 2.2 Three Components of Career Development

Adapted from: Education Bureau (2014)

The model can be applied flexibly in different school contexts with different student levels. Detailed learning elements categorised under these three components are proposed in Table 2.1 for consideration and reference of schools.

Table 2.1 Suggested Learning Elements in Life Planning Education

Adapted from: Education Bureau (2014)

Components of Career Development	Learning Elements for Students
<p>Self-understanding and Development - To understand one-self and the impact of external influences</p>	<p>Make a realistic self-assessment of achievements, qualities, aptitudes and abilities.</p> <p>Relate and use the self-assessment outcomes to build self-confidence and positive self-image.</p> <p>Relate results of self-assessment to academic and career goal setting.</p> <p>Formulate short and medium term goals by goal-setting, review, reflection and planning.</p> <p>Be aware of stereotyping in career and work.</p>
<p>Career Exploration - to investigate options (opportunities and constraints) of learning and work</p>	<p>Identify and use a variety of sources of career information.</p> <p>Take initiative to seek guidance or support from relevant people in school or in family.</p> <p>Be aware of the opportunities and constraints offered by various study choices or options.</p>

	<p>Integrate information and use research skills to select, analyse, and evaluate various study choices or options.</p>
<p>Career Planning and Management - to make decisions, formulate and act out plans to manage changes and transition in learning and work</p>	<p>Establish learning or career goals/aspiration.</p> <p>Set tentative occupational preference and related study/training targets.</p> <p>Evaluate the impact of external influences (e.g. from family, socio-economic setting, employers' expectations) and reconcile these influences with aspirations of oneself.</p> <p>Understand, select and apply decision making techniques.</p> <p>Critically compare study, training and occupation options.</p> <p>Consider various factors that influence career decisions, including finance and changes in socio-economic context.</p> <p>Evaluate and make critical use of unbiased, impartial and updated information and guidance from various sources.</p> <p>Develop skills and attitudes in presenting their personal attributes, employability skills and study/career goals.</p>

	Develop and master generic and employability skills that prepare them for transition to work.
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iv. Career Guidance Implementation Country Review

Hoyt et al. (1972) emphasised the importance of comprehensive career information that should be organised into instructional programs offered to all students as requirements for a variety of jobs are changing as new jobs are emerging while others become obsolete. According to OECD (2007) OECD countries career guidance includes a wide range of services for career guidance: group discussions, printed and electronic information, school lessons, structured experience, telephone advice and online help. Career guidance is provided to people in a very wide range of settings: schools and tertiary institutions, public employment services, private guidance providers, enterprises and community settings. It is provided unevenly to different groups both within and between countries and in various ways as discussed.

In Austria three large career fairs are held each year. They cover vocational training, tertiary education and adult education. They are visited by thousands of people, involve hundreds of professional and trade organisations, employers, trade unions and educational institutions, and are strategically marketed to schools and the community (OECD, 2007).

Canada’s public employment services contract many career guidance services to community organisations, which are often seen as more attuned to the needs of particular groups: Single parents or aboriginal people. Some of these organisations focus mainly on career development activities, such as information services, career counselling and job-search workshops. Others have a wider range of education, training and community functions (OECD, 2007).

In England, the career service at the University of Leicester a self-service system in a careers resource centre is the major initial form of contact. Career development programmes are run in all

undergraduate classes with each undergraduate department having a careers tutor to act as a first point of contact. Increased use is also made of ICT-based tools (OECD, 2007).

In Spain, the international company Altadis has a career development programme, built around a database of employees' qualifications and descriptions of existing positions in the firm. Those taking part in the programme are interviewed regularly to assess their competencies and aspirations against future business needs. As part of a planned redundancy programme negotiated with the trade unions, Altadis offers career counselling to employees, and has contracted a specialist outplacement firm to provide this service. The outplacement firm normally employs psychology or economics graduates to deliver it (OECD, 2007).

In the United Kingdom call centre technology is being used to widen adults' access to education. The service, "learndirect" provides both information and more extensive career advice to callers. The staff of the service have relevant qualifications at one of three levels, depending upon the nature of their work, and can call upon an online database of information on over half a million education and training courses. Over four million people have called the national advice line since it was established in 1998. The help line is open between 8.00 and 22.00, everyday throughout the year (OECD, 2007).

Australia has a national careers web site (www.myfuture.edu.au) containing information about courses of education and training, about labour market supply and demand at the regional level, on the content of occupations, and on sources of funding for study. Users can explore their personal interests and preferences, and relate these to educational and occupational information. In its first seven months, the site was accessed 2.5 million times (Grubb, 2014).

As per the New Zealand Education Review Office (2015), schools have the responsibility to provide students with appropriate career information and counselling, and special attention to be paid to those who are almost completing their education cycle. They have to be provided with specific career guidance and counselling to enable them to make informed decisions on further education. There are several models and frameworks available that have been offered by researchers in form of theories. This study is going to focus on Holland's theory methodology.

v. Holland’s Theory

John Holland’s theory was developed in 1966 and continually improved in 1973, 1985 and 1992 (Jigau, 2007). The theory of vocational choice was an immediate success because it provided a comprehensible and easy to apply conceptual framework, the two instruments that support the application of Holland’s theory are Vocational Preference Inventory (VPI) and Self-Directed Search (SDS). Self-Directed Search is an Inventory exploring aspirations, interests, activities and competences, that allows individuals to understand the way these factors might relate to certain occupations since there are several professions suitable for each person, that match their personality structure. SDS consists of evaluation questions facilitating the identification of the occupation corresponding to the personality code obtained as a result of applying the inventory of interests. Vocational Preference Inventory (VPI) provides a set a listing of careers with their relating Holland code.

Holland suggests six connected personality categories and work environments namely: Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E) and Conventional (C). They are graphically represented by means of a hexagon.

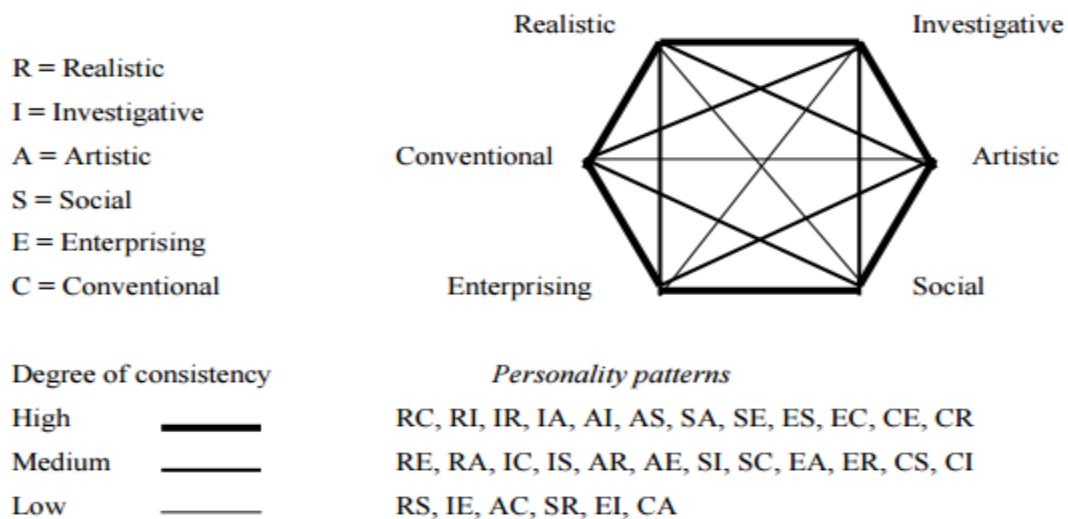


Figure 2.3 Holland Personality Categories.

Adapted from: Jigau (2007)

Holland (1992) describes personality types applied to work environment and typical individual behaviour as follows: The realistic people enjoy practical, hands-on problems, creating solutions, machines handling and consequently an individual must have technical competence that allows working with objects rather than interacting with people. The investigative are people who enjoy to work on activities that have to do with ideas and thinking more than with physical activity, they like to observe, learn, investigate, analyse, evaluate, problem-solve, thus they tend to have logical and mathematical abilities.

The artistic people have artistic, innovative, intuitional ability and like to work in unstructured situations using imagination and creativity and hence they like self-expression in their work. The social people who like to work with others by informing, helping, training, teaching, developing or curing them. The enterprising people who enjoy work activities that have to do with starting up and carrying out projects, especially business ventures. They like influencing, persuading, and leading people and making decisions. The Conventional people who like to work with data, have clerical or numerical ability, and who enjoy work activities that follow set procedures and routines, these types are good at coordinating people, places or events (Holland J. L., 1992).

However, Holland (1992) adds that there are very few cases of “pure” personality types and work environments, more often we encounter combined types. This is precisely why The Holland Code employs three letters to describe each personality type and work environment (e.g EIA, ISE, CAS) these letters are the initials of the categories described above (R, I, A, S, E, C). For instance, a library worker will not be labelled with C (Conventional) alone, he or she could be Conventional (C) firstly, but Investigative (I) second, and Social (S) third, in sum, the code will be CIS per the score of the Self-Directed Search (SDS) set of questions.

The goal of the theory is to find congruence, which refers to the relation between the personality type and the type of work environment, the closer the codes the more congruent the relation. For instance, if a Realistic type works in a Realistic environment, it is said that the relation between the personality type and the type of work environment is congruent. On the other hand, if a Social

type is employed in an Artistic environment, the relation is incongruent, and the person will be relatively frustrated and unsatisfied (Jigau, 2007).

Spokane (1985) do not show the level of satisfaction Holland claims should be achieved through a correct match. It is not always easy to classify people or jobs under Holland's system, things are not always so neat and tidy. Jobs for example are increasingly complex resisting a focus on one area. Holland does not recognise wider social phenomenon that may affect career such as ethnicity, gender, location, social capital etc. both in terms of how they affect our perceptions and limit opportunities. These factors need to be considered to get from type to job. Finally, he argues that Holland provides little support on how to choose between roles you are equally well matched to.

However, Holland's theory has continued to be is massively influential in the legacy of computer questionnaire inventories that have spawned out from him plus his popularisation of type as a concept for governing career choice. Holland's greatest strength is his simplicity, I am type "S" and so I should look for "S" type jobs has a simplicity of logic to it. It is obvious what practitioners and clients alike should do with his theory, a common critique of more complex theories is they make it far from obvious how to employ them in practice. No such problem with Holland. Holland is also powerful in that it can generate an answer for someone no matter their level of experience or how clear and idea of their identity they can articulate (Staunton, 2015).

2.7 Existing Career Guidance Solutions

i. Career Guide

Career Guide adapted from <https://play.google.com/store/apps/details?id=sid.angel.careerguide> is an application designed for students, teachers, parents and consultants. The application covers more than 200 career options and professional courses after schooling and graduation with details like salary structure, work hours, colleges and placement organisation. It is ideal for individuals: searching for a career to choose, who want to know various career options after their schooling and even after graduation, who want to learn about the salaries, work hours, work stress, job satisfaction in a career and those interested in knowing work, life style of different professions. Figure 2.4 shows some of the page samples of the Career guide application.

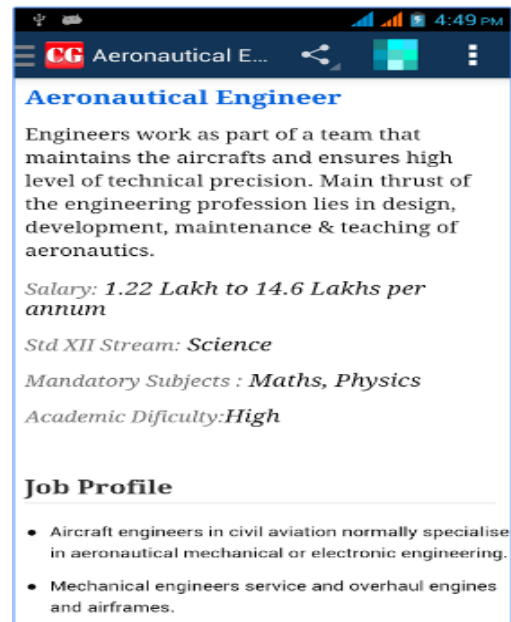
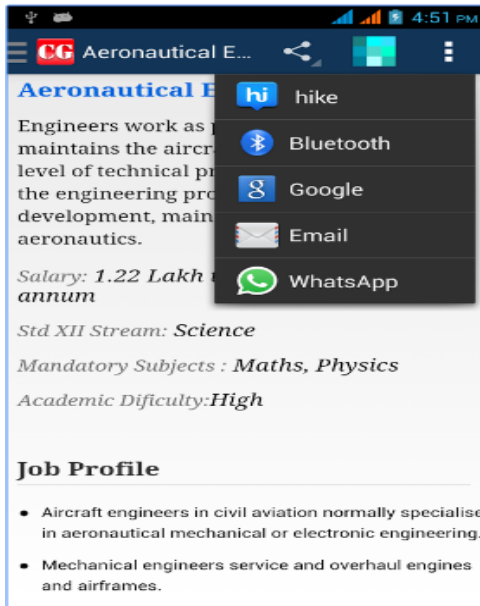
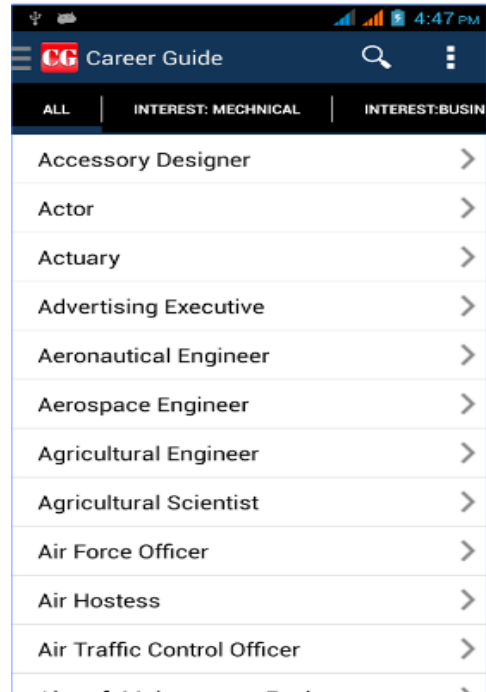
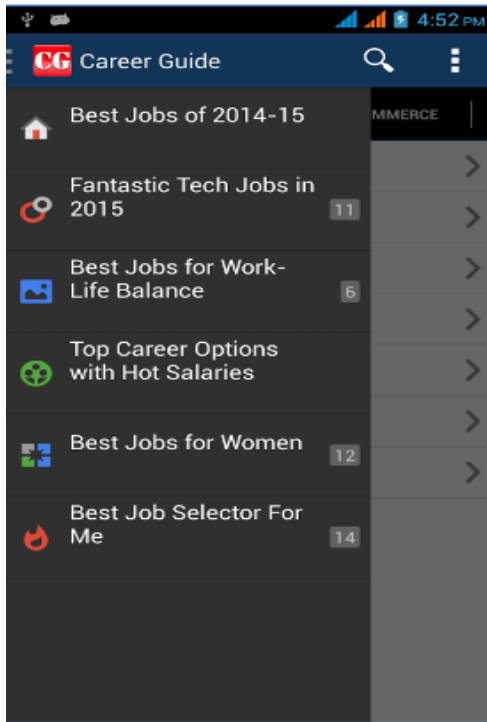


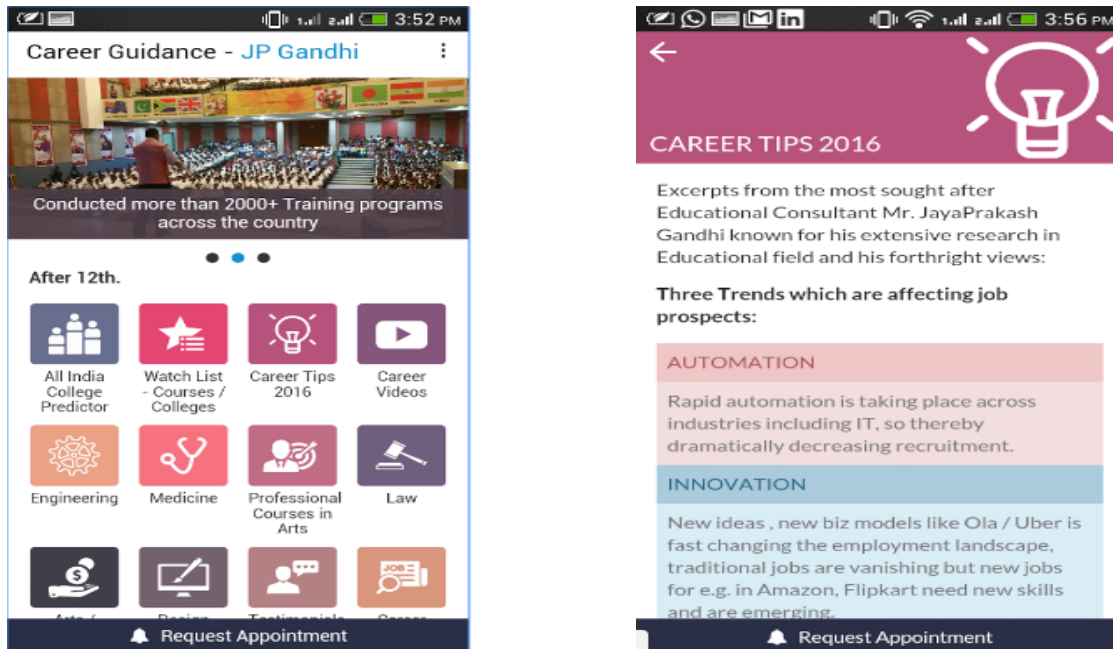
Figure 2.4 Career Guide Sample Campaign

Adapted from: <https://play.google.com/store/apps/details?id=sid.angel.careerguide>

ii. Career Guidance

Career Guidance (<https://play.google.com/store/apps/details?id=com.askjpgandhi.app>) is an Indian mobile application meant to help student to choose the right career path after +2 which is higher secondary education level. The application provides comprehensive information to enable students decide on the right career choices. It also provides detailed information for students choosing Engineering, Medicine, Law, Design, Arts and Management. The App allows students to stay in tune with current trends in the education field and provide career tips and career options.

