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Mobile Application for School Quality Evaluation System

GITONGA, GRACE KENDI

A Dissertation submitted to the Faculty of Information Technology in partial fulfillment of the requirements for the award of Master of Science Degree in Mobile Telecommunication and Innovation at Strathmore University

Faculty of Information Technology

Strathmore University

Nairobi, Kenya

June, 2016

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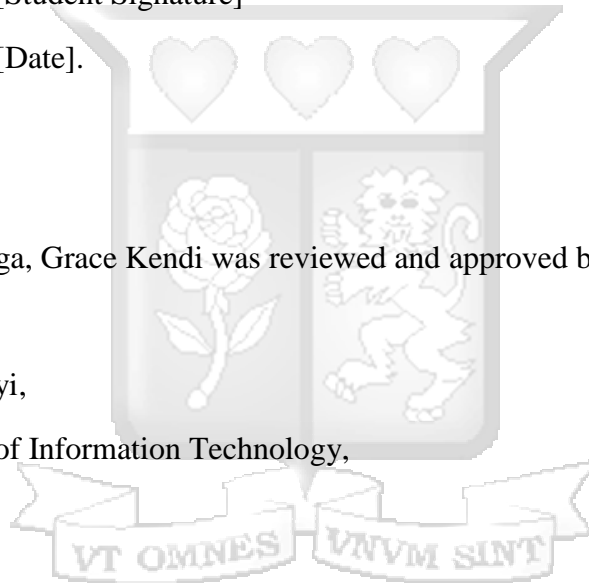
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Gitonga Grace Kendi [Student Name]

84949 [Student Number]

_____ [Student Signature]

_____ [Date].



Approval

The dissertation of Gitonga, Grace Kendi was reviewed and approved by the following:

Dr. Vitalis Gavole Ozianyi,

Senior Lecturer, Faculty of Information Technology,

Strathmore University.

Dr. Joseph Orero,

Dean, Faculty of Information Technology,

Strathmore University.

Prof. Ruth Kiraka,

Dean, School of Graduate Studies,

Strathmore University.

Dedication

I dedicate this dissertation to God, my family and friends for their encouragement, that I could make it, to all my classmates for the support granted throughout the masters' period, the lecturers for their guidance and finally, to my supervisor Vitalis Gavole Ozianyi, for his advice throughout the research period.



Acknowledgements

I would like to acknowledge my supervisor Vitalis Gavole Ozianyi, who throughout this period he offered guidance and support in the research. To @iLabAfrica, Safaricom Academy and Strathmore University for the opportunity to partake my master in their program and the exposure I got to new technology, skills, knowledge and networks attained. Finally, to Purity Gitonga who's support was key to accomplishing this.



Abstract

In Kenya, school performance is evaluated and analyzed through exams. Rarely does the government consider evaluating school according to other factors like fees, facilities, number of teachers, merit awards, food menu, and co-curriculum activities. This leads to the look down upon the schools that do not perform well in national examinations.

The decision by Kenya's Ministry of Education to stop the ranking of students and schools based on examination results is an area of contention among teachers, students and parents. The ministry argued that ranking examinations does not enrich the country's education system, through a circular sent to head teachers and other education stakeholders.

This dissertation aims to come up with a mobile application school evaluation system, that evaluates school performance through various factors and ranking them to get the best out of schools in Kenya.

The dissertation used descriptive research to establish the nature of the problem and to facilitate the provision of better understanding of the problem. The target population consisted of schools in Nairobi County from where teachers, principals were drawn. Quality officers from the ministry of education were also drawn. A sample population of two hundred was obtained from the target population. The research findings indicated the need for development and implementation of an application to address the shortcoming of the current evaluation system in schools. Therefore, a mobile application school evaluation system was developed to allow scholars, educators, students and parents have a better understanding of Kenya schools in different evaluations.

The system consists of an android mobile phone for installation of the mobile application school evaluation system, a back-end to allow the school administrator login, register school, and input necessary information about the school, system administrator to enroll, deactivate and activate a user. The information stored in the system by the school administrator is generated into a graph showing the overall evaluation of the school.

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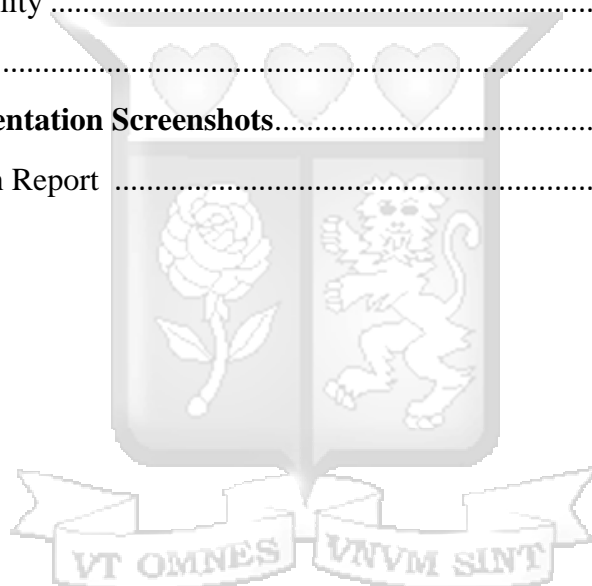
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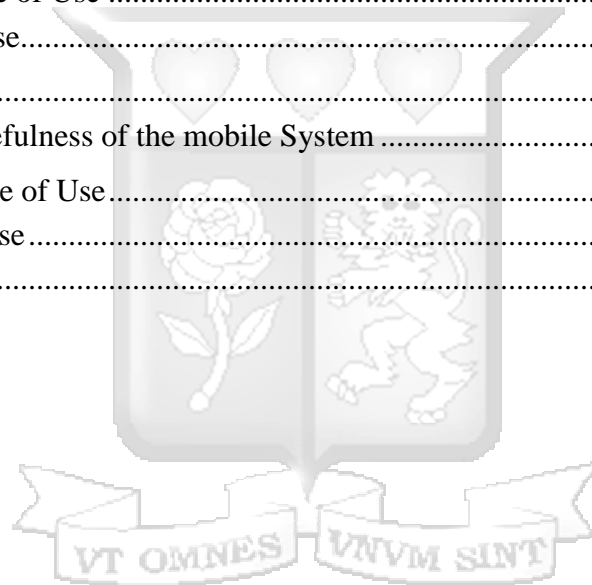
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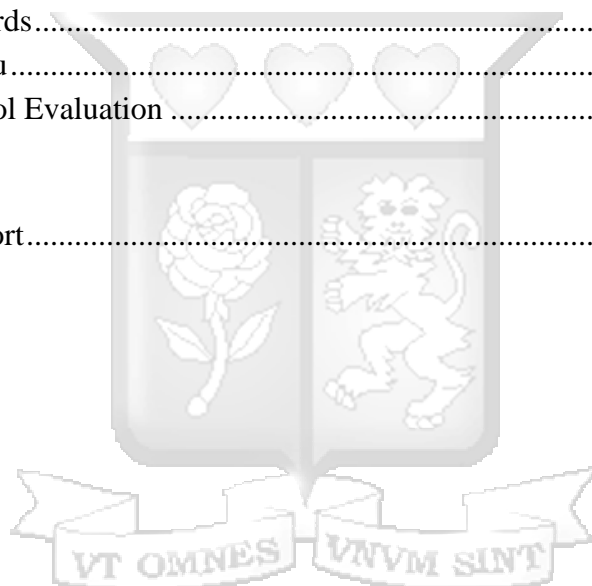
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List of Abbreviations/Acronyms

CAI	-	Computer Assisted Instruction.
CSV	-	Comma Separated Values.
GIS	-	Geographic Information System.
IVR	-	Interactive Voice Response.
MDG	-	Millennium Development Goals.
MSAM	-	Mobile Secure Access Module.
NFC	-	Near Field Communication.
PC	-	Personal Computer.
RFID	-	Radio Frequency Identification.
SDLC	-	Software Development Life Cycle.
SMS	-	Short Message Service.
WLAN	-	Wireless Local Area Network.
KCSE	-	Kenya Certificate of Secondary Education
KCPE	-	Kenya Certificate of Primary Education

CHAPTER ONE: INTRODUCTION

1.1 Background Information

Education is widely seen as one of the most promising paths for individuals to realize better, more productive lives and as one of the primary drivers of national economic development. For quite some time, the international development community has emphasized the paramount role of education in bringing about sustainable socio-economic development in the south. The second goal of the United Nations Millennium Development Goals (MDGs) aims was to achieve universal primary education for children everywhere, boys and girls alike, by 2015. Significant challenges remain, however. For example, in southern Asia the enrolment ratio has reached 90%, but there still remain more than 18 million children of primary school age who are not enrolled. Similar challenges confront secondary and tertiary education. (UNDP, 2016)

In developing countries, on average, only 54% of children of appropriate age attend secondary school currently (UN, 2008). The citizens and the government of Kenya have invested heavily in improving both the access and quality of education, in an effort to realize the promise of education as well as to achieve the education-related Millennium Development Goals and Vision 2030. Additionally, more than one-third of the world's adult population, most living in the developing world, has no access to printed knowledge, new skills, and technologies that could improve the quality of their lives (Dhanarajan, 2009). Inequalities in access to education continue to pose major barriers in the developing world, and the delivery of cost-effective and quality education remains a persistent problem.