Figure 2.5 shows some of the page samples of the Career Guidance application.



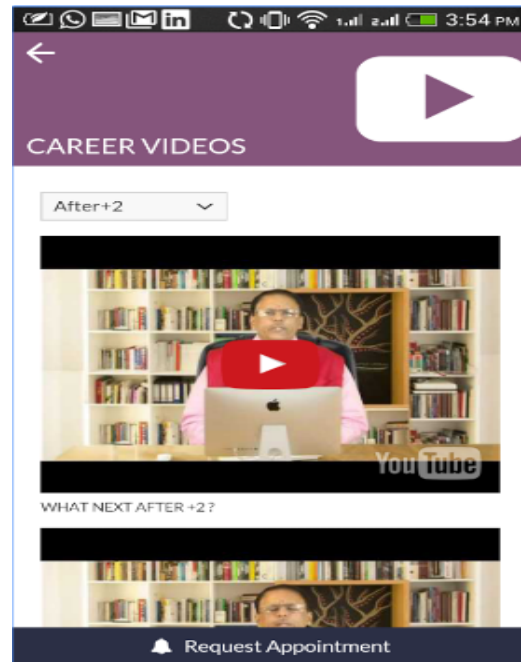
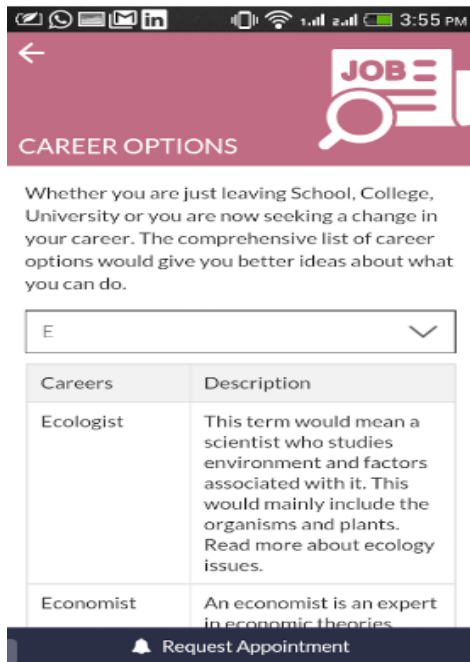


Figure 2.5 Career Guidance Sample Campaign

Adapted from: <https://play.google.com/store/apps/details?id=com.askjgandhi.app>

iii. PathSource Careers and Schools

PathSource (<https://play.google.com/store/apps/details?id=www.pathsource.pathsource>) is a career search and education tool for students, it asks questions to match the user with their ideal career and educational path. It empowers its user to discover careers or schools and figure out what to do with your life, and then learn what it takes to get there. Its features include: Career assessment that helps the user identify the ideal career that best suits their own interests and personality, get matched with the exact career, school or college major that fit their unique lifestyle and interests.

PathSource has an Ecosystem of in-depth career data, including comprehensive descriptions for every career, including: what personality traits, education degrees, college majors and work experience are required for each job, average salary ranges by city and state, number of job

opportunities by city and state, and the level of education achieved by those already working in those careers.

PathSource also helps users find the best schools and programs that will put them on the right track towards working in their chosen career. The application is a particularly good fit for university students who need guidance on choosing a college major or finding the right industry in which to pursue internships, college student searching for an easy and intuitive way to find your ideal career path and great post-graduate job opportunities. Figure 2.6 shows some of the page samples of the PathSource application.

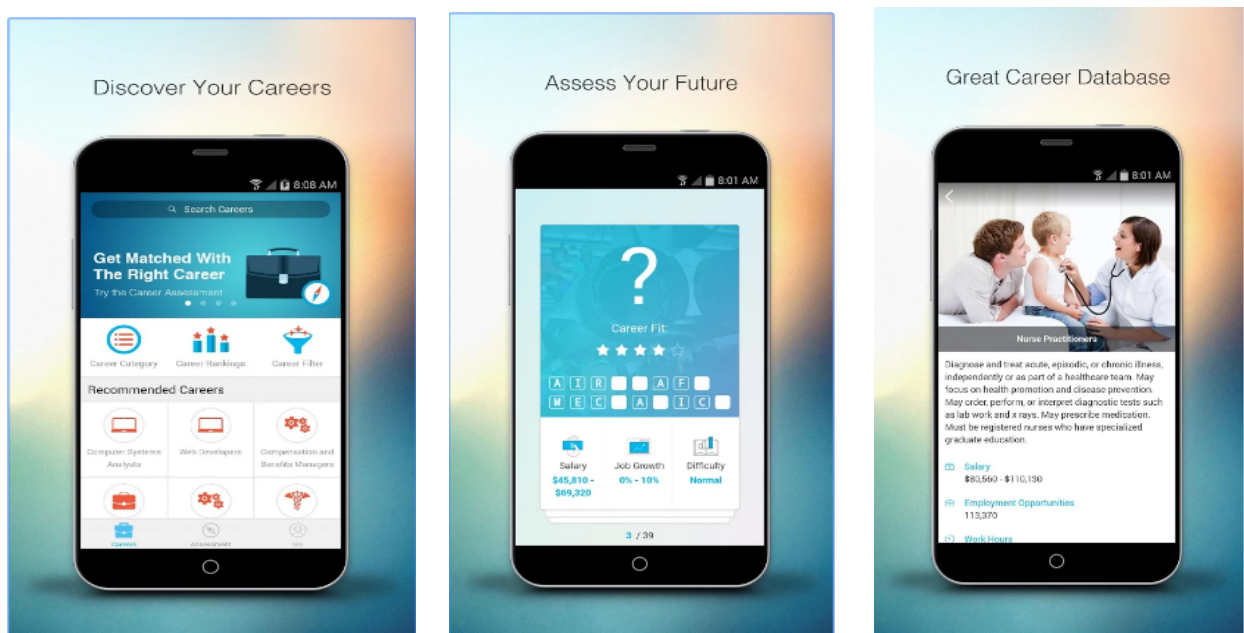


Figure 2.6 PathSource Sample Campaign

Adapted from: <https://play.google.com/store/apps/details?id=www.pathsource.pathsource>

2.8 Gaps and Limitations

Following the reviews on the three applications discussed, we can notice that all of them are career guidance application each providing guidance in different ways. The information they provide can be very useful to students as most students now have access to mobile phones. Unfortunately, these applications have a limitation because the information provided is specific to the countries in which they were developed in.

There is need to have a country specific career guidance tool, as different countries have varying education systems and labour markets. Information such as relevance of education degrees, college majors and work experience are required for each job, average salary, number of job opportunities, may differ from one country to another.

2.9 Conceptual Model

The developed solution is made up of personality questions and professional testimonials. The application adopts the Holland theory which is supported by two instruments namely: Vocational Preference Inventory (VPI) by Holland (1985) which is a psychological personality-interest inventory composed entirely of occupational titles representing the six personality types in the RIASEC theory of personality and Self-Directed Search (SDS) also by Holland (1995) which is an inventory exploring aspirations, interests, activities and competences, that allows clients through self-scoring to understand the way these factors might relate to certain occupations. However, a few adjustments were made with regards to naming of some courses to fit what is offered currently by universities. For congruence to be found between the personality type and the type of work environment, The Holland code is used, it employs three letters to describe each personality type and work environment for example EIA, ISE, CAS these letters are the initials of the personality categories. For instance, a library worker will not be labeled with C (conventional) alone, he or she could be Conventional (C) firstly, Investigative (I) second, and Social (S) third, in sum, the code will be CIS. This code is then matched to a career, in this case librarian. Professional testimonials were derived from willing professionals who accepted to act as mentors, to get their details seen on the application, they submit them via the web platform. Figure 2.7 shows the conceptual model of the developed system.

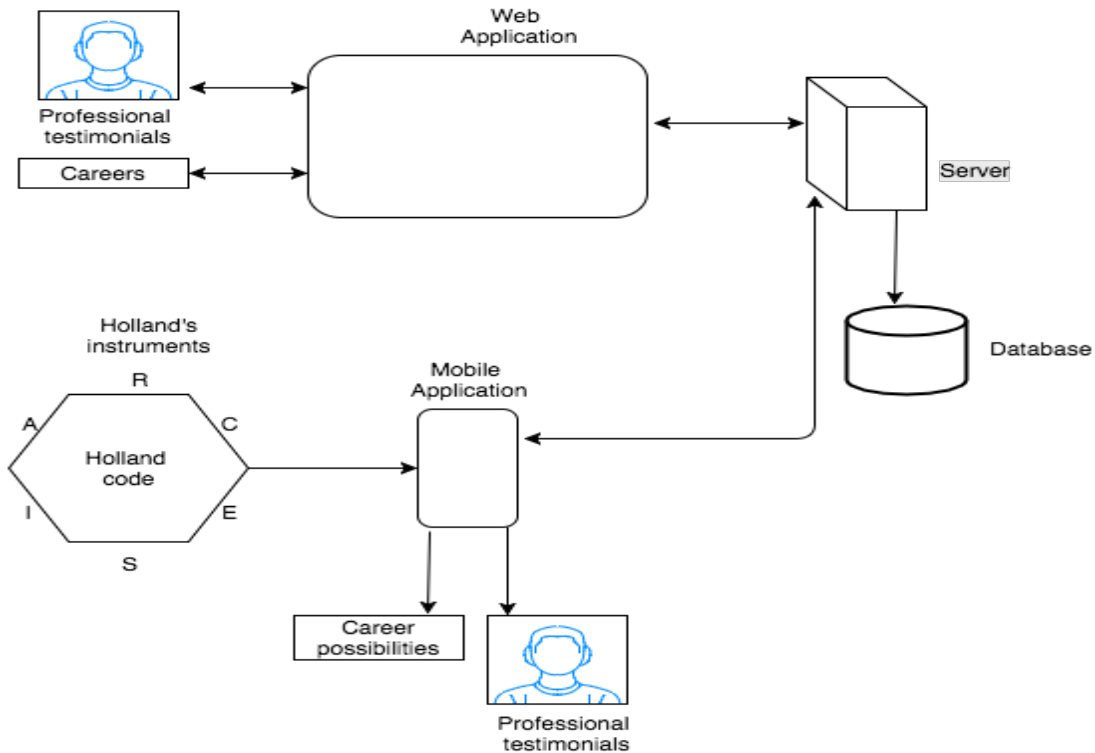


Figure 2.7 Conceptual Model

2.10 Conclusions

From the reviewed literature, it is clear that the Kenyan students experience a challenge of inadequate career guidance and the need for a system that will address this issue. In the literature, some of the countries are seen to be doing pretty well in this sector by providing well structured and reliable information that is country-based to those seeking career guidance, borrowing such concepts will be of great importance in developing a system that will benefit the students. Coming up with a career guidance mobile application with the Kenyan context in mind is justified given the available applications do not meet the needs of Kenyan students. With such an application, questions testing on personality of an individual are going to help students narrow down to careers fit for them and professional testimonials from individuals already in the local job market. The benefits of informed career guidance and selection process are going to be achieved. The next chapter will put into perspective the methodology that was used in the study and development of the career guidance solution.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter gives an in-depth discussion of the software methodology that was used in the development process of the system. This study used agile methodology as a framework to plan, design, develop and evaluate the system. This section explains the agile methodology and its application in the development of the system.

3.2 Agile Development

This methodology was founded by a group of practitioners and consultants (Beck et al., 2001). It enables for revisiting of the phases of development thus improving project efficiency. The idea of revisiting phases over and over is to allow for incremental and iterative development. The development lifecycle is cut up into iterations and each iteration touches on each of the traditional phases of development. Therefore, as new requirements surface and as the scope changes, this process continually capture the requirements iteration after iteration, thus ensuring that users stay very close to the project from inception to delivery (Szalvay, 2004).

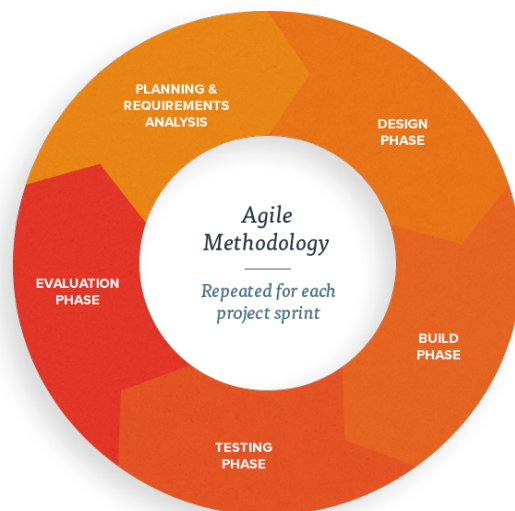


Figure 3.1 Agile Methodology

Adapted from: Agile Methodology (2016)

The Agile Methodology is made up of five phases as shown in Figure 3.1, the researcher will go ahead and describe them and how they were be applied in the system development process.

3.3 Planning and Requirements Analysis

Planning

The first stage was planning which involves setting priorities for the different activities that are to be performed. The time required to perform each activity and develop each functionality is estimated, a schedule formulated and milestones are also set (Pekka et al., 2002). This study used a Gantt chart for planning, this enabled the researcher have a clear perspective of the actual time when the research ought to start and come to an end. It was also a time for the developer to familiarise oneself with the tools and the technology to be used during the development and testing process.

Requirements Analysis

This phase involved gathering the requirements of the system to be developed from the user and analysing them to assist in determining the feasibility of the application to be developed. Data collection through the pre-formulated questionnaires was done by use of Google forms and the analysis of the data submitted by the respondents done using Google analytics to provide qualitative data represented in form of charts and graphs.

To gather system requirements the research used review of literature and questionnaires to uncover information about career guidance from respondents from various universities namely: Strathmore University, Kabianga University, JKUAT, Egerton University. The methods mentioned were helpful in gathering accurate information on the current situation as it is and seek the respondents' opinion on what would be of help in an application developed for this purpose.

The gathered system requirements were important in ensuring that the system developed meets the needs of the users. This questionnaire is found in Appendix A. For review of existing methods and technologies used for career guidance, several journals, academic articles, books, online resources were used too. This clarifies the problem further, what has been done both locally and globally with regards in solving it and lastly the gaps that still exist.

i. Location of the Study

This study was conducted in four universities namely: Strathmore University, Kabianga University, JKUAT University, Egerton University, these institutions are located in various parts

of the country. The institutions are ideal for the research as they have a high uptake of technology (Jidenma, 2014). Considering that this research is geared towards the development of a mobile application such a location is well suitable as most of its resident do own mobile phones.

ii. Target Population

The target population comprised of 30 students from both private and public universities. The respondents from the institution are some point consumers of career guidance services, the university students have just transitioned from high school and are undergoing actual training in the careers they chose and can tell what they think would have been helpful to them at the time of career selection.

iii. Sample Size

To arrive at the sample size, the study used a mathematical formula as shown in Equation 3.1. The standrad error level (z) associated with the chosen level of confidence was 1.96. The estimated percent (p) in the population was 10% in all the universities sampled. The estimated percent (q) not in the population was 90%. The acceptable sample error was set at 5%, with all the parameters in place, the desired sample size came to 134. However, on the basis of availability the respondents that were involved in the study were 30 in number.

$$n = \frac{z^2 pq}{e^2}$$

n=the desired sample size

z=the standard normal deviate set at 1.96 which is 95% confidence level

p=the estimated percent in the population

q=p-1

e=acceptable sample error set at 0.05

Equation 3.1 Sample Size Calculation (Moazzam, 2014)

iv. Sampling Strategies

The sampling strategy selected for this study is Convinience sampling. The respondents were selected simply because they are easiest to recruit for the study (Mugenda and Mugenda, 2003). This strategy was selected because it involved direct user participation in the gathering of information about career guidance through answering online questionnaires sent via email. The respondents were involved in the study both at the requirements gathering stage and the system

testing and evaluation stages, this enabled the researcher to come up with a refined product as per the requirements and changes proposed by the users.

3.4 Design Phase

Unified Modelling Language (UML) notion was used for modelling and designing diagrams to offer a clear picture of the system to be developed (Object Management Group, 2015). The study employed four different UML diagrams for its design. These diagrams include a use case diagram, database schema, sequence diagram and class diagram.

i. Use Case Diagram

Use cases were used to identify and separate system functionalities in terms of who is responsible for it, thus coming up with actors and uses cases. The actors of this system are students, professionals and the administrator. The use case is in text for describing the action performed by the actors on the system (Object Management Group, 2015).

ii. Sequence Diagram

The sequence diagram was used to show interaction between the objects. This gives a clear picture of how the system flows from one point to another (Object Management Group, 2015).

iii. Class Diagram

This was used to show objects in the system, their attributes and methods. The relationships between the objects and their cardinality values (Object Management Group, 2015).

iv. Database Design

A database design was generated out of the entity relationship diagram (ERD) that shows various entities and their attributes and how they are related to one another (Object Management Group, 2015). A database is necessary for storing the system's data, these data is stored in form of tables representing the different entities within the system.

v. Wireframes

Wireframes were designed using an online platform known as Fluid UI (<https://www.fluidui.com>). This allowed the developer to have a clear view of how the interfaces are going to look like in terms of the total user experience.

3.5 Build Phase

This stage involved the actual development of the system regarding the designs discussed above. This involved the creation of a mobile application and a web application both linked to a database. Below are the approaches that were used in the application development.

i. Mobile Application

The platform for mobile application implementation used Android. The source code was written in Java utilizing Android classes. JavaScript Object Notation (JSON) (www.json.org) was used to provide the linking between the Android application and the database. The reasons for choosing Android for developing the client application are: Availability of a flexible Android Studio software development kit (SDK) (<https://developer.android.com/studio/index.html>) and online support for Android developers.

ii. Web Application

This was built using Laravel development framework (<https://laravel.com/>) which is based on PHP. The main reasons for using Laravel are: It is open source, it is light so provides good performance in terms of speed, availability of online support, ensures development of secure applications by providing methods and structures which to a certain extent force the developer to write code that is resistant to common exploits such as cross site scripting XSS, and SQL injection and other hacks.

iii. Database

MySQL database management system (<https://www.mysql.com>) was used to store the application data for both web and mobile. The reason for using MySQL are: It is an open source platform, provides compatibility with PHP.

3.6 System Testing Phase

Once the development phase is over, testing was done on the application with the aim of ensuring that it performs as intended. The system went through the following tests:

i. Usability Testing

This was done to determine the usability of the application. For this exercise, a total number of 10 respondents were sampled out of the respondents used to gather system requirements to test and give their feedback with regards to the application. The method using was convenience sampling on the basis of the respondents that could be found easily. The respondents were sent the APK of the application and the link to the web application, this was followed by a questionnaire as shown in Appendix A sent via email that required them to test whether the application met the requirement specifications they had suggested. This feedback was useful as it was used to refine the application and in validation of the system.

ii. Functionality Testing

This was done to test the systems' functional and non-functional requirements. The respondents were sent the APK of the application and the link to the web application via email, this was followed by a questionnaire as shown in Appendix A also sent via email that required them to test various use cases of the application and give their response.

iii. Compatibility Testing

The mobile application and web application was tested on different web browsers including Google Chrome, Safari, Mozilla Firefox, Internet Explorer and Android mobile devices with different versions of Android like Android Version 6.0, Android Version 4.4.4 and Android Version 5.1.1 respectively to ensure compatibility.

iv. Integration Testing

This is meant to check the amount of time the application would take to process a request or load a certain functionality. This was done by performing queries and observing how long it takes to bring the results.

3.7 Evaluation

The application was evaluated if it met the research objective of developing an application that will improve career guidance process. This was achieved by use of a questionnaire and the APK

sent via mail to the respondents to use the application and later fill in the questionnaire asking them whether the application improved their career guidance experience. The goal being to achieve better satisfaction levels among students as they study and after graduation. Therefore, reduce such cases as reported by Philips (2014) that per a study in November 2013 by website CareerBuilder, about one-third (31 percent) of college-educated workers age 35 and older are never employed within their degree field of study. The questionnaire used in the study is as seen in Appendix B.

3.8 Conclusions

In this chapter, the processes and methods used to answer research questions mentioned in chapter 1 and data collection were discussed in detail. This discussion was useful in setting foot into the following chapter of system design and architecture where the illustrations of the methods discussed here will be shown.

CHAPTER 4: PLANNING, REQUIREMENTS ANALYSIS AND DESIGN PHASE

4.1 Introduction

This chapter details the discussion of planning, the data collected and later how this data is used to come up with design and architecture of the proposed solution. Design diagrams were drawn using the Unified Modelling Language (UML) showing the detailed design and architecture of both website and Android mobile application. The design diagrams include use case diagram, use case description, system sequence diagram, class diagram, entity relationship diagram (ERD) and the wireframes.

4.2 Planning

The planning phase was done by identifying all the activities that were necessary for the completion of the study and their time required for each activity. The study used a Gantt chart to achieve a well visualised planning. Figure D.1 shows the Gantt chart.

4.3 Requirement Analysis

Data used for obtaining system requirements was collected using the questionnaire (Appendix A) created using Google forms and sent to respondents via email. This data needed to be analysed to give useful insights in the development of the application. This section shows the analysis of the data collected.

Degree of Response

The target population of 20 respondents included student from four universities namely: Strathmore University, Kabianga University, JKUAT University and Egerton University. It was of essence to know their satisfaction levels with the courses that they are undertaking, the challenges they experienced in choosing their careers as they joined the university, whether they used any career guidance tool in their career choice process and whether they would have used one if they knew about it or recommended it to others, and lastly what features they would

recommend to be included in such a solution. Below is the analysis of the data obtained from the respondents.

i. Institution Distribution

All the respondents were asked to specify the university they study in. The chart below in Figure 4.1 shows the institution distribution of all the respondents.

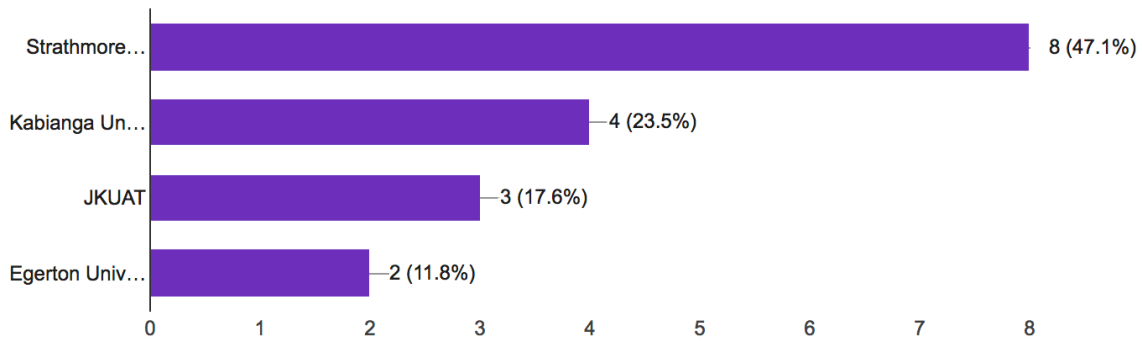


Figure 4.1 Institution Distribution

ii. Course Satisfaction Levels

The respondents were asked to indicate their satisfaction levels with the courses that they are currently undertaking in the university and a majority were at 3 on a scale of 1-5. With the ranges standing for: 1-not satisfied, 2- not sure, 3- fairly satisfied, 4- satisfied, 5- very satisfied.

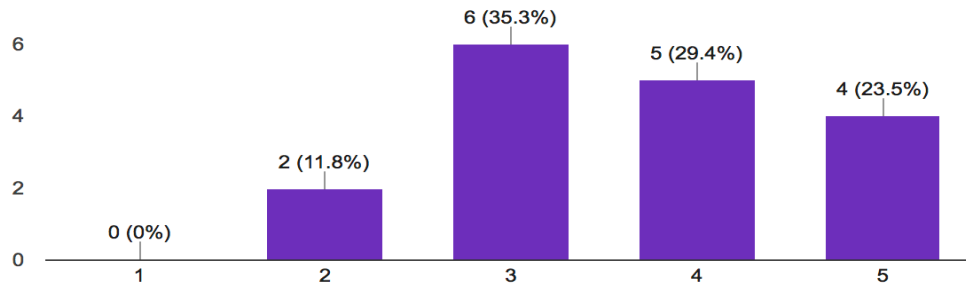


Figure 4.2 Course Satisfaction Levels

iii. Challenges Experienced in Choosing Careers

All the respondents as shown in Figure 4.3 indicated that they experienced challenges in choosing their careers, when asked further what these challenges were they mentioned: Lack of sufficient information about the career and future advancement.

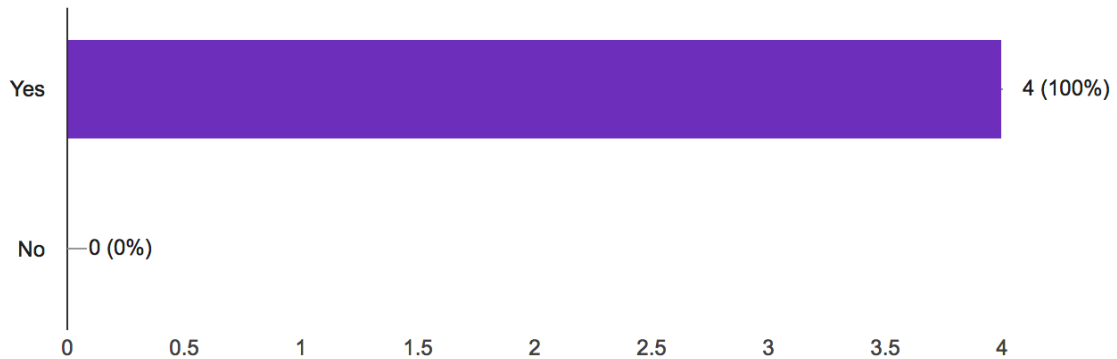


Figure 4.3 Challenges Experienced in Choosing Careers

iv. Knowledge of Career Guidance Tool

Respondents were asked if they knew or had ever used a career guidance tool and only 25% of them were aware while 68.8% of them had never used career guidance tools.

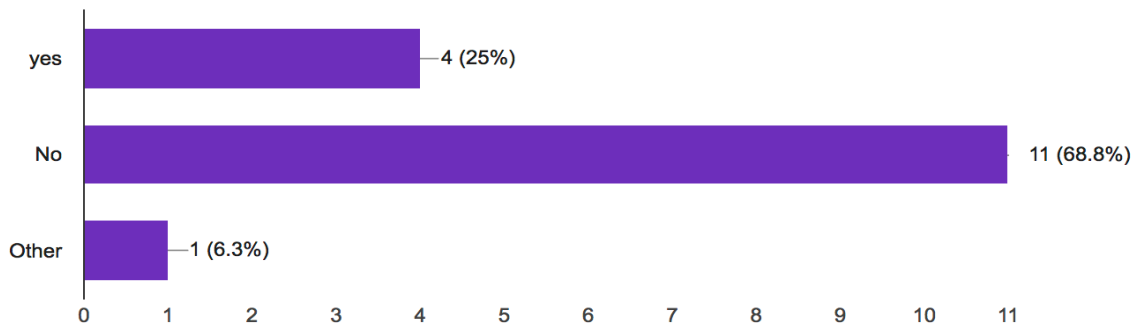


Figure 4.4 Knowledge of Career Guidance Tool

v. Uptake of a Career Guidance Tool

All the respondents who were not aware or had never used a career guidance tool showed their interest in using one if they knew about it and recommending it to others.

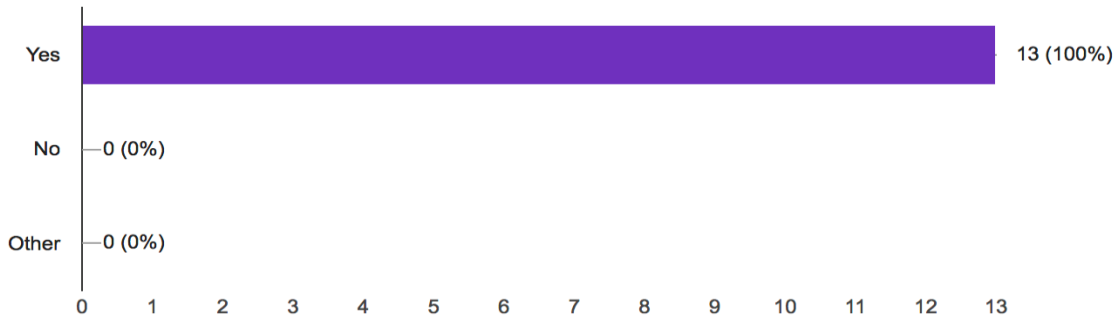


Figure 4.5 Uptake of a Career Guidance Tool

vi. Factors to Consider in Choosing a Course

As the respondents were university students, they were asked what advice they would give to someone choosing a career given that they have been through the process and these were responses: Passion in an area, personality, field of interest, availability of opportunities in a field, academic performance and aptitude.

vii. Ownership of Smart Phones

The system uses mobile technology hence it is paramount to know smart phone availability among the students. Apart from one student who reported of not having mobile phones, most of them owned smart phones. The chart below in Figure 4.6 illustrates mobile phone ownership among the students.