1.1.1 Quality Education Concept

Quality education can be described from three dimensions: the teacher quality, teaching quality and quality of teaching environment. Teacher quality might be thought of as the bundle of personal traits, skills, and understandings an individual brings to teaching, including dispositions to behave in certain ways (Darling-Hammond, L. 2000). Teaching quality refers to strong instruction that enables a wide range of students to learn. Teaching quality is in part a function of teacher quality, teachers' knowledge, skills, and dispositions. It is also strongly influenced by the context or environment of instruction, the curriculum and assessment system, the "fit" between teachers'

qualifications and what they are asked to teach and teaching conditions, such as time, class size, facilities, and materials. According to Sass (2008) a high-quality system should create a coherent, well-grounded mobile system approach to developing teaching, crafted collectively by leaders with teachers and their representatives that address current, pertinent and relevant societal issues.

In addition to clear standards for student learning, accompanied by high-quality curriculum materials and assessments, this system should include five key elements: Common statewide standards for teaching that are related to meaningful student learning and are shared across the profession, (Corcoran 2011) Performance assessments, based on statewide standards, guiding state functions such as teacher preparation, licensure, and advanced certification, local evaluation systems aligned to the same standards, which assess on-the-job teaching based on multiple measures of teaching practice and student learning. Support structures to ensure trained evaluators, mentoring for teachers who need additional assistance, and fair decisions about personnel actions. These structures should include, at minimum: trained, skilled evaluators with deep knowledge of teaching and learning supports, including mentoring, for teachers needing assistance, governance structures that enable sound personnel decisions, resources to sustain and monitor the system, aligned professional learning opportunities that support the improvement of teachers and teaching quality (Berry, 2009).

1.1.2 Quality Education Evaluation

Braun (2005) describes evaluation as a systematic collection of information to make judgments, improve program effectiveness and/or generate knowledge to inform decisions about future programs. Evaluation may be formative, providing feedback for improvement, or summative, assessing merit or worth. It may be internal, or external, conducted by outside evaluators who provide third party validation of special programs.

For effective evaluation in education, desired program outcomes should be developed with school principals. teachers input should be realistic and where possible within the control of the curriculum strategies, activities selected to attain desired outcomes should be flexible and open to revision as needed by empowered local program managers and school leaders to reflect the evolving program in practice (Goldhaber & Brewer, 2000), the evaluation in local schools should be participatory to build local buy-in and capacity to sustain an effective program and planning for

evaluation should start early. For example, identifying key data indicators and how data will be gathered (Braun, 2005).

According to Humphrey, Koppich, Bland, and Bosetti, (2011) during evaluation process, evaluators and decision-makers can use available data at the national and local levels to analyze key education outcomes such as student proficiency, dropout and graduation rates, achievement gaps between student subgroups, and readiness for postsecondary education and careers added. Use of measures of individual student learning growth over time, already in place in some nations, can improve the accuracy of outcomes data. Evaluation can help educational transformation programs define and measure quality indicators and measures of the education transformation process, gauge progress toward desired educational outcomes, increase stakeholder participation, and empower school leaders and teachers to build and sustain transformation in schools.

1.1.3 Mobile Application School Quality Evaluation System

Mobile phones are thought, for several reasons, to be a particularly suitable tool for advancing education in developing regions. First, mobiles phones are the most prevalent ICT in the developing world, and the penetration rate is rising rapidly. In Asia, mobile penetration has doubled within a short span of time in 2001, average penetration was 19.7 per 100 inhabitants while in 2005 the penetration rate rose to 40.9 (Orbicom, 2007). Also relevant is the fact that mobile phone ownership is increasingly more common in the lower socio-economic segments of society (Samrajiva & Zainudeen, 2008). Second, mobile phones are an especially good 'leapfrogger' since they use the radio spectrum. There is, therefore, less need for new physical infrastructure such as roads and phone wires, and base-stations can be powered via generators in places where there is no electrical grid (Economist, 2008). Finally, in addition to voice communication, mobile phones allow the transfer of data, which can be particularly useful for delivering educational content over long distances.

1.1.4 Relationship between Mobile Analysis System and Evaluation of Quality Education

The unique approach to literacy assessment incorporates cutting edge mobile technology into the process of recording and sharing results. Consequently, communication and action surrounding school's curriculum, teacher lessons, environment, motivation, modification of teaching, learning routines and authentic learning, student test results happen more quickly and has the potential to improve the performance of the children who are assessed.

The recorded information about children's age, sex, enrollment status, and their performance on the literacy test can be accessed once the phones have access to wireless Internet. The surveys can be sent electronically back to form hub, where the data can be organized and disseminated. This allows for automated generation of report cards, which means that data from assessments can be used nearly instantly, thereby benefiting not just school administrators and policymakers, but potentially the students themselves who take the tests.

1.2 Problem Statement

Rarely does the Kenya government consider evaluating school according to other factors like fees, facilities, number of teachers and co-curriculum activities. This leads to the look down upon the schools that don't appear in the top 100 best exam performing list every year. Parents and guardians focus on the listed top performers schools, leaving out the rest of the 11,183 secondary schools in the country.

According to (Kithuure, 2015), The ministry dropped the ranking of schools and pupils because the grade a student earns on the final national examination does not give a definitive assessment of the academic learning process. Primary and secondary schools were previously ranked according to students' performance on the Kenya Certificate of Primary Education and Kenya Certificate of Secondary Education. Education Cabinet Secretary said the disadvantage of ranking school and students far outweigh the merits and urges those opposed to the no-ranking policy to support the ministry in its endeavor to standardize educational outcomes for all public and private school pupils

According to (KNEC 2013) 29 percent of students in secondary schools do not attend the schools they have been admitted to due to various factors like fees. Therefore, many students miss their chance in attending their dream schools yet they worked hard for it. Focus of the few good performing school, leaves out other schools that are better in other fields of performance. If schools were evaluated and analyzed in all categories of performance, then every student would have a place in the country. For instance, in the case where a student was admitted in a very good exam performing school in Nakuru county, was turn off on the day of admission after the school found out she was from the turban community (Matara, 2015).

There are various platforms that provide a list of schools and their exams performance across a certain number of years. These schools are ranked and evaluated through their exams performance. The purpose of this study is to propose a mobile application school quality evaluation platform that will evaluate and rank Kenya schools through various factors, apart from exam performance. The application will enable users to view the performance of Kenya schools through various factors and rank them accordingly through a graph and pie chart.

1.3 Research Objectives

The main purpose of this dissertation is to develop a system to evaluate school performance through a mobile device.

- i) To determine the mobile application school quality evaluation system information needs.
- ii) To identify the approaches used in mobile application school quality evaluation system.
- iii) To identify the technologies used in mobile application school quality evaluation system.
- iv) To develop a mobile application school quality evaluation system.
- v) To test the functionality of the mobile application school quality evaluation system.

1.3.1 Research Questions

- i) What are the information needs to determine the mobile application school quality evaluation system?
- ii) Which are the approaches used in mobile application school quality evaluation system?
- iii) Which technologies are used in mobile application school quality evaluation system?
- iv) How can a mobile application school quality evaluation system be developed and implemented?
- v) How can the functionality of the mobile application school quality evaluation system be tested?

1.4 Scope of the Dissertation

The geographical location of the study schools is Nairobi County. The dissertation focuses on the components of education quality standards in schools, methods (types) of evaluation of quality education in Kenya schools and on the development/designing and implementing mobile school quality evaluation system in Kenya schools. The application will help reach a large percentage of

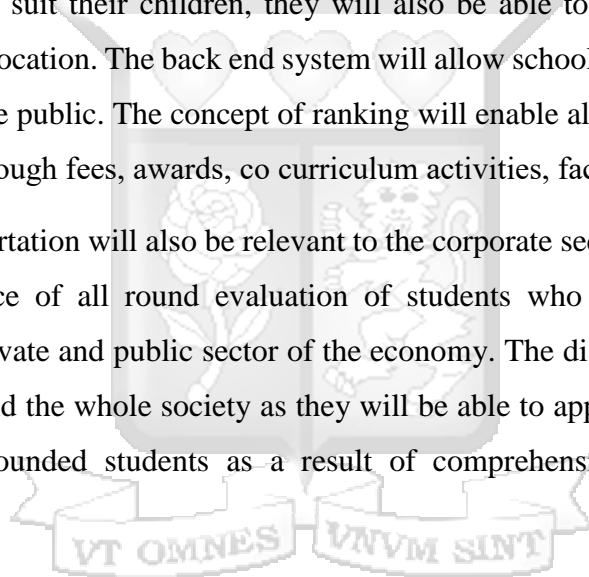
people compared to the current way of evaluating Kenya schools because the information will be on mobile.

1.5 Justification of the Dissertation

The dissertation will be significant to the ministry of education, teachers' service commission, students, parents and the Institute of curriculum development as they will be able to use the dissertation's results to review their process of school evaluation and ranking.

The proposed mobile application school quality evaluation system will reach a larger group of people seeking school information because of the ability to access the information using either end low end mobile phones or smartphones. The application will enable the users get a clear view of various schools that best suit their children, they will also be able to view school information available in their area of location. The back end system will allow schools to view and review their school information for the public. The concept of ranking will enable all the users be able to view school's performance through fees, awards, co curriculum activities, facilities and exams.

The findings of the dissertation will also be relevant to the corporate sector as they will be able to appreciate the importance of all round evaluation of students who will be able to perform efficiently in both the private and public sector of the economy. The dissertation findings will be of value to the parents and the whole society as they will be able to appreciate the importance of schools producing all rounded students as a result of comprehensive evaluation of school education.



CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of the literature related to the effectiveness of mobile analysis system in the evaluation of quality education in Kenya schools. The section is organized according to the research questions and specific objectives, which include establish the components of education quality standards, methods (types) of evaluation of quality education and developing/designing and implementing mobile-based quality education evaluation system in Schools in Kenya in order to ensure relevance to the research problem.

2.2 Theoretical Review

The term “theory” primarily refers to models or approaches which specify how an evaluation should be carried out. To date, a limited amount of evaluation theory is based on empirical study of what works in evaluation. Until such empirical theory is developed, “we must rely on the prescriptive models generated by knowledgeable members of the evaluation community to guide practice” (Alkin, 2013). Alkin (2013) sees differences between the models of prominent evaluators based upon their relative emphasis on methods, value, or use. Evaluators tend to follow a model that makes sense to them intellectually, but should be prepared to vary their approach based on the purpose of the evaluation and program context.

A method-focused evaluation will examine program effectiveness in terms of whether test scores improved as a result of program participation, by conducting a controlled research experiment or quasi-experiment, and rendering an expert judgment on whether the program caused the desired outcomes. A use-focused evaluation might look at what the program manager needs to know to improve the program or demonstrate progress, gathering multiple sources of evidence and recommending improvements that the program manager may decide to implement. A value-focused evaluation might explore a program’s impact on equity or social justice issues. Here the public is the ultimate judge. It might also actively empower local staff and stakeholders to ensure education transformation fits local needs and interests.

An evaluation of holistic school reform requires elements of all three approaches: Use-focused approaches (Patton, 2008; Wholey, 2010) may be the best primary emphasis for a program evaluation of education transformation at the system level, Methods-focused research studies may

be embedded to determine the causal impact of key program features, in this case, staff training is needed on fidelity of implementation of key features, and the importance of adhering to research protocols, Values-focused evaluation components should actively involve local school staff and stakeholders to connect program theory and practice, ensure equitable participation for marginalized people, and build local capacity for sustainability.

2.3 Theoretical Framework

A theoretical framework is a structure that guides research by relying on a formal theory constructed by using an established, coherent explanation and presentation of observed or experienced phenomena and relationships (Eisenhart, 1991). A theoretical framework strengthens the dissertation, by permitting the reader to evaluate the explicit statement of theoretical assumptions. Critically, it connects the researcher to connect with existing knowledge (USCLibraries , 2014), provides a guideline for conceptualizing and designing research studies, makes a set of data comprehensible, helps in deep understanding of the research by providing a structure for designing research studies, interpreting data resulting from those studies and drawing conclusions (Lester, 2005).

2.3.1 Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT is a model of individual acceptance meant to make factors affecting the acceptance and use of technologies understandable. It is compiled from models and theories. Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behaviour (TPB), Decomposed Theory of Planned Behaviour (DTPB), Combined TAM and TPB (C-TAM-TPB), Model of Personal Computing Utilization (MPCU), Innovation Diffusion Theory (IDT) and Social Cognitive Theory (SCT) (Venkatesh, Morris, Davis, and Davis, 2003). UTAUT has been recognized by various studies for its role in better understanding about the factors influencing the behaviour of acceptance and use of new technologies than other similar theories and models (Venkatesh et al., 2003; Wu, Tao and Yang, 2007).

The last secondary stimulation to technology adoption is social influence which relates the effect of referees' opinions on individual user behaviour. According to social influence theory, users tend to comply with other important referees' opinions (Bagozzi and Lee, 2002). Thus, when others who are important to a user recommend to him or her to use mobile school quality evaluation

system, he or she may follow their suggestions. This factor affects the adoption of technology in both voluntary and involuntary contexts (Venkatesh et al., 2003). The study factored social influence controlled by age, experience and gender to affect behavioural intention and usage of mobile school quality evaluation system.

The UTAUT model encompasses four moderators: age, gender, voluntariness and experience as having specific moderating roles to indirectly and directly determine technology usage behaviour. UTAUT has been used before to explain the adoption of various information technologies: location-based services (Xu and Gupta, 2009), mobile technologies (Park, Yang and Lehto, 2007), mobile banking (Zhou, Lu and Wang, 2010), workplace computer systems (Venkatesh and Zhang, 2010), Internet banking (Im, Hong and Kang, 2011) and health information technologies (Kijisanayotin, Pannarunothai and Speedie, 2009).

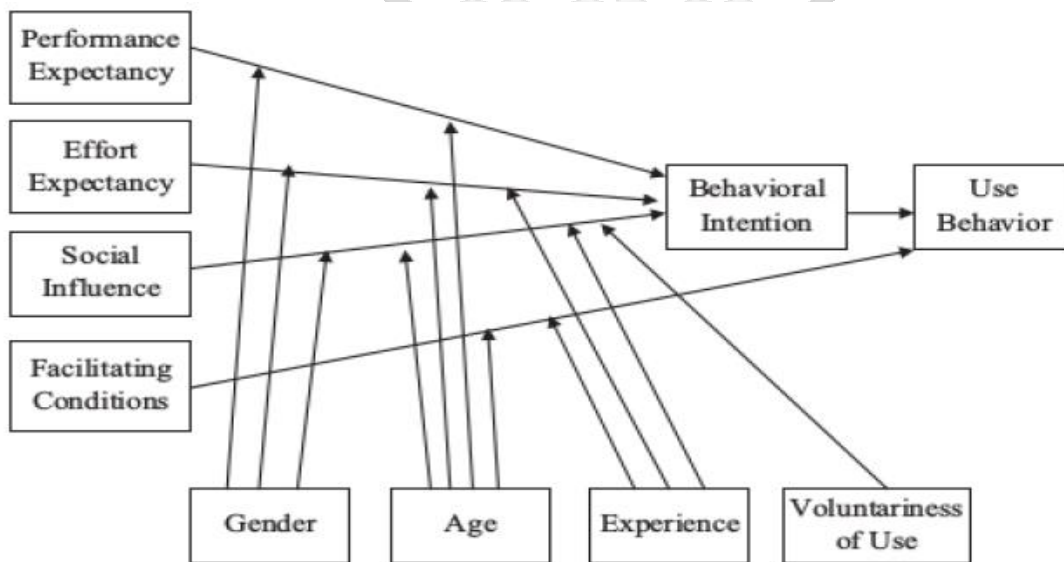


Figure 2.1: Unified Theory of Acceptance and Use of Technology (Venkatesh, et al., 2003)

2.3.2 Model of Goal-directed Behaviour (MGB)

MGB was proposed to address the lack of theoretical sufficiency of the Theory of Planned Behaviour (TPB) in terms of modeling the pre-volitional processes (Bagozzi, Perugini and Conner, 2000). The main aim was to expand and deepen TPB by incorporating constructs from three new theoretical areas: affective, motivational and automatic processes by hypothesizing a different theoretical flow. All original antecedents of the Theory of Planned Behaviour (TPB) are included in the MGB, although

their roles are redefined. First, attitude can be reviewed as a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor (Eagly and Chaiken, 1993). In MGB, attitudes can be referred to as evaluative appraisals (Perugini and Bagozzi, 2001). If these evaluations are strong enough, attitudes will influence a person’s intention to use or not use mobile application school quality evaluation system in Kenya.