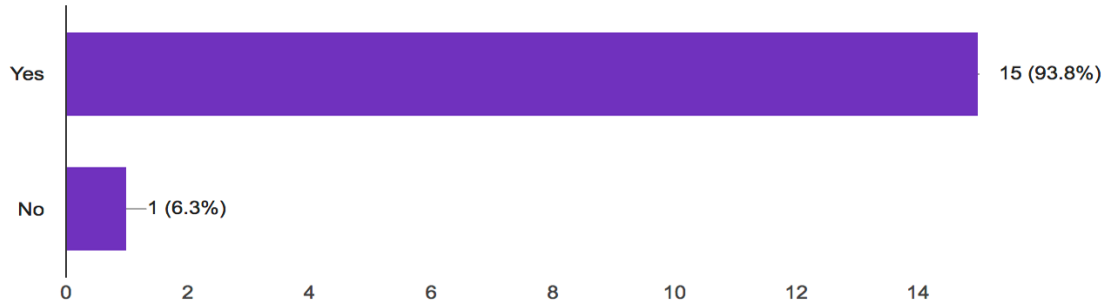


Figure 4.6 Ownership of Smart Phone

viii. Operating System of Mobile Device

The respondents were asked to indicate the operating system on their mobile phones in order to have a solid base on which the operating system should the system be based on. Figure 4.7 shows most them have Android phones 93.3% ,6.7% have IOS phone.

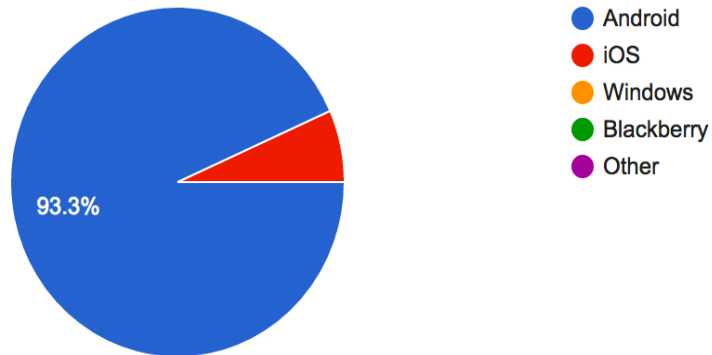


Figure 4.7 Operating System of Mobile Device

ix. Desired Features in a Career Guidance Application

The respondents were asked to give the desired features they would wish to see in a career guidance toll and these were their responses: Testimonials from professionals in the field, interaction with mentors in a field, details of a course and how it fits the job market, different career options and detailed information about them, job opportunities in a field, career that fits personality, industry expectation, the various specialisation areas in a career path, what it takes to succeed in a certain career.

4.4 Requirements Analysis Conclusions

The responses received from the respondents were highly valuable and very informative in making the decision of whether to the proposed system was feasible. The features of the system were refined based on the feedback collected by the researcher. The findings that were derived from the respondents were: Android platform would be the one preferred for the development of the mobile application. The current career guidance method has major challenges that need to be addressed. The proposed system which includes the use of mobile technology would be acceptable by majority of the users.

System Requirements

This section outlines Functional and Non-Functional requirements of the system.

Functional Requirements

These requirements define the capabilities and functions that the implemented system must have in order to achieve its intended purpose. It includes a set of inputs, behaviour and outputs in line with the objectives of the study. They include:

- i. Login and Logout – to gain access to the web application users must login using username and password. Users need to logout in order to exit the system.
- ii. Add professional profile – the system should allow a user who is logged into the system to

create a personal profile.

- iii. View profile – A user can view their own personal profile stored in the database.
- iv. Modify records – The administrator should be able to modify career, user and professionals' records.
- v. Take personality test – The student should be able to take a personality test on the mobile application and view their score.
- vi. View career possibilities – The student should see career possibilities once they get their score.
- vii. View professional testimonials – The student can view professional testimonials related to the career possibilities provided.

Non-functional Requirements

These requirements that specify the criteria used to judge the operation of the system. They were constructed in agreement with functional requirements that define specific behaviour and functions. They include:

- i. Usability – the system interface should be easy to use.
- ii. Reliability and availability – the system should be reliable and always available to perform tasks requested by the user.
- iii. Scalability – the system should be able to adopt additional functionalities. Additional data should be easy to incorporate.
- iv. Integrity – the system being data oriented, it should ensure that the data analysed and stored is not altered or corrupted.
- v. Performance – the system should have an acceptable response time while performing its functions.
- vi. Security – The system should allow only authorized users to use its functionalities.

4.5 Design Phase

This section focuses on the design structure of the solution the researcher has developed. It shows how various components of the system work together to achieve the desired goal and their relationships. Design includes the system architecture, a use case, class diagram, entity relation diagram, system sequence diagram and the database schema.

System Architecture

The architecture used in the system is a client-server architecture. This a model that better employs available computing resources and share data processing loads allowing the client machine to provide the user with interaction facilities and application processing while the server machine provides data processing.

The client side is made up of the Android mobile application and the web application. The mobile application contains personality test questions that the students are required to answer. The score of the test is used to give career possibilities to the student and then go ahead and view professional testimonials associated with each career. The web application is used for administration purposes to manage users, careers and professional testimonials. Both the mobile and web application are connected to an online server through the internet. The server is then connected to an online database where the users, professionals and career details resides. Figure 4.8 illustrates the client server architecture.

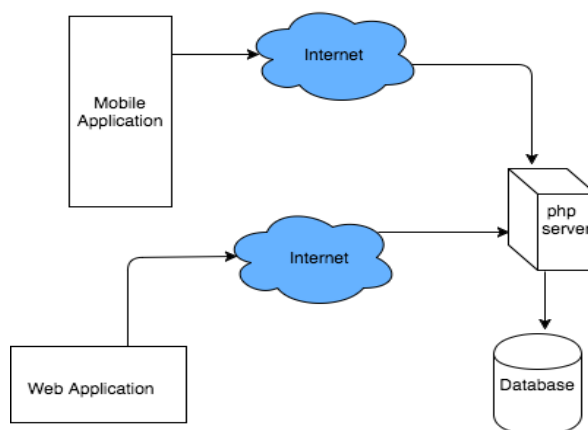


Figure 4.8 System Architecture

System Design

The user requirements collected from potential users of the system were combined with the developer's ideas to develop a system design that fulfils the functional, non-functional requirements and the research objectives. The following section discusses the design diagrams that depicts the actual implementation of the system.

i. Use Case Diagram

The system functionality is described in detail using the use case diagram in figure 4.9.

Actors

Below is a list of actors who will interact with the system:

Administrator- This is the individual in charge of creating and managing users and careers.

User- This is the person responsible for creating professional testimonials.

Student- a student is anyone who uses the mobile application to take a personality test, view career possibilities and professional testimonials.

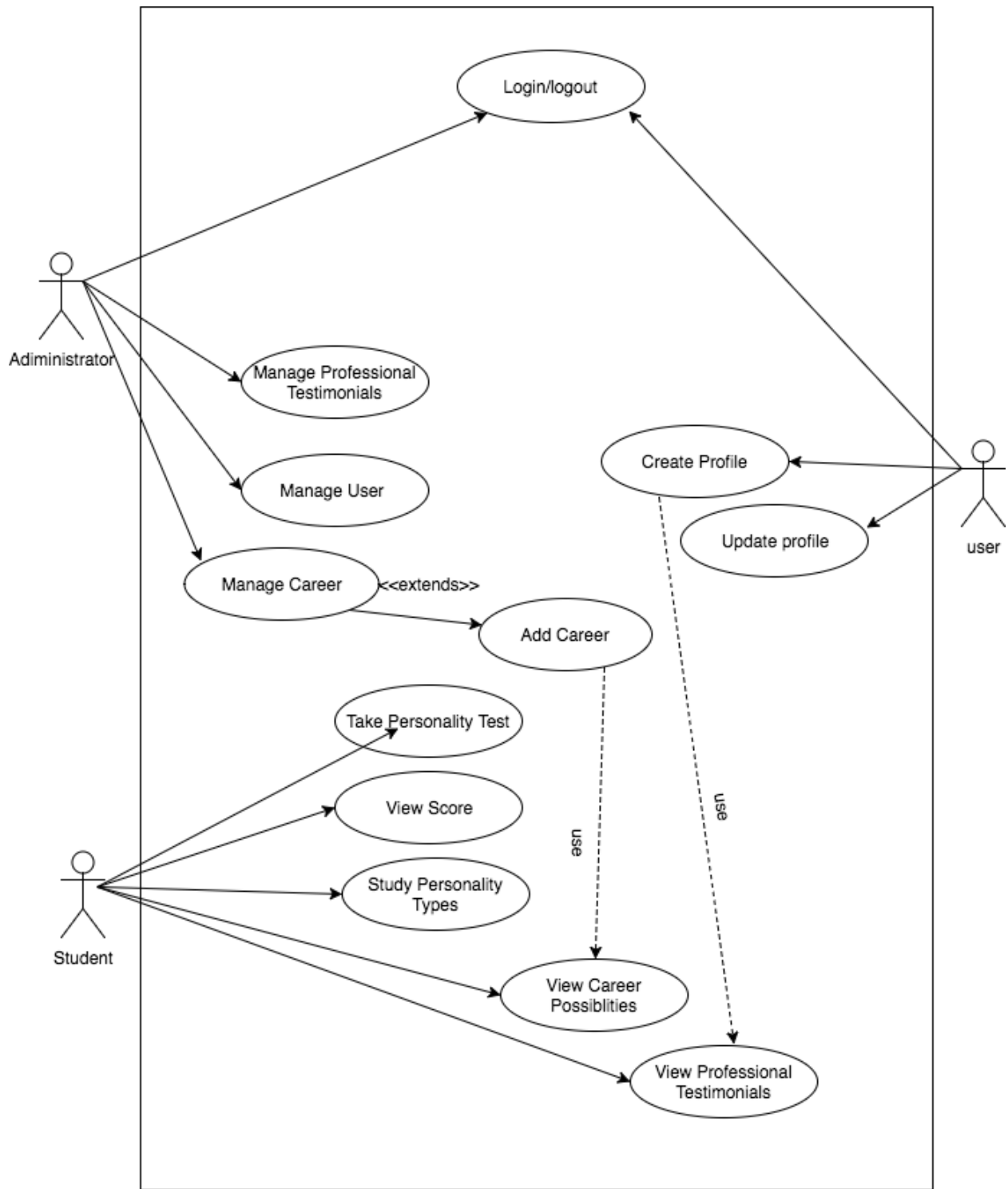


Figure 4.9 Use Case Diagram

ii. Use Case Description

Discussed below are the use case descriptions for the major use cases.

Table 4.1 Login/Logout Use Case Description

Use case 1: Login/Logout	
Use case Description: This use case describes the steps taken by the user to log in and out of the system	
Primary Actors: Administrator, user	
Precondition: The user must be registered to use the web application	
Post condition: The user gains access to the system	
Typical case of events	
Actor Response 1. User enters username and password or logs out 3. User gains access to the system	System Response 2. System verifies login credentials and grants access to the web application or logs out the user
Alternative flow The user provides wrong username and password combination a) Access to the system is denied	

Table 4.2 Add User Use Case Description

Use case 2: Add user	
Use case Description: This use case describes the process of adding a user	
Primary Actors: Administrator	
Precondition: The administrator must be logged in to the system	
Post condition: The user details are added into the database	
Typical case of events	
Actor Response 1. Select the add user option 3. Enter and save user details	System Response 2. Display add user form 4. Store user details
Alternative flow User details are not saved	

Table 4.3 Manage User Use Case Description

Use case 3: Manage User	
Use case Description: This use case describes the steps taken to manage a user	
Primary Actors: Administrator	
Precondition: The administrator must be logged in to the system The user details must be saved into the database	
Post condition: The modified user details are stored into the database	
Typical case of events	
Actor Response 1. Select the edit user button 3. Enter and save changes user details	System Response 3. Display edit user form 4. Store modified user details
Alternative flow The modified user details are not saved	

Table 4.4 Create Profile Use Case Description

Use case 4: Create Profile	
Use case Description: This use case describes the steps taken to create a mentor profile	
Primary Actors: User	
Precondition: The user must be logged in to the system	
Post condition: The created mentor profile is stored into the database	
Typical case of events	
Actor Response 1. Select the create profile option 3. Enter and save profile details	System Response 1. Display create profile form 4. Store profile details
Alternative flow The mentor details are not saved	

Table 4.5 Take Personality Test Use Case Description

Use case 5: Take Personality Test	
Use case Description: This use case describes the steps taken to take a personality test	
Primary Actors: Student	
Precondition: The student must have the mobile application	
Post condition: The personality test has a score	
Typical case of events	
Actor Response 1. Select the personality test image button 3. Student check the action that best describes them	System Response 2. Display the personality questions 4. Display the personality test score
Alternative flow Study personalities View professional testimonial	

Table 4.6 View Career Possibilities Use Case Description

Use case 6: View Career Possibilities	
Use case Description: This use case describes the steps taken to view career possibilities	
Primary Actors: Student	
Precondition: The student must have taken the personality test	
Post condition: Career possibilities are displayed	
Typical case of events	
Actor Response 1.Select the next button on the score page	System Response 2.Display career possibilities
Alternative flow Go back to the personality test	

Table 4.7 View Professional Testimonials Use Case Description

Use case 7: View Professional Testimonials	
Use case Description: This use case describes the steps taken to view professional testimonials	
Primary Actors: Student	
Precondition: The student must have the mobile application The student should have the career possibilities displayed	
Post condition: Professional testimonials are displayed	
Typical case of events	
Actor Response 1.Select a career	System Response 2.Display professional mentor associated with that career
Alternative flow Go back to career possibilities	

iii. System Sequence Diagram

This diagram (Figure 4.10) shows the sequential flow of information passing through the system entities.

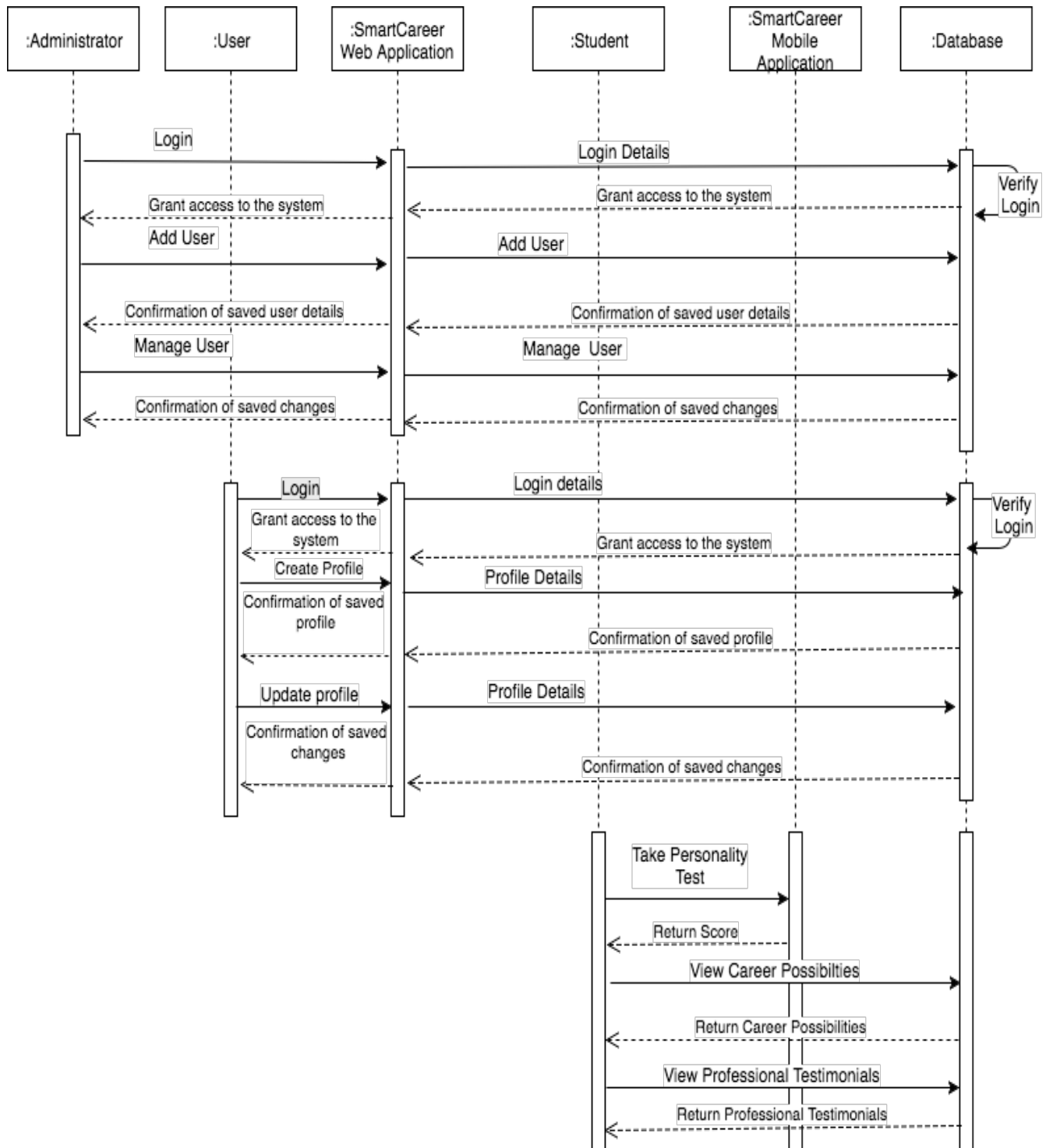


Figure 4.10 System Sequence Diagram

iv. Class Diagram

This diagram (Figure 4.11) shows various entities of the system and their corresponding attributes and methods of implementation.