Secondly, subjective norm refers to the perceived social pressure to perform a specific behaviour (Perugini and Bagozzi, 2001). The study therefore investigated the significance of social influence on the taking up and utilization of mobile school quality evaluation system in Kenya. Finally, perceived behavioural control can be viewed as an individual’s confidence in ability to execute a specific behaviour (Ajzen, 1991). The research explored factors that will boost or lead to the loss of consumer's confidence towards the usage and acceptance of mobile school quality evaluation system in Kenya.

MGB also incorporated desire, positive and negative anticipated emotions, and past behaviours in addition to the original variables of the TPB. Desire can be conceptualized to explain a person’s decision formation (Perugini and Bagozzi, 2001) and can encapsulate a future orientation where future outcomes are deemed desirable or undesirable. Markets need to study primary desires of their target customer segment so that product and services can be developed to satisfy this desire or give the perception of satisfaction of the desire (Erasmus, Boshoff and Rousseau, 2001). MGB was thus applied in the study to establish the desire for consumers to use mobile school quality evaluation system.

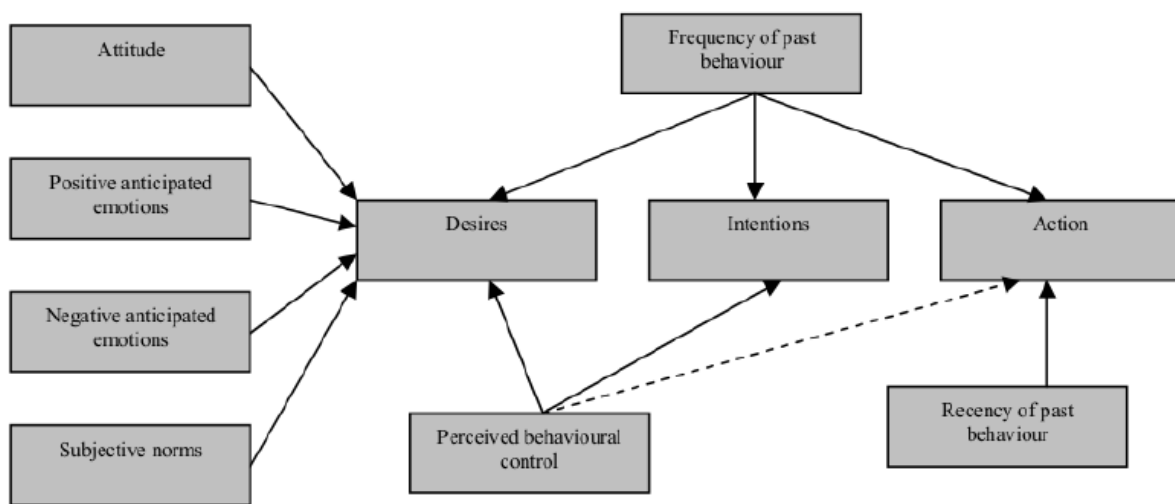


Figure 2.2: Model of Goal-directed Behaviour (Bagozzi, Gurhan-Canli, Priester, 2002)

2.4 Components Used in Mobile School Quality Evaluation System

A component represents a modular part of a system that encapsulates its content and whose manifestation is replaceable within its environment and can define its behavior in terms of provided and required interfaces (OM Group, 2007). Components that can be utilized in a mobile school quality evaluation system are:

2.4.1 Mobile Phone

A survey conducted by StatCounter on Top 8 Mobile OS in Kenya from December 2013 to December 2014 established that the number of mobile phone users in Kenya is about 78.61% (StatCounter, 2015). The research therefore, adopted android platform, for the development of the school evaluation application. The application can be customized to also be windows and ios Nonetheless, the mobile phones will require an active Internet connection in order to communicate with the system and this may result in battery wastage since the android operating system has a lot of background processes that quickly drains battery (Ahmad, 2012).

2.4.2 Private APN

An Access Point Name is the name of a gateway between a GSM, GPRS, 3G or 4G mobile network and another computer network. A mobile device making a data connection must be configured with an APN to present to the carrier, the carrier will then examine this identifier to determine what type of network connection should be created. An IP address should be assigned to the wireless device. Security methods should be used if it is connected to a private customer network (T-Mobile Polska S.A., 2016).

A private Access Point Name can be obtained from most mobile operators, as a service which can be used to capture all 3G/4G mobile data leaving a device and route to the traffic back to an IP endpoint at a corporate network. Private APN allows: external corporates infrastructure to expose only the provisioned devices and not to the whole internet, devices whose VPN allows split tunneling to be forced to traverse the corporate network regardless of the VPN deficiencies, the device itself protection from attacks from other users on the cellular network as only other devices on the APN can route traffic to that device and low-level malware such as rootkits which can bypass the VPN enforcement.

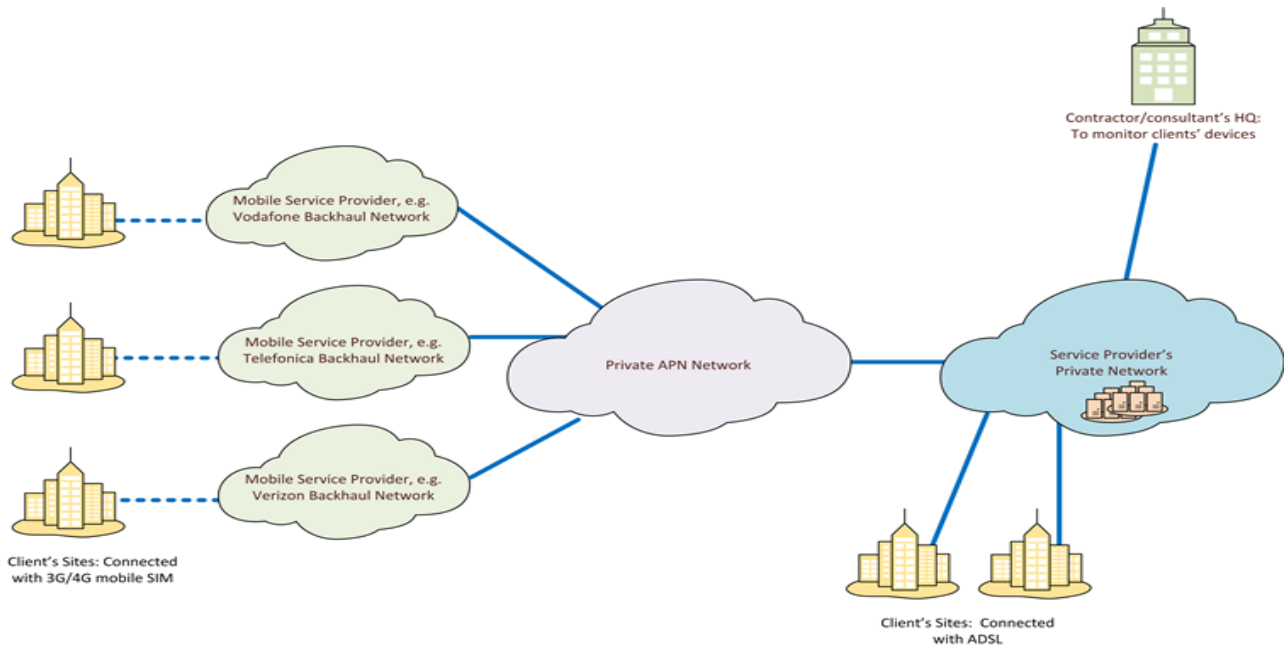


Figure 2.3: Example of Private Access Point Name (Topham, 2014)

2.4.3 Wi-Fi Network

Wi-Fi short of wireless fidelity, is a popular wireless networking technology that uses radio waves to provide wireless high-speed internet and network connections. It works with no physical wired connection between sender and receiver by using radio frequency technology, the frequency within the electromagnetic spectrum associated with radio wave propagation. When an RF current is supplied to an antenna, an electromagnetic field is created that then, is able to propagate through space. The cornerstone of any wireless network is an access point. Wi-Fi is supported by many applications and devices including home networks, PDAs, mobile phones and major operating systems. Any product that are tested and approved as “Wi-Fi certified” by the Wi-Fi Alliance are certified as interoperable with each other even if they are from different manufacturers (Alliance 2015).

Wi-Fi will be very useful when it comes to uploading mobile school quality evaluation system in the android phones.

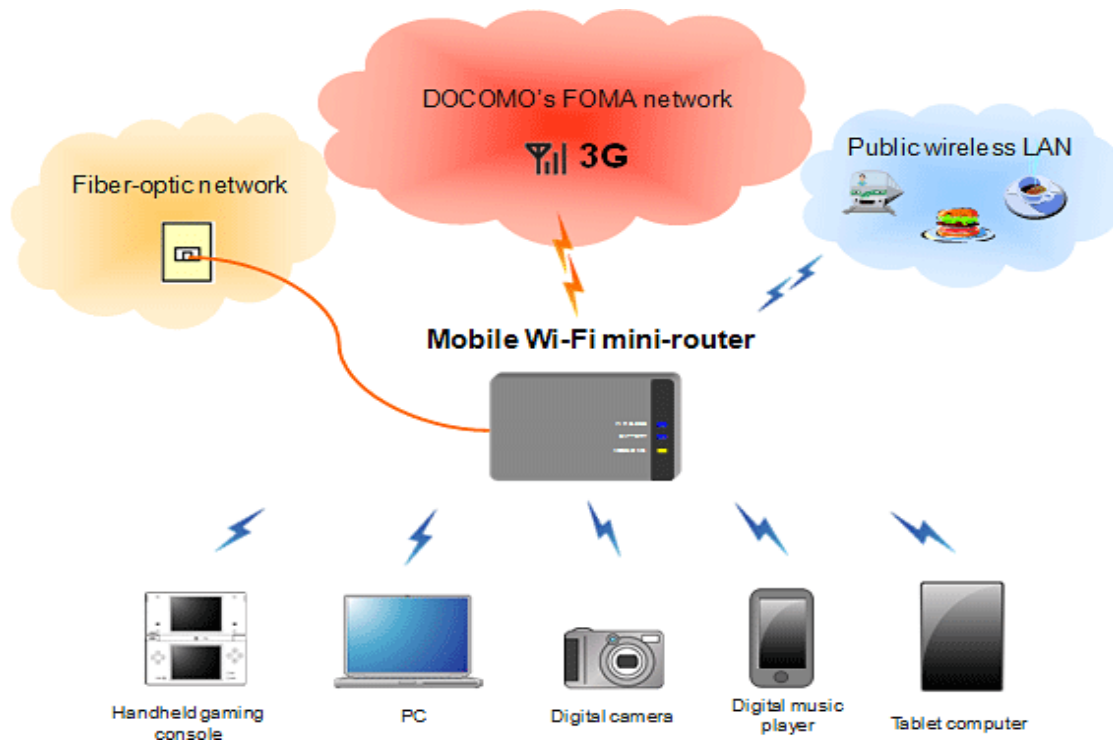


Figure 2.4: Example of WiFi Connection (DOCOMO, 2016)

2.5 Existing School Evaluation Systems

School evaluating systems consist of analytical tools that help on data collection. System administrator collect data through various ways. The data collected is analyzed and represented through tables, excel sheets or graphical.

2.5.1 Quality School Ratings: Trends in Evaluating School Academic Quality in USA

According to (The National Alliance for Public Charter, 2013) . To examine trends in evaluating USA school quality, 25 rating systems used by state departments of education, large public school districts, charter associations and authorizers, and private news and advocacy organizations were reviewed.

Only systems that result in a single, overall rating or grade for schools were reviewed. In order to have access not only to published descriptions of adopted rating systems, but also to view results and reports, our review of state was limited and district systems to those that published ratings for all schools for the 2011–12 school year. Many states and districts have adopted rating

systems that will be implemented in 2012–13 or later which are not included. During the review of systems, the following types of performance metrics used for evaluation were identified:

Table 2.1: Rating Components

Rating Components	Rating Component Variables
Student Achievement Measures	Proficiency rates Comparison with district or state performance Advanced proficiency rates n Point systems for performance at different proficiency levels Controls for differences in student population Trend in overall school proficiency
Student Growth Measures	n Student Growth Percentiles (SGP) model Value-added growth model Value table growth model Growth to proficiency/Adequate Growth Percentiles (AGP)
College- and Career-Readiness Measures	Graduation rate Disaggregated graduation rate Extended graduation rate (5- or 6-year) Diploma quality Advanced coursework (e.g., AP, IB) College readiness examinations (e.g., ACT, SAT)

	<p>Industry certification</p> <p>College remediation</p> <p>College attendance/acceptance</p> <p>Dual credit</p>
Subgroup Performance and Achievement Gap	<p>Subgroup performance</p> <p>Consolidated subgroup performance (use of “super groups”)</p> <p>Growth of lowest-performing students</p> <p>Reduction of achievement gap</p>
Measures of Student Engagement	<p>Dropout, retention, or re-enrollment rates</p> <p>Attendance, absenteeism rates</p> <p>Parent and student satisfaction surveys</p>
Rating Format	<p>A–F grades</p> <p>Performance labels</p> <p>Ranking</p>
Reporting Format	<p>School report card</p> <p>Interactive online interface</p>

While there are similarities among the systems, they vary in the measures chosen for inclusion, the weighting of those measures, the method used for calculating an overall score or grade, and the presentation of the final results to the public. Two systems may have similar measures that are weighted differently, or very different measures that result in the same type of public reporting,

such as an A–F grade. The profiles were selected to provide examples of the range of measures, weighting, methodology, and reporting formats, and are referred to throughout the report for illustration. We also conducted interviews with national experts on school accountability systems and selected practitioners of school rating systems, so we could identify additional insights and trends.

2.5.2 Common Components and Trends in School Rating Systems

The review of systems produced five broad categories of components: student proficiency, student growth, measures of subgroup performance or achievement gap, postsecondary readiness and success, and measures of student engagement. Although the methods for assessing these components differed across systems, interesting trends exist in each area. They also reviewed the methods for categorizing performance levels and reporting these results to the public. The system highlights how each rating system incorporates metrics into the categories.

2.6 Assessing U.S.A Public School Quality

2.6.1 The Advantages of Combining Internal “Consumer Ratings” With External NCLB Ratings

The school quality assessment process under No Child Left Behind (NCLB) is criticized for oversimplifying and overemphasizing standardized test results and unfairly targeting diverse, urban schools. There has been much development in alternative test score evaluations, especially value-added models. These developments have tilted the public discourse away from the original discussion about how to best assess school quality. Although test scores are an important metric for learning, school quality embodies more than this external evaluation. Stakeholders are uniquely positioned to internally evaluate the school learning environment that is central to school quality. This study compared the external NCLB testing-based assessment to the internal stakeholder assessment using longitudinal data from Milwaukee’s School Climate Report Cards. Each tool is found to have scope limits and vulnerabilities to exogenous bias based on school and student-body characteristics. Combining both evaluations forms a broader assessment, reduces biases, and widens the evaluation of school quality (Price, 2016).

2.7 Niche's K-12 Rankings

The Niche's K-12 ranking has helped people make informed choices about their education for more than 12 years. They have helped millions of students choose their college. These students have come from nearly every public and private high school and school district in the United States, which gives a unique insight into the student outcomes at each high school and district. Through College Ranking the quality of student's outcome can be assessed.

According to (Niche, 2016), by incorporating millions of opinions from more than 300,000 students and parents, dozens of statistical factors, and millions of student outcomes are the most comprehensive K-12 school and district rankings to date.

The rankings are different, and for a good reason, it is believed that the quality of a school or district should be measured at least in part by the parents and students who actually go there. They should also be measured by hard data and across a number of key factors so that no one factor dominates a ranking. Most importantly, they should be measured by their results. The most unique thing about our rankings is that they incorporate student outcomes.

Rankings show the Top 100 schools or districts for each ranking, grades are used to provide the user with some context to those rankings and also to provide insight into those that did not make the Top 100. In each ranking, it's important to focus on more than just the number. Given the high number of schools included in the rankings, there may not be a large gap between the 15th and 30th ranked schools in a given ranking. In reality, both are exceptional schools when compared to the total population of all schools. Grades can often provide greater context because they are assigned based on how each school or district performs compared to all other schools or districts included in the ranking.

To compute the rankings and grades, a series of steps are followed. These steps are in place to ensure that the rankings are statistically sound and offer the most amount of guidance to those looking to make a school choice. In general, the process used to compute each ranking was as follows: First, select each ranking's factors to represent a healthy balance between statistical rigor and practical relevance in the ranking, Next, evaluate the data for each factor to ensure that it provides value for the ranking. (The factor needed to help distinguish schools and districts from

each other and accurately represent each one.) Because there are different factor types, process them differently. Factors built from parent- or student-submitted survey responses were individually analyzed to determine a required minimum number of responses. After this, responses are aggregated. They logically have a higher degree of confidence in the aggregated score for schools with more responses, so a Bayesian method was applied to reflect this confidence. Factors built from factual information were inspected for bad data including outliers or inaccurate values. Where applicable, this data was either adjusted or completely excluded depending on the specific data. After each factor was processed, they produce a standardized score (called a z-score) for each factor at each school or district. This score evaluates distance from the average using standard deviations and allows each school's score to be compared against others in a statistically sound manner.