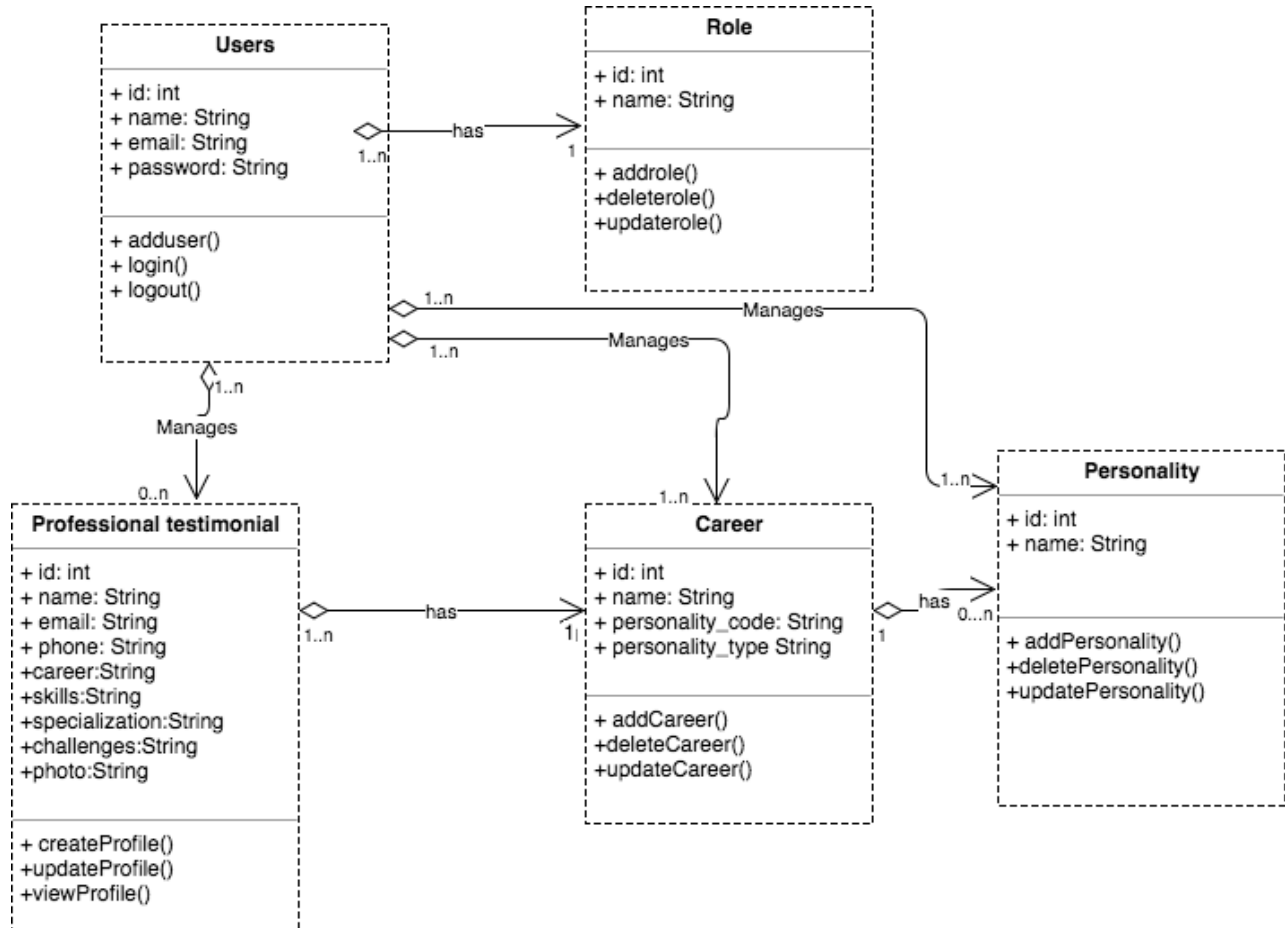


Figure 4.11 Class Diagram

v. Database Schema

Entity Relationship Diagram (ERD)

The entity relationship diagram as shown in figure 4.12 illustrates the conceptual view of the database. It also illustrates the tables and their relationships.

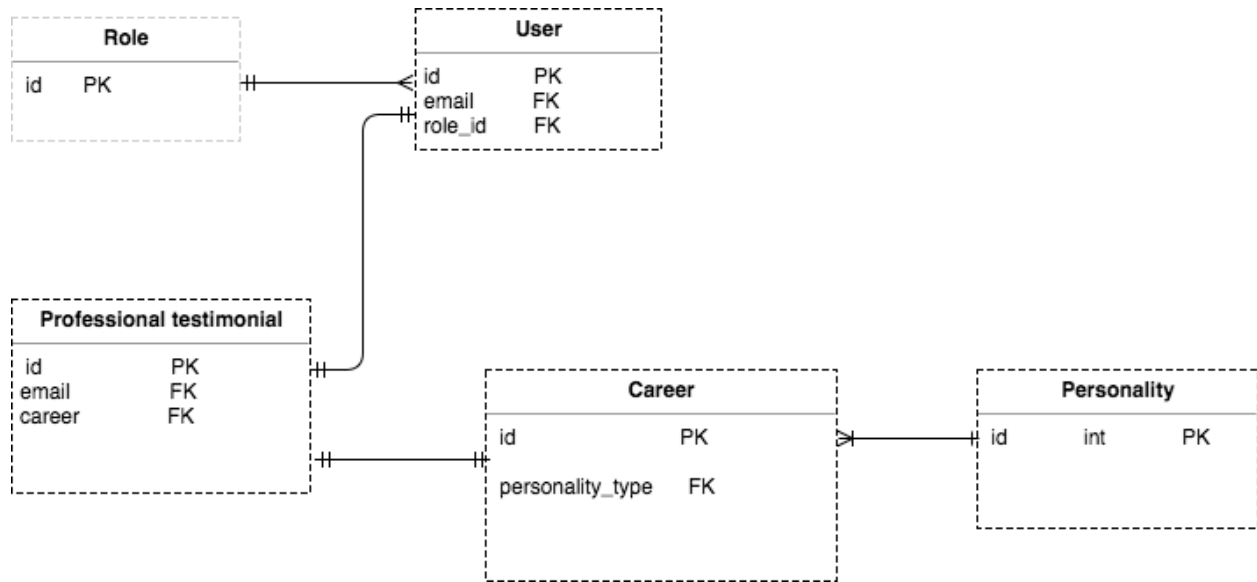


Figure 4.12 Entity Relationship Diagram

The following is the explanation of the Entity Relation Diagram:

The relationship between role and a user is a One-to-Many relationship. The reason being, a role can be assigned to several users.

The relationship between a user and a professional testimonial is One-to-One. This is because a professional testimonial can only be created by one user.

The relationship between professional testimonial and a career is One-to-One relationship. This is so because a professional testimonial can only be associated with one career.

The relationship between personality and career is One-to-Many relationship. Reason being, a personality type can have different careers under it.

Database Tables

i. Role Table

This table contains the roles of users within the system, these details are used during log in. Whenever a user enters their details the system checks against the details in the database and directs the user to a certain page depending on their role.

Table 4.8 Role Table

Column Name	Data Type	Index
id	Int	Primary Key
role	Varchar (255)	

ii. User Table

This table contains the user details, these details are used during log in. Whenever a user enters their details the system checks against the details in the database if the details match the user is logged in otherwise they are prompted to enter the correct details.

Table 4.9 User Table

Column Name	Data Type	Index
id	Int	Primary Key
name	Varchar (255)	
email	Varchar (20)	Foreign key
password	Varchar (255)	
role_id	Varchar(255)	Foreign Key

iii. Personality Table

This table contains the different personality types used in the Holland's career guidance theory. These personality types are used to determine extra career possibilities and the questions to be displayed on different sections of the application.

Table 4.10 Personality Table

Column Name	Data Type	Index
id	Int	Primary Key
name	Varchar (255)	

iv. Career Table

This table contains the different careers together with their personality code and personality type. The system displays the exact career match if the personality code generated after the test score is determined matches that which is in the database.

Table 4.11 Career Table

Column Name	Data Type	Index
id	Int	Primary Key
name	Varchar (255)	
Personality code	Varchar (255)	
Personality type	Varchar (255)	Foreign Key

v. Professional Testimonial Table

This table contains the professional testimonials which are viewed by the user whenever they click on a career to find out more details concerning that career.

Table 4.11 Professional Testimonial Table

Column Name	Data Type	Index
id	Int	Primary Key
name	Varchar (255)	
email	Varchar (20)	Foreign Key
phone	Varchar (20)	
career	Varchar (255)	Foreign Key
skills	Varchar (255)	
specialisation	Varchar (255)	
challenges	Varchar (255)	
photo	Varchar (255)	

Mobile Application Wireframes

i. Personality Test and Score Wireframes

Figure 4.13 shows the personality test wireframe together with the score wireframe.

Step 1

In each section please select the that best describes you

- Are you systematic?
- Are you self controlled?
- Are independent?
- Are you practical?
- Can you pitch a tent?

Back Next

Step 2

View your total score

- Realistic 23
- Artistic 25
- Investigative 4
- Social 21
- Entreprising 10
- Conventional 15

Your personality code is **ARS**

Back Next

Figure 4.13 Personality Test and Score Wireframes

ii. Personality Description and Career Possibilities Wireframes

The personality description and career possibilities wireframes are as shown in Figure 4.14.

Step 3

We would like you to understand the various personality types which will form the basis for our career guidance

Personality type	Description
Realistic	
Artistic	
Investgative	
social	
Entreprising	
Conventional	

Back Next

Step 4

These are the career possibilities that match your personality. Please click on a career to get a mentor

Your personality code is **ARS**

1. System Design
2. Mechanical Engineering
3. Electrical Engineering

Back

Figure 4.14 Personality Description and Career Possibilities Wireframes

iii. Professional Testimonial Wireframes

The professional testimonial wireframes displays where details given by the mentors are shown. This is seen in Figure 4.15 .

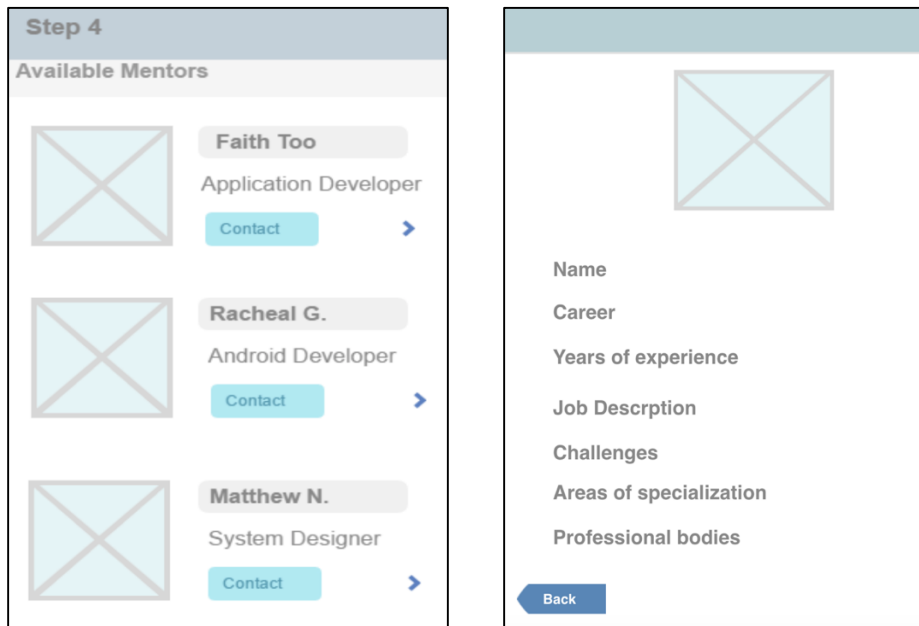


Figure 4.15 Professional Testimonial Wireframes

Web Application Wireframes

i. Create Profile Wireframe

This wireframe (Figure 4.16) shows the page where a professional enters their testimonial.

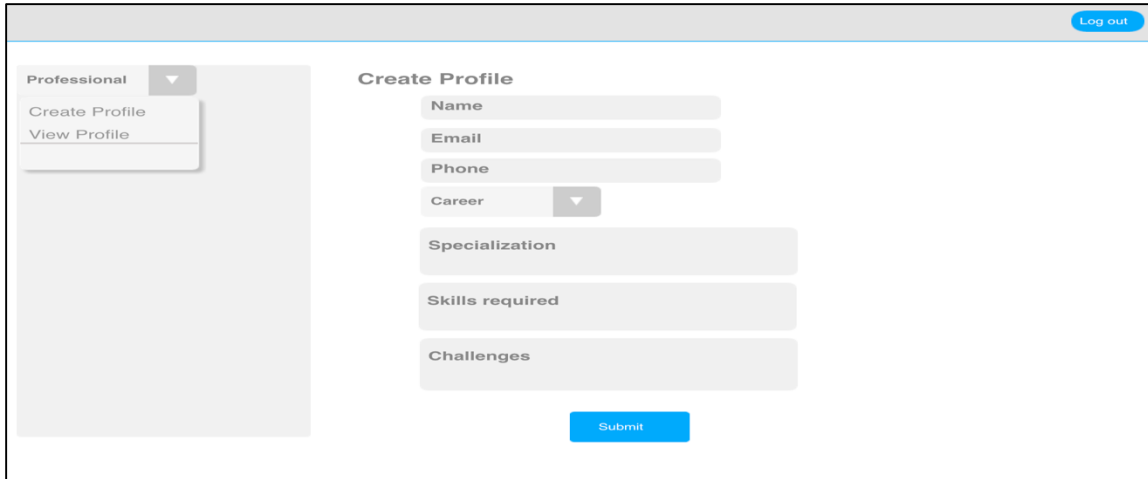


Figure 4. 16 Create Profile Wireframe

ii. Mange User Details Wireframe

This wireframe displays the page that enables the administrator to edit or delete details of a user. Figure 4.17 shows the manage user details wireframe.