With clean and comparable data, weights for each factor are assessed. The goal of the weighting process was to ensure that no one factor could have a dramatic positive or negative impact on a particular school or district's final score and that each school's final score was a fair representation of the school's performance. Weights were carefully determined by analyzing: How different weights impacted the distribution of ranked schools/districts, Niche parent and student user preferences and industry research, each factor's contribution to the intended goal of the ranking, as described in the introduction above. After assigning weights, an overall score was calculated for each school or district by applying the assigned weights to each school's individual factor scores. This overall score was then assigned a new standardized score (again a z-score, as described in step 3). This is the final score for each ranking. With finalized scores, they then evaluated the completeness of the data for each individual school or district. Depending on how much data the school had, they might disqualify it from the numerical ranking or from the grading process.

Schools or districts missing the data for 50 percent or more of the factors (by weight) were completely excluded. They did not qualify for the numerical ranking or a grade. Schools or districts that had at least 50 percent of the factors (by weight) but lacked one or more of the required factors were not included in the numerical ranking but were assigned a grade according to the process outlined. Schools or districts that had all of the required factors (by weight) were deemed eligible for both a grade and a numerical ranking. Lastly, they created a numerical ranking and assigned grades (based on qualifications discussed in step 6). Here is how they produced these

values, the numerical ranking was created by ordering each school or district (when qualified) based on the final z-score discussed in step 5. Grades were determined for each school or district (when qualified) by taking the ordered z-scores (which generally follow a normal distribution) and then assigning grades according to the process below.

Table 2.2: Grading Process

Grade	Final Z-Score	Frequency	Cumulative Frequency (Score at least)
A+	$1.96 \leq z$	2.5%	2.5%
A	$1.28 \leq z < 1.96$	7.5%	10%
A-	$0.84 \leq z < 1.28$	10%	20%
B+	$0.44 \leq z < 0.84$	13%	33%
B	$0.00 \leq z < 0.44$	17%	50%
B-	$-0.44 \leq z < 0$	17%	67%
C+	$-0.84 \leq z < -0.44$	13%	80%
C	$-1.28 \leq z < -0.84$	10%	90%
C-	$-1.96 \leq z < -1.28$	7.5%	97.5%
D+	$-2.25 \leq z < -1.96$	1.3%	98.8%

D	$-2.50 \leq z < -2.25$	0.6%	99.4%
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D-	$-2.50 > z$	0.6%	100%
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Grades are assigned based on how each school or district performs compared to all other schools included in the ranking by using the following distribution of grades and z-scores. While most rankings generally follow this normal distribution, there are slight variances across each ranking, so the actual counts and distribution may vary.

State Assessment Proficiency represents 15 percent of the weight in the Best Public High Schools ranking since it accounts for 25 percent of the Academics score, which is weighted at 50 percent in the Best Overall ranking, and 25 percent of the Teachers score, which is weighted at 10 percent in the Best Overall ranking.

2.8 School Quality Snapshot

The School Quality Snapshot displays a broad series of data that can be used to help inform parents and policy leaders about the success of each school. This broader view of accountability includes not only state assessment data, but other important types of information demonstrating school performance (California Department of Education, 2016).

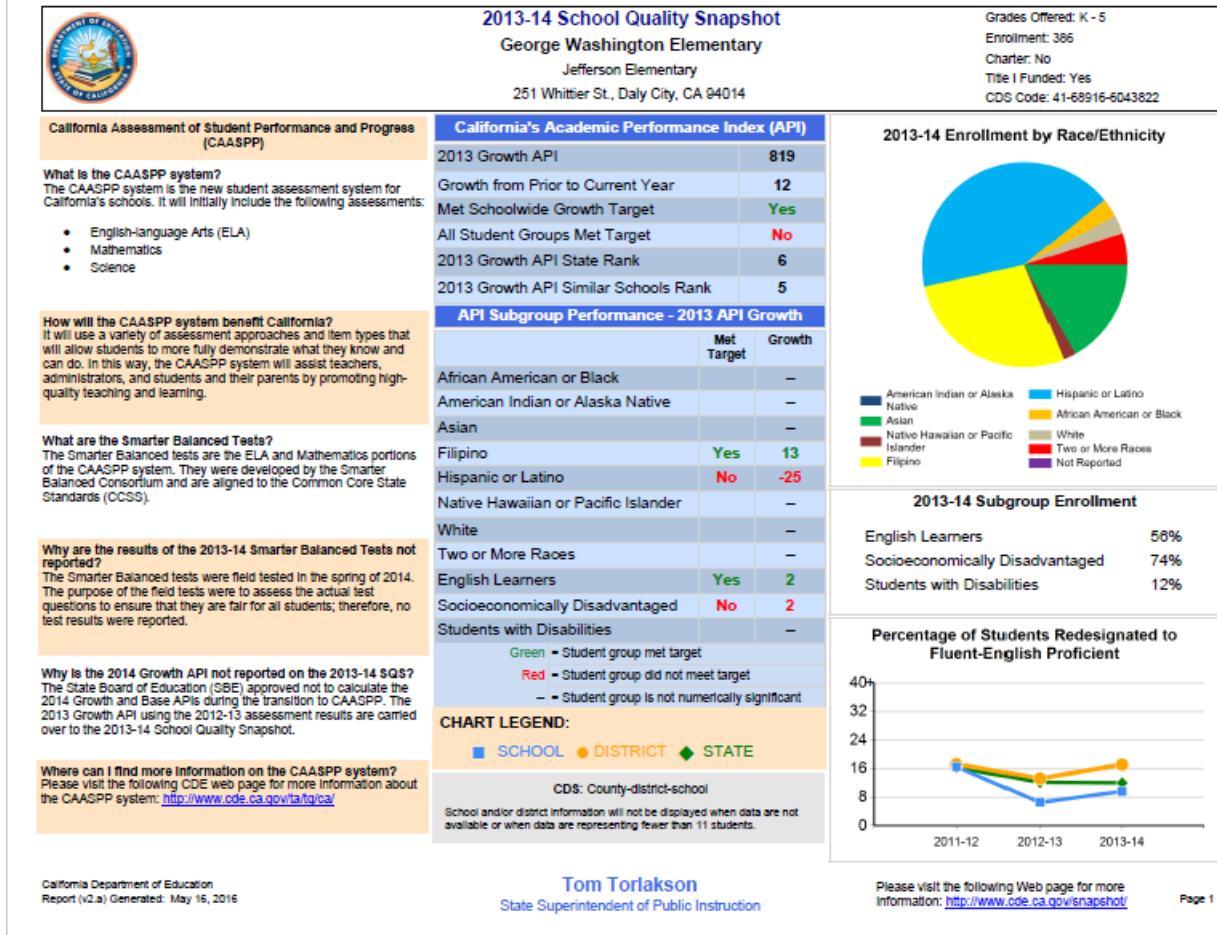


Figure 2.5: School Quality Snapshot



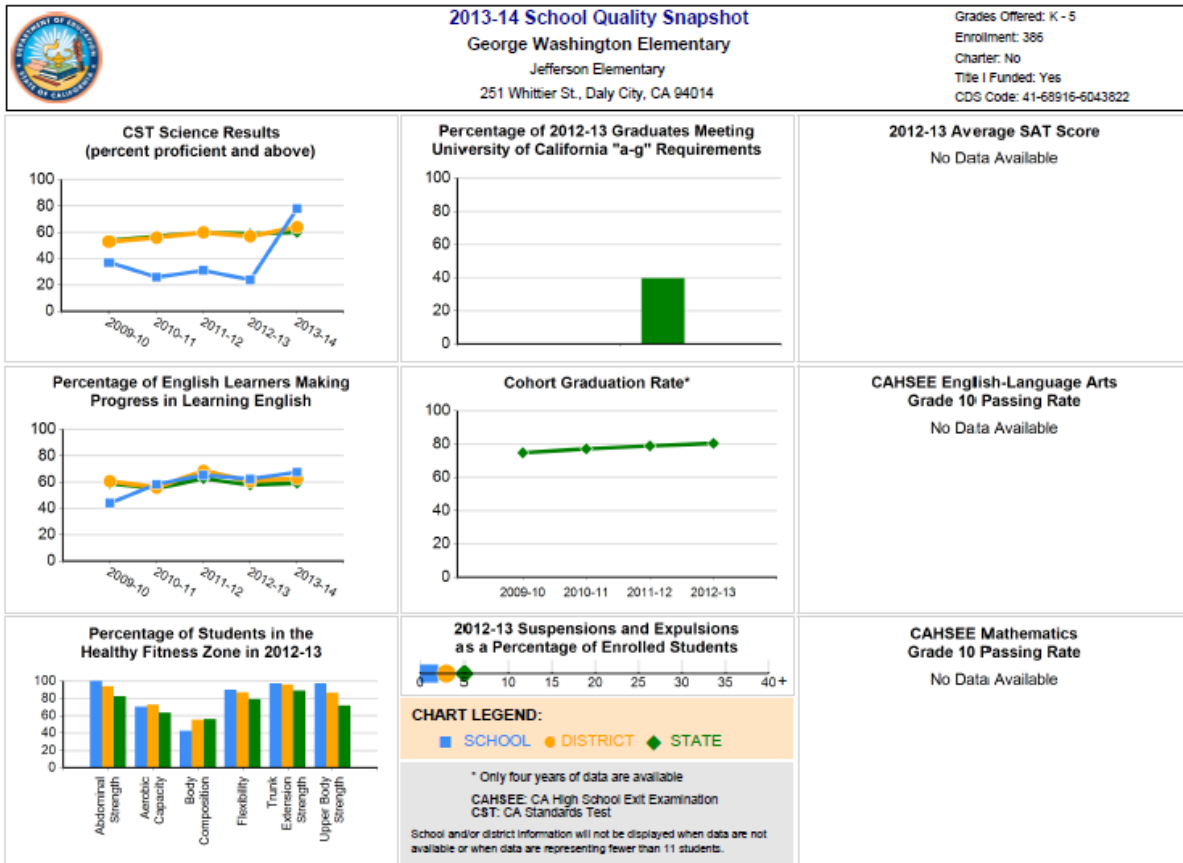
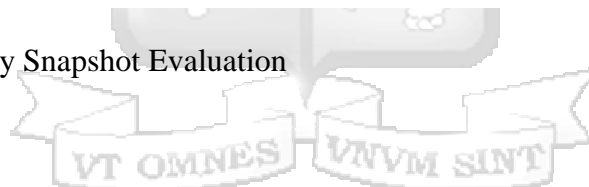


Figure 2.6: School Quality Snapshot Evaluation



2.9 Evaluation of NEPAD’S Pilot E-school in Kenya

Evaluation of the NEPAD’S pilot E-school in Kenya, a study conducted to evaluate the success of the pilot phase of the NEPAD e-school project in Kenya used the SPSS evaluation method. The specific objectives were to: establish the ICT infrastructure installation in the e-schools and determine the infrastructure’s quality accessibility and suitability for enhancing teaching and learning, determine the effectiveness of the training imparted to teachers and students to enable them to constructively engage with the installed ICT infrastructure in teaching and learning and establish the extent to which e-school infrastructure is being used to enhance teaching and learning and providing health information.

The study was conducted in six NEPAD e-schools in Kenya which included: Chavakali High School, Isiolo Girls Secondary, Maranda High School, Menengai Secondary School, Mumbi Girls

Secondary and Wajir Girls Secondary School. An Analysis of the qualitative data was done using the Statistical Package for Social Sciences and Microsoft Excel (Nyagowa, 2012).

2.9.1 Statistical Package for the Social Sciences

SPSS Statistics is a software package used for statistical analysis. It is widely used for statistical analysis in social science. It was described as one of “sociology’s most influential books” for allowing researchers do their own statistical analysis. In addition to statistical analysis, data management and data documentation are features of the base software.

2.10 Criteria used by Ministry of Education to Rank Schools in Kenya

Kenya’s national education system is structured on an 8-4-4 model with eight years of basic education, four years of secondary education and a four-year undergraduate curriculum. This model replaced the 7-4-2-3 system in 1985.

Formal schooling begins at the age of six, with compulsory and free basic education running through to the age of 14. Students’ progress to the academic secondary cycle, technical schools or trade schools from the basic cycle. Secondary schooling is also free but not compulsory.

The grading system used by the Ministry of education in Kenya in ranking secondary school’s exam performance is shown in the figure below:

KCSE Grading and Points System

Grade	Scale	Grade	Scale
A	12.00	A	80.00 - 100.00
A-	11.00 - 11.99	A-	75.00 - 79.99
B+	10.00 - 10.99	B+	70.00 - 74.99
B	9.00 - 9.99	B	65.00 - 69.99
B-	8.00 - 8.99	B-	60.00 - 64.99
C+	7.00 - 7.99	C+	55.00 - 59.99
C	6.00 - 6.99	C	50.00 - 54.99
C-	5.00 - 5.99	C-	45.00 - 49.99
D+	4.00 - 4.99	D+	40.00 - 44.99
D	3.00 - 3.99	D	35.00 - 39.99
D-	2.00 - 2.99	D-	30.00 - 34.99
E	1.00 - 1.99	F	0.00 - 29.99

Figure 2.7: Grading and Points System. (Classbase , 2012)

2.11 Open Schools Kenya

Open schools Kenya is a website portal that allows people to access information about schools through a website. Open school Kenya allows people to collect information about their communities, and share it openly online. Open school Kenya relies not on formal surveys but on people's local knowledge making citizen data, official data and any other data source about a school easy to combine and compare, to get the best picture of what is happening in education at the moment. Open schools Kenya enables parents to give feedback on their children's schools, helping to show which schools are performing well. Schools themselves can take ownership of their pages, submit changes and share their page to promote their work.

Open schools Kenya uses JSON a lightweight data interchange format which is based on subset of the JavaScript Programming Language (JSON, 2013) and CSV a comma-separated values file, which stores tabular data in plain text. JSON is a format that is very hard to read for humans and

may frighten the newbies and make for complicated debugging. Both formats don't allow graphical tabulation of data.

Nonetheless, open schools Kenya does not provide a clear analysis of school's performance in all categories other than exams. Open schools Kenya also don't have a mobile platform that can be used by citizens who don't have access to PC's.

2.12 Quality Education

A high-quality system includes five key elements: countrywide standards for teaching that are related to meaningful student learning and are shared across the profession, standards for student learning can focus teachers' work environment (Berry, 2009). Performance assessments based on countrywide standards, guiding state functions such as teacher preparation, advanced certification, to predict and develop greater effectiveness. Such assessments which look directly at teachers' abilities to plan, teach, and assess learning should be used to make key decisions regarding entry into the profession, readiness to be professionally licensed, and recognition of expertise.

Odden, Kelley, Heneman, and Milanowski (2001), stated that in a tiered system, these kinds of assessments can create a career continuum that fosters career development from early preparation to instructional leadership. Local evaluation systems aligned to the same standards, which assess on the job teaching based on multiple measures of teaching practice and student learning. Such local evaluation systems should have three components, considered in relation to one another, in an integrated fashion, standards-based evaluations of practice based on observations, curriculum plans, assignments, and assessments revealing teachers' classroom practice evidence of teachers' contributions to the work of their colleagues and the school as a whole (Accomplished California Teachers 2010).

Evidence of teacher's contributions to student learning based on multiple sources of information reflecting classroom work and other assessments that are mobile system appropriate and valid for the curriculum and for the students being taught (Athanasos, 1994). Support structures to ensure, mentoring for teachers who need additional assistance, and fair decisions about personnel actions. Aligned professional learning opportunities that support the improvement of teachers and teaching quality. To transform systems, incentives should be structured to promote collaboration and knowledge sharing, rather than competition, across organizations. Knowledge-sharing is needed

to develop not only learning organizations but a learning oriented system of education in which ongoing evaluation and inquiry into practice are stimulated within and across classrooms, across schools partnered within regions, and within the system as a whole (Newton, 2010).

In this system all students have a clear idea of how learning progresses and what they can do to improve Rivkin, Hanushek, and Kain, (2000). Parents understand the expectations for their children's learning as well as the information they receive from school, district, and state assessments. They can work with educators to support their children's growth and progress. Teachers are skilled at developing and using a range of assessments based on standards, learners' needs, and their professional judgment.

Supportive educators, including school principals, administrative staff, and leaders at the school and district levels, understand the standards and assessment elements and create conditions for successful learning (Packard, & Dereshiwsky, 1991). Student achievement information generated at all levels of the assessment system becomes part of the longitudinal state data system and contributes to a rich profile of accomplishment for every student.

2.13 Evaluation of Quality Education

Evaluation is defined by Patton (1997) as "the systematic collection of information to make judgments, improve program effectiveness and/or generate knowledge to inform decisions about future programs. Evaluation may be formative, providing feedback for improvement, or summative, assessing merit or worth. It may be internal, conducted by program staff or external, conducted by outside evaluators who provide third party validation or examine areas of special interest. Evaluation can help educational institutions and programs to document program success for educational stakeholders and funders, develop clear, attainable outcomes and goals for education transformation, and flexible strategies for achieving them, promote high levels of engagement by local school stakeholders and promote ongoing communication about roles, expectations, progress, and performance. It can also help keep schools funded education programs stay on track, by: evaluating program implementation and progress toward desired outcomes, helping programs identify and remedy implementation problems early on. In schools the focus is examining areas that have greater influence on the education process, activities and outcomes.