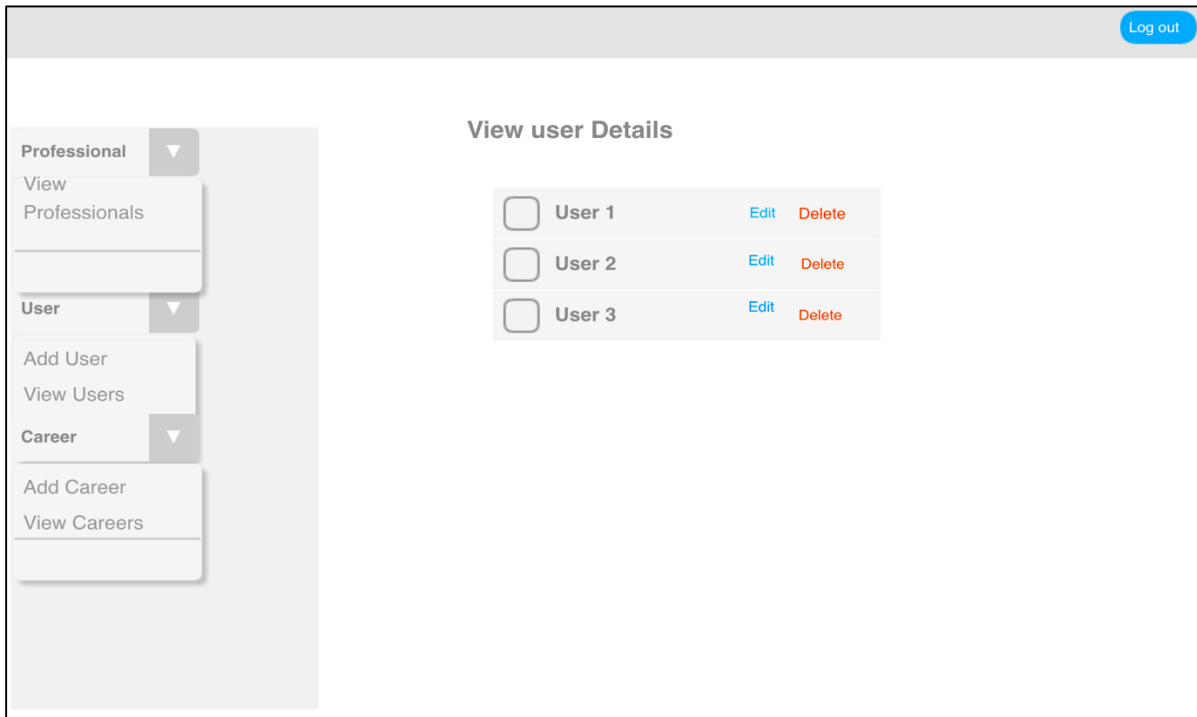


Figure 4.17 Mange User Details Wireframe

iii. Manage Careers Wireframe

It is on this page that the administrator can edit or delete details of a career. Figure 4.18 shows the manage careers wireframe.

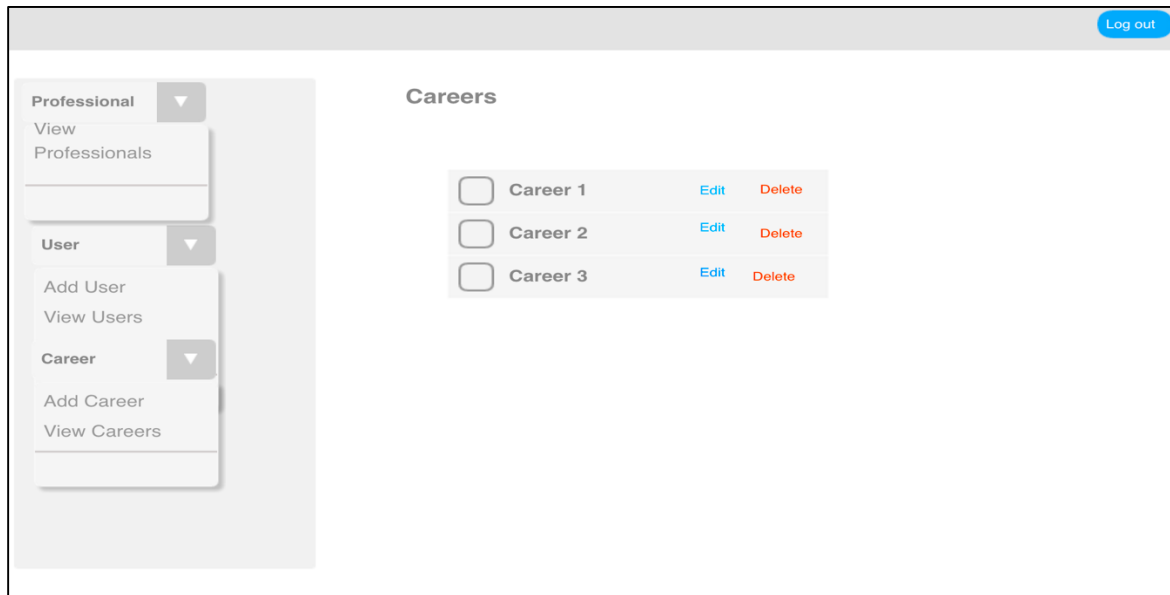


Figure 4.18 Manage Careers Wireframe

4.6 Conclusions

System design and architecture as discussed in this chapter aids in understanding the system flow. UML notations have been used to design diagrams that aid in understanding the system. These diagrams include the system architecture which is client server based architecture. A use case diagram showing the system requirements. A sequence Diagram illustrating the system processes. A class diagram indicating the classes and methods of the system. An ERD that shows the database design and. Lastly the wireframes giving a picture of how the system will look like after development.

CHAPTER 5: BUILDING PHASE, TESTING AND EVALUATION

5.1 Introduction

This chapter explains how building, testing and evaluation phases of the system were carried out. How the major functionalities of the system have been implemented and the tests carried out on them, this aids in understanding how the application meets the set research objectives as stated in Chapter 1.

5.2 Building Phase

Implementation Environment

i. **Mobile Application**

Android platform was used for the mobile application implementation. The application source code was written in Java, making use of Android classes. The application was then compiled and tested using the Android Software Development Kit (SDK) emulator and several other Android phones. JSON was used as the web service that gives the interface between the Android application and the database.

ii. **Web Application**

The web application was built using Laravel 5.4 framework written using PHP5. Hosting of the website is done on an online Apache HTTP server.

iii. **The Database**

MySQL database management system was used to store application data for both the mobile and the web application.

Implementation Details

The mobile application runs on any mobile phone with Android operating system from version 4.3 upto the latest version. The smartphone running the application requires Internet connection. The application contains three options which a user can access from the home page.

The first option is taking a personality test where the user is presented with six sections of the test. The questions have been presented using checkboxes enabling the user to check the action that best describes them. The score of this test is used to determine the career possibilities to be listed where then the user can view the mentors associated with a career. The second option is a study of the different personality types so that the user can identify where they belong and the career possibilities thereof. The third and last option offers the user a broad spectrum of the professionals without them having to take a test.

System Components

The career guidance mobile application has the following components:

Application Home Page

This is the first page of the application where one can navigate to the different sections of the app. Figure 5.1 below shows the Home Page.

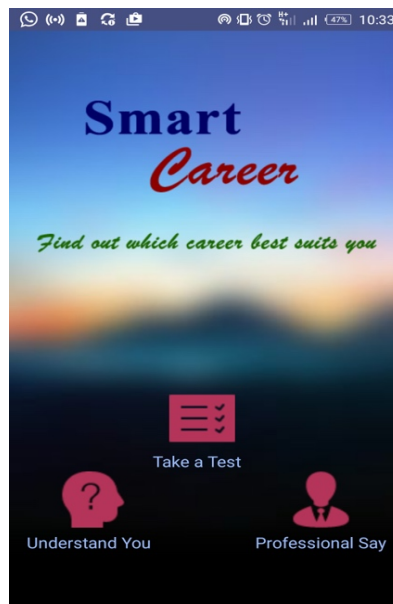


Figure 5.1 Home Page

Personality Test Questions Page

This is the page that appears when a user selects the take a test option. The test has six sections

containing questions testing different personalities, once a user is done with one section they can click on the next button to navigate to the following sections. Figure 5.2 shows some of the personality test questions pages.

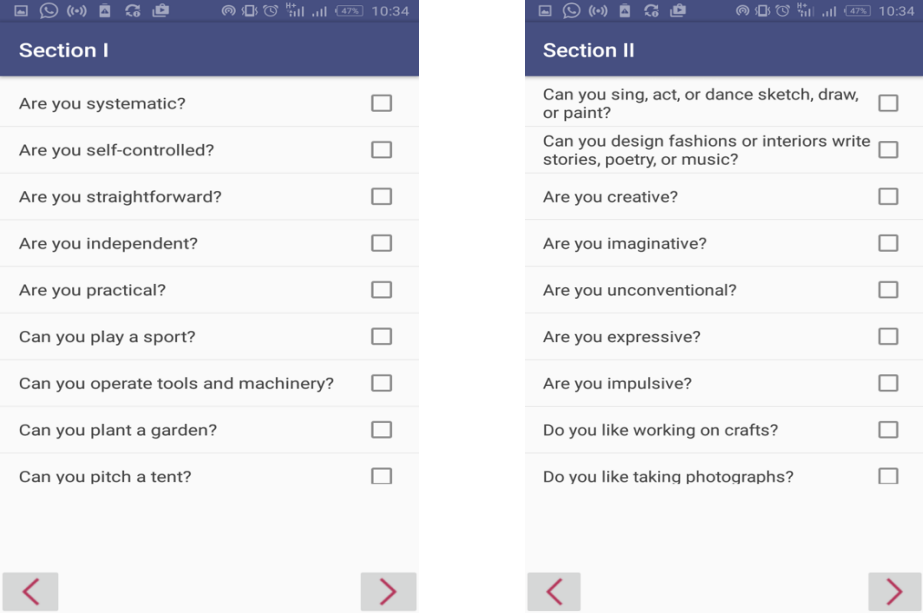


Figure 5.2 Personality Test Questions Page

Personality Test Score Page

This page displays the score of every section test taken in the previous pages. It identifies the top three highest scored personality types and combines the abbreviation letter assigned to it to generate a personality code which is displayed to the user together with a next button to navigate to the following page. Figure 5.3 shows the content of this page.



Figure 5.3 Personality Test Score Page

Career Possibilities Page

This page displays the career possibilities determined by the personality code generated from the score of the user. The user can click on a career they would wish to find more information about. Figure 5.4 shows the content of page.

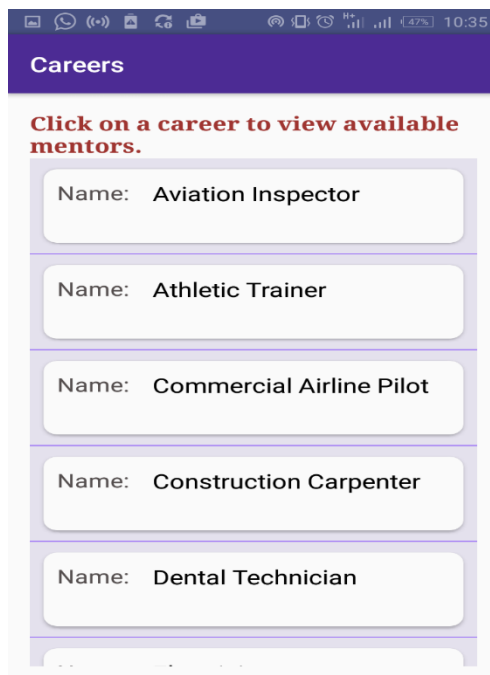


Figure 5.4 Career Possibilities Page

Mentor Details Page

This page contains the professional details and testimonial, it shows up when a user clicks on a career. Here the user can get information related to a career such as skills needed, challenges, areas of specialization, average salary, etc. Figure 5.5 shows the mentor details page.

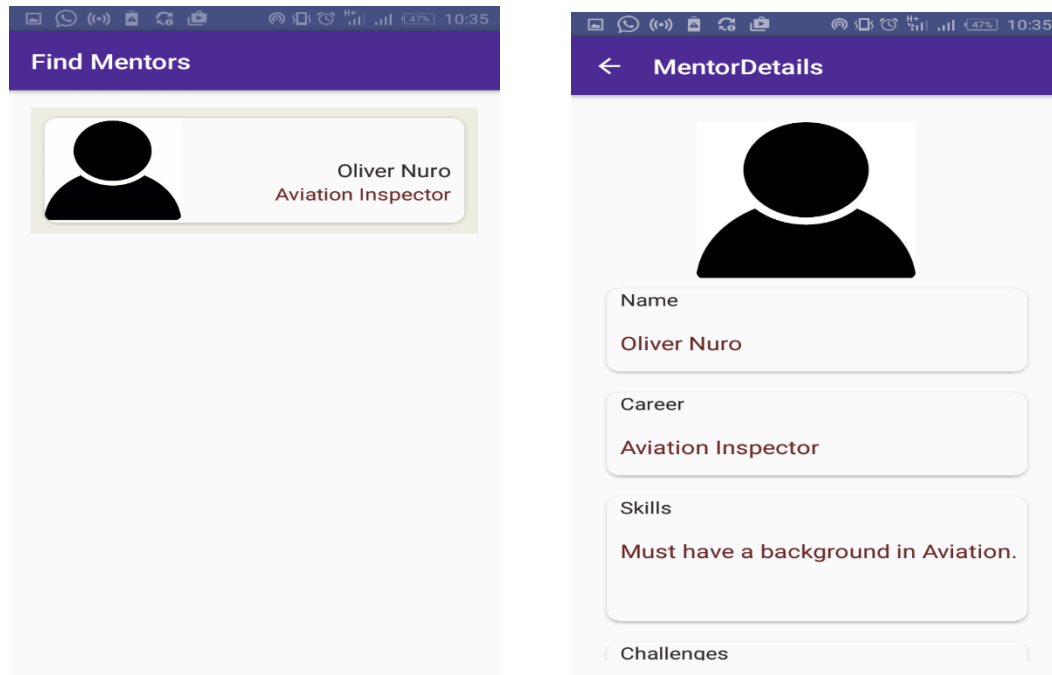


Figure 5.5 Mentor Details Page

i. Web Application

The main system components of the career guidance web application are:

Login Page

This page has an email and password fields where the user should enter their credentials for verification to login into the system, different users are directed to different pages depending on their role. If a user has forgotten their password, they can click the forgot password button. Figure C.1 shows the login page.

Profile Management Page

This system component offers profile creation career functionality by providing the user with an interface for adding a new profile, managing their details by editing and viewing them. The screen shot for profile management is provided in Figure 5.6.

The screenshot shows the 'Create Profile' page in the SMARTCAREER system. The page has a dark header with the SMARTCAREER logo on the left and a user profile icon on the right. A left sidebar contains navigation links: Dashboard, Professionals, Create Profile, View Profile, and Login Page. The main content area is titled 'Create Profile' and contains a form with the following elements:

- Name:** A text input field.
- Phone:** A text input field.
- Email:** A text input field.
- Career:** A dropdown menu with 'Professional' selected.
- Specialization areas:** A large text area for input.
- Challenges:** A large text area for input.

Figure 5.6 Create Profile Page

User Management Page

This system component offers user management functionality by providing interface for adding a new user, managing their login credentials or delete users. The screen shot for user management is provided in Figure 5.7.

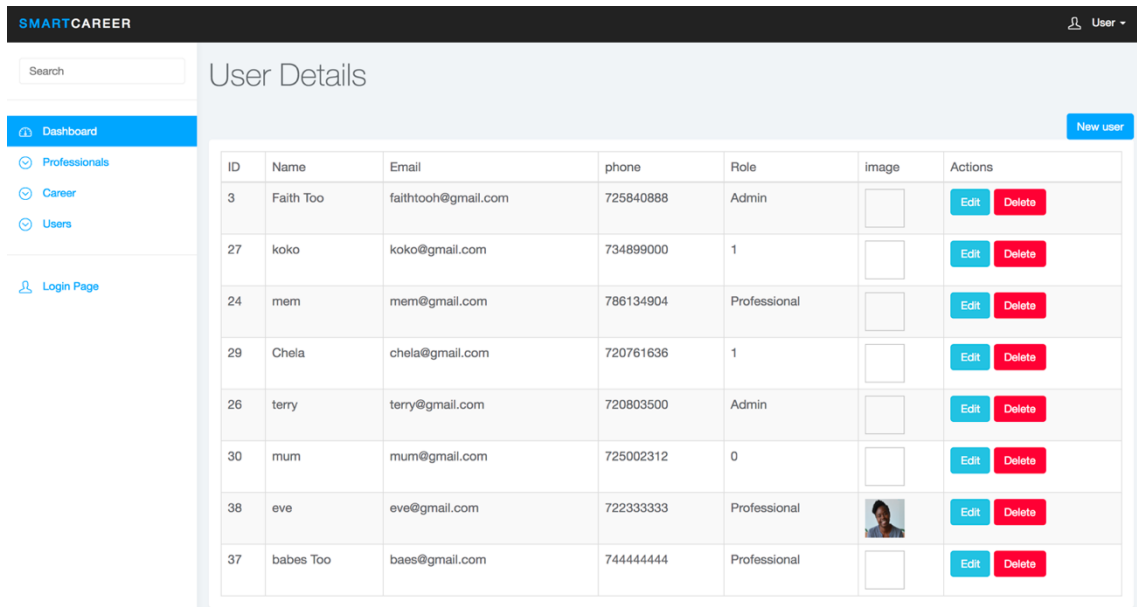


Figure 5.7 User Management Page

Career Management page

This system component offers career management functionality by providing interface for adding a new career, managing their details or delete careers. The screen shot for career management is provided in Figure 5.8.

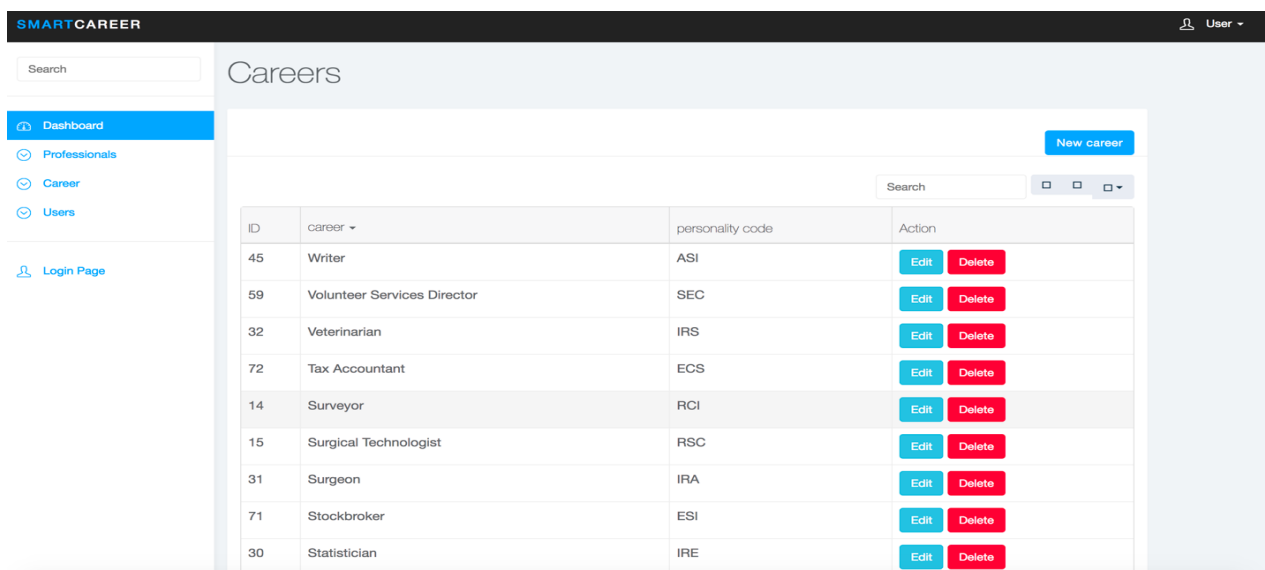


Figure 5.8 Career Management Page

5.3 Testing Phase

System Testing

This section details the tests carried out on the mobile and web application with the aim of observing whether the set functional and non-functional requirements have been met. It also gives explanations on the types of tests used on the developed application. A test questionnaire attached in Appendix B below was also sent to the users to get their feedback on the use of the application. The tests included:

i. **Functional Testing**

Functional testing is used to test whether the functions of the application are working as specified in the system requirement. Testing was applied on the several use cases to see if they performed as expected or not.

Table 5.1 Login and Logout Test Case

Identifier	1
Test Case	Login or out of the application
Description	Users perform login with a username and password pair then logout.
Utilized use case	Login and Logout
Results	Successful login and access granted or Successful logout
Pass/Fail	Pass

Table 5.2 Add New User Test Case

Identifier	2
Test Case	Add new users
Description	The administrator adds new users into the system.
Utilized use case	Add User
Results	User added successfully and saved in the database
Pass/Fail	Pass

Table 5.3 Manage User Test Case

Identifier	3
Test Case	Manage existing users
Description	The administrator edits details of an existing user in the system.
Utilized use case	Manage User
Results	User details updated successfully and saved in the database
Pass/Fail	Pass

Table 5.4 Create Profile Test Case

Identifier	4
Test Case	Create Mentor Profile
Description	A mentor creates their personal profile.
Utilized use case	Create Profile
Results	Mentor successfully creates a profile and is saved in the database
Pass/Fail	Pass

Table 5.5 Take Personality Test Test Case

Identifier	5
Test Case	Take Personality Test
Description	A student takes the personality test.
Utilized use case	Take Personality Test
Results	Student is successfully able to take the personality test and view the score
Pass/Fail	Pass
Pass/Fail	Pass

Table 5.6 View Career Possibilities Test Case

Identifier	6
Test Case	View Individual Career Possibilities
Description	A student views a list of career possibilities.
Utilized use case	View Career Possibilities
Results	A student can view a list of career possibilities after completing the personality test

Table 5.7 View Professional Testimonial Test Case

Identifier	7
Test Case	View Professional Testimonial
Description	A student views a professional testimonial.
Utilized use case	View Professional Testimonial
Results	A student can view professional testimonial associated with every career possibility listed
Pass/Fail	Pass

ii. **Compatibility Testing**

This test was done to ensure that the mobile and web applications are compatible with the available and commonly used platforms. The mobile application was tested against the available Android

versions while the web application was tested against the available web browsers commonly used.

Android Platform Compatibility Testing

Compatibility test conducted for each of the available Android platforms is shown in Table 5.8.

Table 5.8 Android Platform Compatibility Test

Android Platform	Compatibility
Android Version 6.0	Yes
Android Version 4.4.4	Yes
Android Version 5.1.1	Yes

Web Browser Testing

Table 5.9 Web Browser Test

Browser Type	Compatibility
Google Chrome	Yes
Safari	Yes
Firefox	Yes
Internet Explorer	Yes

User Testing

User testing was done by the study obtaining the users feedback on the application. Their feedback on the application is important so as to gauge whether the goals set have been met or not and how beneficial the system is to them. The areas tested included, user friendliness of the application, functionality, acceptability and quality of interface design. For this to be achieved, a total of 20 respondents were asked to test the application and give their response on the same. Appendix B provides the user-testing questionnaire. Charts were used to represent user responses as shown.

i. User Friendliness

The ease of learning and using the application was tested by potential users. The results were as follows 100% of the potential users indicated that the application was easy to learn and use. Figure 5.9 shows a summary of the results.

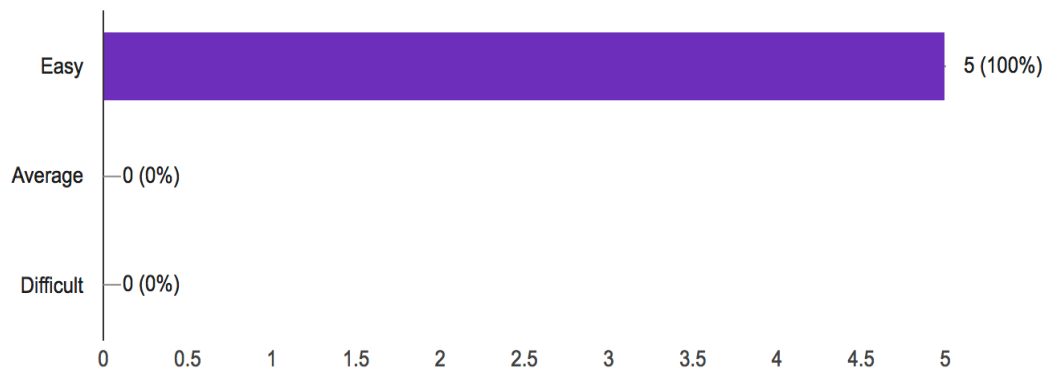


Figure 5.9 User Friendliness

ii. Functionality

Potential users of the application tested the system functionality against the user specifications. 80% of them indicated that they were very satisfied with the application's functionality meaning that the developer achieved most of the user functionality and requirements specification, 20% indicated that they were satisfied with the application's functionality meaning that some of the user specifications were not entirely meet. This result was used to refine the system until an acceptable application was developed. A summary of the results is shown in Figure 5.10.

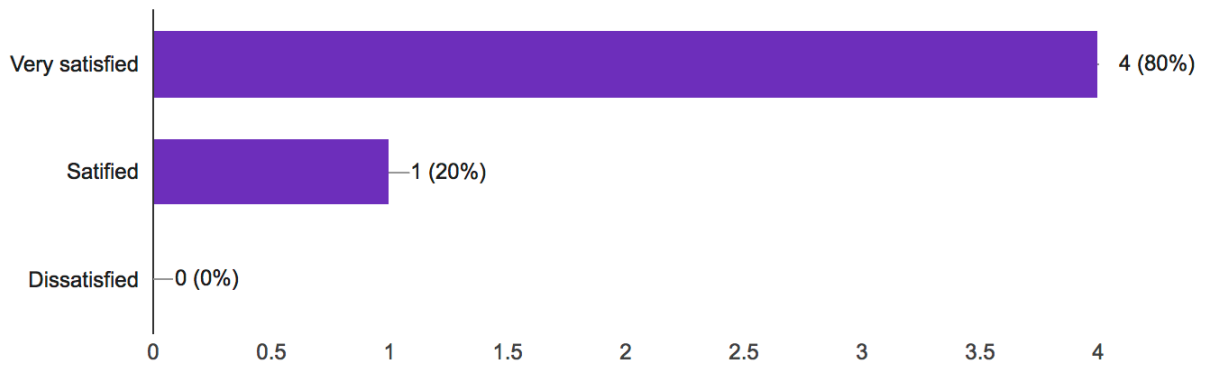


Figure 5.10 Functionality

iii. Acceptability

To measure if the application was great success user acceptance was tested. 83.3% of the potential users gladly accepted the application for use in career guidance. 16.7% accepted the application meaning that there were some aspects about it that they wish would be different. Since majority of the users gladly accepted the application this test was a great success. Figure 5.11 provides a summary of these results.

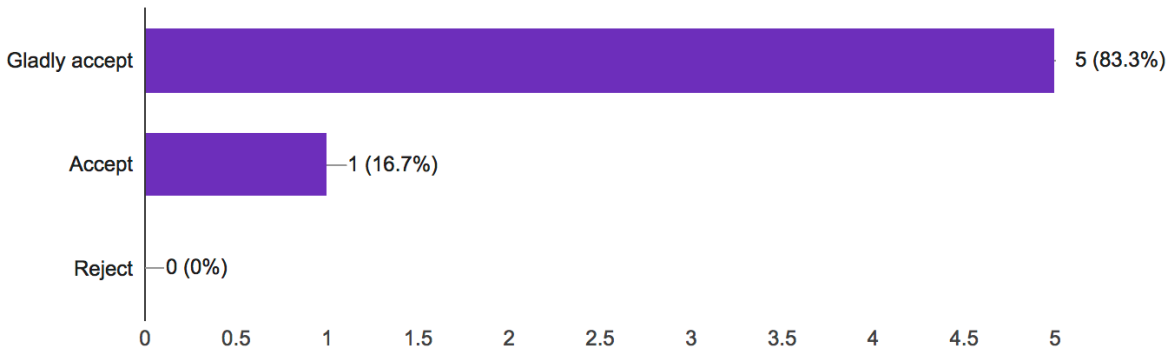


Figure 5.11 Acceptability

iv. Interface Design

The application appearance including the look and feel was tested by potential users. The results provided were: 85.7% of the respondents indicated that the application was

attractive, 14.3% indicated that the application was fairly attractive. A summary of the results is shown in Figure 5.12.

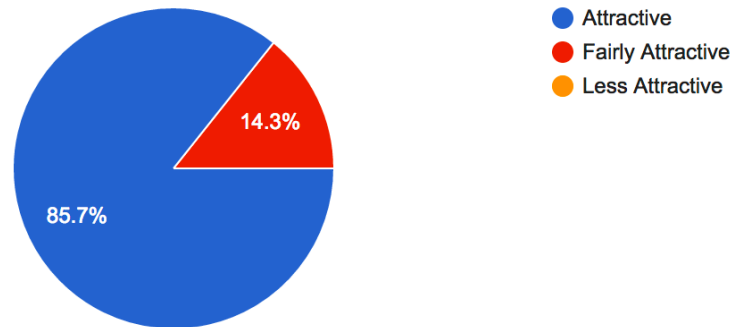


Figure 5.12 Interface Design

5.4 System Evaluation

This was done in order to ascertain whether the career guidance system solves the problem of improving the career guidance process. Figure 5.13 shows what the users thought of the implementation and if the system solves the problem, we can see that majority of the users were very satisfied that the implementation addresses the raised issues. Figure 5.13 shows system evaluation feedback.

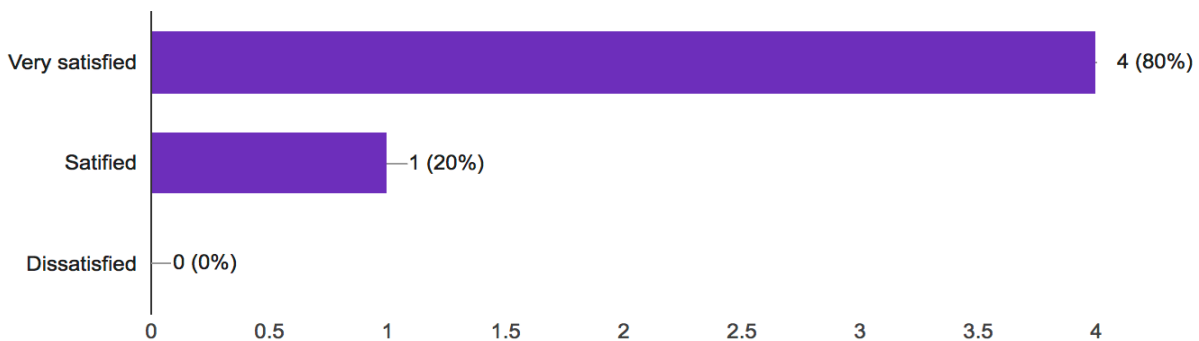


Figure 5.13 Evaluation

5.5 Conclusions

The system requirement collection stage clarified what functionalities the users would prefer in the application. This in turn translated to development of an application that met the set objectives and the user requirements also. Hence, most of the set objectives were met with the implementation of the application. This was made possible by the methodology used, that is the Agile methodology, as it facilitated constant inflow of information from stakeholders that helped in coming up with a good design for the application.

CHAPTER 6: DISCUSSIONS

6.1 Introduction

The research was done with the aim of examining current career guidance situation in Kenya, tools and techniques being used in order to identify a suitable technique that will be adopted among a larger population facing major challenges of inadequate career guidance. The research finding helps to identify whether there is need for career guidance system, the prospected level of uptake and the needed features in such a system in order to develop a system that solves these challenges. This chapter seeks to find if the set objectives were achieved and provide a review of the developed system in relation the current system, its advantages, benefits and some of its limitations.

6.2 Explanation of Findings

Two main questionnaires were used in this study namely, the pre-questionnaire and the Post questionnaire. The pre-questionnaire was meant to find out the system needs and if the system was feasible, and from the findings, 66.7% of the respondents showed that they were not aware of a career guidance tool that could be of assistance to them and went ahead to express their interest in using one if they knew of any while the 33.3% who have ever used a career guidance tool expressed their helpfulness levels of 80-100 %.

The post questionnaire was mainly used to test the how well the application's functionalities were performing, the look and feel of the application. The questionnaires were designed in such a way as to make it easy for the respondents to answer and that they were able to answer the research questions set and to meet the objectives of the study.

6.3 Discussions

A review of the literature indicated that the techniques used for career guidance vary from group discussions, printed and electronic information, school lessons, structured experience, telephone advice and online help. Automation of this process especially by use of a mobile based system comes with the benefit of providing the service to large number of people at a go any time they

request for the service. With many individuals owning one or more mobile devices it makes it easier for them to use their mobile devices to access this service any moment and anywhere.

The existing career guidance system used in Kenya by many schools is a manual process that requires students to go see their career counselling teachers, while some schools could be lucky enough to have career fairs organised for them once in a year where several professionals come to speak to the students. There has been lack of an online system where students can get guidance and explore what various careers entails in the Kenyan context especially.

The respondents of the study comprised of students from both public and private universities with the numbers being 60% and 40% respectively. It was necessary to get response from the both types of universities because of the varied circumstances that students from either of the universities experience when choosing a career.

92.9% of the students owned smartphones of which 92.3% had Android operating system and 7.7% had iPhone. Since majority of the students owned smartphones with Android operating system, Android platform was preferred for the implementation of the proposed solution.

90% of the students experienced challenges in choosing their career, with every of them giving their challenges, these challenges vary from lack of proper guidance, a career being chosen for them, lack of information, financial constraints, lack of the required subjects. These responses show the need of a widely accessible system to guide students early enough.

Based on the above-mentioned findings an online based career guidance system was developed. It comprises of an Android application and a web application. The Android application is mainly used for taking the personality test, displaying career possibilities depending on the personality score and displaying professional testimonials associated with every career while the web application is used for user management, professionals' records presentation and manipulation.

The application successfully passed the functional and user testing. In user testing a cumulative of 80% of the respondents stated that the application was attractive. 70% of the respondents indicated that the application was easy to use. 80% of the respondents indicated that the application's functionality was good and satisfactory and the application was successfully accepted by 90% of the respondents.

6.4 Review of the Research Objectives

This dissertation identifies the challenges faced by students in choosing career, the factors that ought to be considered during career guidance in Kenya and existing solutions in career guidance from research based on journals, websites, books and user feedback. A mobile and web application was designed and developed with a selected technique from the literature review and results from system analysis. The research objectives acted as a guideline to develop a mobile and web application.

The first objective was to determine the challenges faced by students in choosing careers in Kenya. This objective was achieved using questionnaires provided in Appendix A. Analysis of the respondent feedback yield the following challenges: lack of proper guidance, a career being chosen for them, lack of information, financial constraints, lack of the required subjects.

The second objective was to find out the factors that ought to be considered in choosing a career. This objective was achieved through study of literature and questionnaires in Appendix A. Some of the factors mentioned were interest in a field, academic ability, personality, opportunities in the field, relevance and passion.

The third objective was to design, develop, implement and test a system that will improve the career guidance process. This objective was achieved through the design, development, implementation and testing of the mobile and web application. The mobile application was developed for the Android platform while the web application was developed using Laravel framework. Functional testing where the system functionality was tested, compatibility testing where the mobile application was tested against different Android versions and the web application was tested against different web browsers and finally user testing where the aesthetics, user friendliness, application functionality and user acceptance were tested.

The fourth objective was to validate if the system improves the career guidance process. This was to validate if the developed system addresses the challenges faced in career guidance. This objective was addressed by a comprehensive literature review in the study of existing mobile applications that provide career guidance. It was seconded by questionnaires feedback where respondents found the features in the application helpful in offering a clear guidance to a probable career (Appendix B).

6.5 Advantages of the Developed Mobile Application

- i. The application is very easy to use and straight forward.
- ii. The application can easily be adopted by users of all levels of education and technological backgrounds.
- iii. The application simplifies the process of finding mentors by storing their testimonials and providing them to the users anytime they need it.
- iv. This application is affordable, it makes it possible for anyone to use it at no cost provided they have internet.
- v. The application also incorporates a web application that makes it easier for the administrator and the professionals to store and manipulate data seen in the mobile application.

6.6 Limitations of the Developed Mobile Application

- i. The mobile application is only usable by smartphone owners with Android operating system.
- ii. Some information on mobile application and the entire web application need Internet for one to access them.

CHAPTER 7: CONCLUSIONS, RECOMMENDATIONS AND FUTURE WORK

7.1 Conclusions

Information about career guidance, challenges faced by both students and teachers in the career guidance process and the factors that ought to be considered to improve the process in Kenya were reviewed. From the analysis carried out, the results pointed out that there are a few issues that the potential users wanted to be addressed. The result was the development of a career guidance system which includes a mobile and web application. The key features of the application include: understanding the different personalities, taking a personality test, viewing career possibilities, viewing professional testimonials, etc.

The application was aimed at coming up with a solution that would bridge the gap in the inadequacy of personnel available both at the school and industry level for guidance and mentorship to the many students we have in Kenya. System testing was performed, look and feel, ease of use, system functionality and acceptance was done.

7.2 Recommendations

The developed system is very important to students in and out of secondary school as it provides them with a platform that assist them in self-understanding and how this relates to career choice, career exploration, planning and management. As for the professional mentors the system provides them with a platform to share their experiences with the students thus enabling them to make informed decisions regarding their career.

7.3 Future Work

The solutions provided in this research can still be improved or added upon as there is room for improvement. This is attainable because, research is ongoing and technology is continuously improving the way things are done and more technological tools are being built daily that could further even more discoveries. Therefore, the following are areas that could be explored in future to improve on this solution.

- i. Develop a web application module for the students that they can access even from schools for those are not allowed to have mobile phones while at school.
- ii. The mobile application should be developed for other mobile platforms to allow users who do not have Android to access the mobile application's functionality.
- iii. Have premium features on the application that require students to pay to be able to use as an alternative revenue model for the application.
- iv. Expand the scope of the application by also offering guidance to university students as they are selecting their specialisation areas.

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APPENDICIES

Appendix A: System Requirements Questionnaire

The purpose of this study is to examine students' satisfaction levels of the courses they are undertaking to refine the career guidance process. The study is being carried out among several universities and is purely for academic purposes. Your response will be anonymous and participation entirely voluntary. Your participation in filling out this questionnaire will be highly appreciated.

*Required

1. Which University are you in?
 - Strathmore University
 - Kabianga University
 - JKUAT University
 - Egerton University

2. On a scale of 1-5, how satisfied are you with the course that you are currently doing?
 - 1
 - 2
 - 3
 - 4
 - 5

3. Given the information that you now have about various careers, would you still have chosen the career you are in?
 - Yes
 - No

4. Did you experience any challenge in choosing your career?
 - Yes
 - No

5. If yes, what was the challenge?

6. What factor did you consider in choosing the course that you are currently doing?

- Passion
- Academic Performance
- Personality
- Employment after graduation

Others.....

7. Did you use any tool as a guide to your career?

- Yes
- No

8. If yes, how helpful was it to you on a scale of 1-5

- 1
- 2
- 3
- 4
- 5

9. If no, if you knew of a platform that offers career guidance would you have used it or recommend someone to it?

- Yes
- No

10. Given the level of education you are at now, what factor would you advice one to consider in choosing a career?

11. Do you own a smart phone?

- Yes
- No

12. What operating system does operate on?

- Android
- iOS
- Windows
- BlackBerry

13. What features would you desire to see in a career guidance application?

Appendix B: User Testing Questionnaire

1. Did you manage to do the following task? (Yes/No)
 - a) Answer questions in all the sections in the mobile application
 - b) view your score
 - c) View career possibilities
 - d) View mentor details
 - e) Login and out of the web application
 - f) Add and manage a user's information
 - g) Add and manage professionals' information
 - h) Add and manage careers

2. How do you find the user interface of the mobile and web application based on its looks and feel?
 - Very attractive
 - Attractive
 - Not attractive

3. Rate the mobile and web application based on whether the application was easy to learn as a first-time user and ease of using the application?
 - Easy
 - Average
 - Difficult

4. Rate the system functionality based of whether it met the user requirements (functionality)?
 - Very satisfied
 - Satisfied
 - Dissatisfied

5. Did the SmartCareer system improve your career guidance process?

- Very satisfied
- Satisfied
- Dissatisfied

6. Would you accept to use the system for career guidance?

- Gladly accept
- Accept
- Reject

Appendix C: Wireframes and System Components

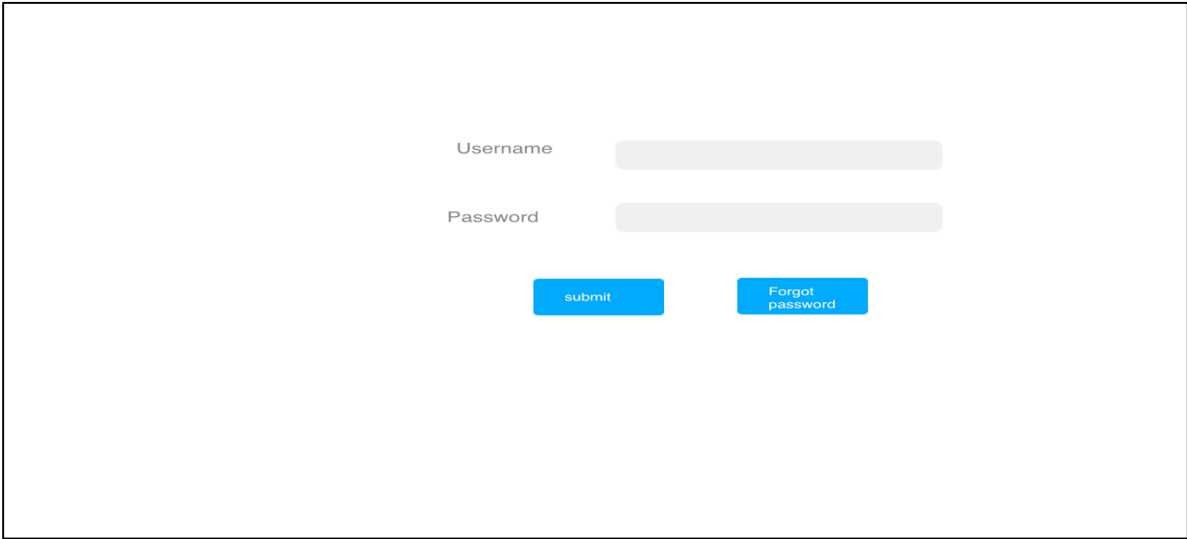


Figure C.1 Login Wireframe

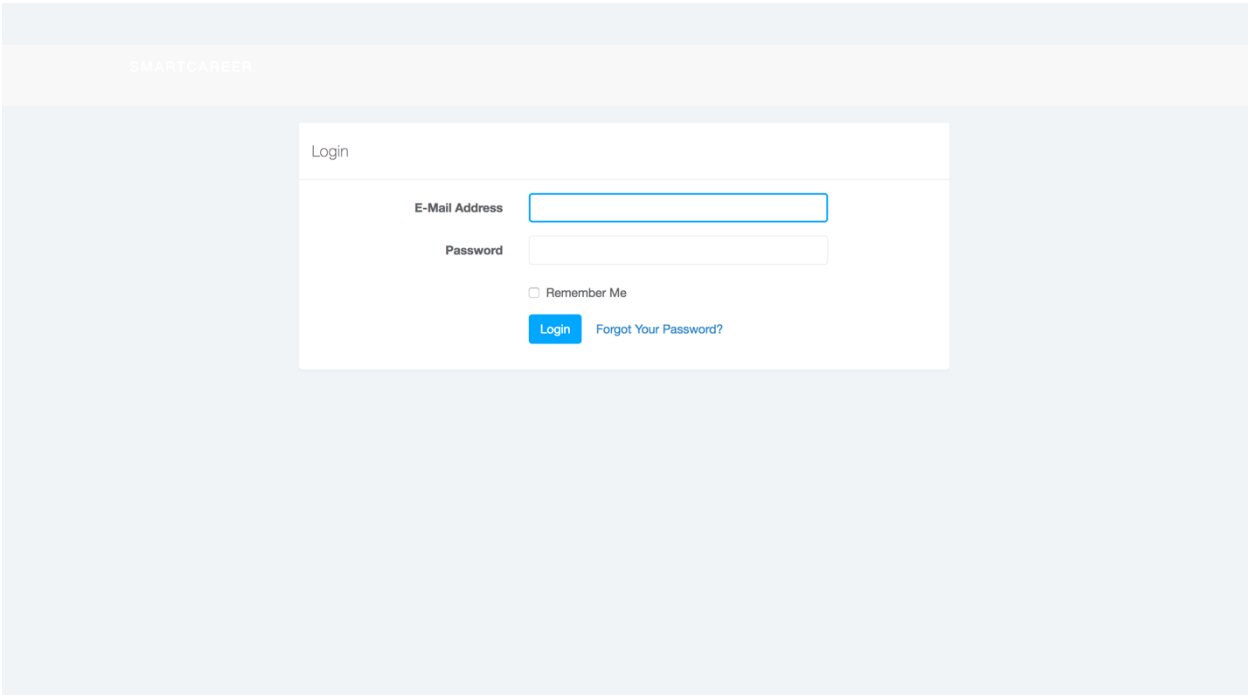


Figure C.2 Login Page

Appendix D: Gantt Chart

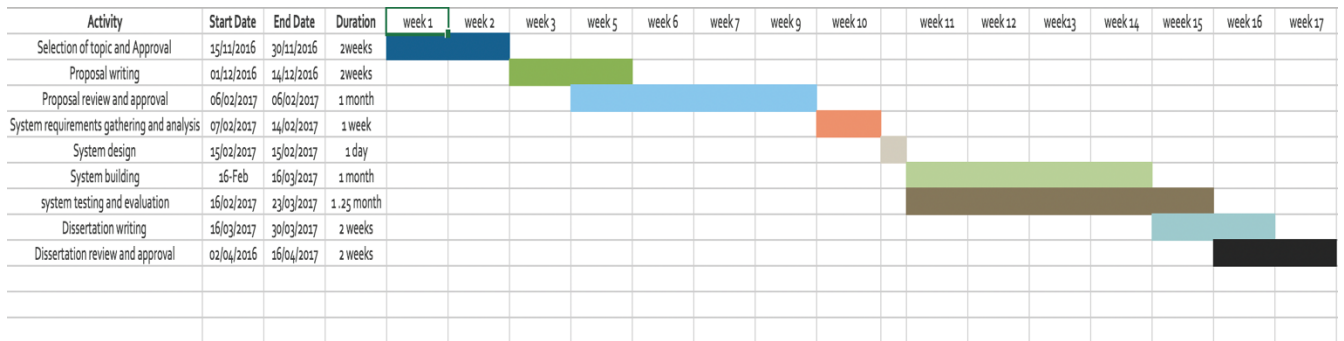


Figure D.1 Gantt Chart

Appendix E: Turnitin Report

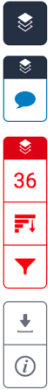


Figure E.1 Turnitin Report