2.13.1 Curriculum Connections

When curriculum is closely connected across environments and disciplines, learning is strengthened. Educational researchers have found that an integrated curriculum can result in greater intellectual curiosity, improved attitude towards schooling, enhanced problem-solving skills, and higher achievement in college (Hirstein, & Walen, 1997).

Practice is a critical component in the process of learning any new skill, or transferring information from short-term to long-term memory. The advantages provided to memory by the distribution of multiple practice or study opportunities are among the most powerful effects in memory research (Benjamin & Tullis, 2010). Distributed practice of skills or knowledge can be provided by ensuring connections between online and offline curriculum. By utilizing Mobile system, skills and concepts introduced by the teacher during direct instruction can be practiced and reinforced.

Distributing practice of concepts and skills over time can have a positive effect on learning and retention. The literature on distributed practice is substantial. A number of researchers have conducted quantitative reviews of distributed practice (Radosevich, 1999; Janiszewski, Noel, & Sawyer, 2003). The authors of these reviews all noted that distributed practice results in an increase in retention. Distributed practice over time may have a positive impact on learning and retention. The issue of developing or identifying meaningful work that can be done independently can be a challenge when working with elementary aged children. It is important to identify high quality.

2.13.2 Authenticity Learning

Learning is more relevant when it occurs in contexts where students see the value or relevance in the assigned task. Providing authentic learning experiences can ensure greater relevance for students. Unfortunately, the separation between knowing and doing has traditionally been the hallmark of school and university learning. The emphasis in school and university has been on extracting essential principles, concepts and facts, and teaching them in an abstract and decontextualized form (Resnick, 1987).

Problem-based learning recognizes that students need to understand the skills and knowledge in order to truly own them. A number of researchers have identified characteristics of problem-based or authentic learning including a complex, open-ended learning environment (Resnick, 1987, Collins, 1988), which reflects the way the knowledge will ultimately be mobile system lied

(Collins, 1988). In terms of activities, they should have real-world relevance (Jonassen, 1991, Winn, 1993, Young, 1993), an authentic context and task (Norman, 1993), and where mobile system appropriate can be integrated across subject areas (Jonassen, 1991).

Authenticity should be an important component of learning in any environment, be it digital or a traditional classroom. Authenticity learning can provide greater relevance, resulting in increased student motivation and engagement. Educational researchers have found that students involved in authentic learning are motivated to persevere despite initial disorientation or frustration (Herrington, Oliver & Reeves, 2003). Most importantly, authenticity can result in deeper learning. Learning is enhanced when that learning takes place in authentic contexts. Newman, Seceda and Wehlage (1995) noted that the absence of meaning, or authenticity, inhibits learning transfer.

2.13.3 Education Feedback

Effective feedback is essential to improved performance in any learning task. Helping students to improve their performance is one of the key responsibilities of teachers. Carefully designed feedback is an important consideration while students are working on mobile system. Given the sense of urgency and pressure on schools today, increasing student achievement cannot be left to chance, or to trial and error. This is a solid research base that ties effective feedback to better outcomes for student learning. John Hattie (2009) identified feedback as the single most powerful educational tool available for improving student performance. In order to make the most effective of the limited time available during the school day, it important that learning not be left to chance, or trial and error. Little improvement in student performance can be expected in the absence of constructive feedback.

A number of researchers have identified specific aspects of feedback that make it effective in improving performance. Marzano, Pickering, and Pollock (2001) reported feedback produces the best results when it is specific, delivered frequently, and provides sufficient information on what needs improvement and how to improve. Several researchers have also connected the immediacy of results with better results (Scheeler, Ruhl, & McAfee, 2004; Coddling, Feinberg, Dunn, & Pace, 2005). The effectiveness of feedback provided to the user while using a Mobile system is an important consideration in judging its quality. In order to be effective, the feedback should be connected to better outcomes in student performance.

Learning is more relevant when it occurs in contexts where students see the value or relevance in the assigned task. Providing authentic learning experiences can ensure greater relevance for students. An authentic context and task (Norman, 1993), and where mobile system appropriate can be integrated across subject areas (Jonassen, 1991). Educational researchers have found that students involved in authentic learning are motivated to persevere despite initial disorientation or frustration (Herrington, Oliver & Reeves, 2003). Most importantly, authenticity can result in deeper learning. The likelihood students will be able to use and mobile system their learning is enhanced when that learning takes place in authentic contexts.

2.13.4 Modification of Teaching and Learning Routines (Differentiation)

One way of conceiving differentiation proposed by Tomlinson (1999) is modification of teaching and learning routines to address a broad range of learners' readiness levels, interests, and modes of learning. Researchers have identified the following effective differentiation practices: use of effective classroom management procedures; promoting student engagement and motivation, assessing student readiness, responding to learning styles; grouping students for instruction and teaching to the student's zone of proximal development (Allan & Tomlinson, 2000).

The term, zone of proximal development, refers to a point of required mastery where a child cannot successfully function alone, but can succeed with scaffolding or support (Tomlinson, 2003). A challenge presented to teachers in academically diverse classrooms is the assignment of meaningful work for students to do independently following direct instruction. High quality Mobile system have the capability to personalize a students' learning path by assessing readiness, providing effective feedback, and determining the mobile system appropriate level of challenge for the student.

Using Mobile system of high quality, with mobile system appropriate scaffolds and support built in, can target a student's zone of proximal development. Kulik, et al (1991) noted student gains are greatest when instructional materials are varied for differing instructional groups, rather than using the same materials for all groups. In academically diverse classrooms, this presents yet another challenge for the teacher. Using Mobile system in conjunction with the teacher's instruction can provide students with a wide variety of games, simulations, and Mobile system to practice and extend their learning.

A number of studies have noted the ineffectiveness of classrooms in which teachers fail to adapt the pace of instruction in response to learners' needs. Often the teacher's instruction is directed to the middle in an effort to cover the curriculum. This mobile system approach may be too challenging for lower achieving students and not challenging enough for those at higher levels of achievement. Effective utilization of Mobile system can reduce the size of instructional groups for teachers permitting the delivery of more targeted instruction.

2.13.5 User Friendliness of School Evaluation Systems

User Friendliness is sometimes referred to as “usability”, the ease of use or how intuitive something is to learn, while, Nielsen and Hackos (1993) note that usability consists of a number of attributes including learnability, efficiency, memorability, errors, and satisfaction. Learnability refers to how quickly the user can learn how to use the program. Efficiency is a measure of productivity for the user once the system is learned. Memorability means the user can return to the program without have to relearn its use. Errors concern the error rate in the system, not of the user. Satisfaction is a measure of how much the user likes the program. When all of these attributes are met, the result is a positive experience for the user.

In today's digital classrooms, students may be assigned reinforcement or extension activities using mobile system when the teacher is not directly instructing them. In these circumstances, usability can contribute to a learning environment that functions smoothly. Intuitive devices and content increase the likelihood students will be able to work independently, freeing up the teacher to provide direct instruction to other students.

This research demonstrates that ease of use is a critical determinant of engagement, and as such is key to every child's product if it is to be a success. There are a number of variables that need to be considered when assessing usability. These variables include design considerations such as activity and screen design, the use of instructions, design icons, cursor design, text-to-speech functionality, rollover features, and help screens.

2.13.6 Education Motivation

Motivation can either enhance or serve as serious impediment to student learning. There is a substantial research base connecting motivation with increased performance. When students are motivated, it increases the effort and energy they expend in activities directly related to their needs

and goals, determining whether they pursue a task with enthusiasm or with apathy (Pintrich et al., 1993). Researchers have noted how motivation increases students' initiation and persistence in activities, even when faced with occasional frustration (Wigfield, 1994, Larson, 2000). When students are motivated it increases their time on task (Larson, 2000). Other researchers have demonstrated a connection between motivation and improved cognitive process, specifically what learners pay attention and how effectively they process it (Pintrich & Schunk, 2002, Pugh & Bergin, 2006).

A number of factors, both intrinsic and extrinsic can affect levels of student motivation. While some students will complete assigned tasks with the goal of task completion and possible resulting rewards (grades or badges), ideally the task itself, or in the case of this study, the Mobile system, should be intrinsically motivating and one a student will choose in the absence of teacher direction.

2.13.7 Student Performance

One of the primary purposes of education is the acquisition of knowledge. With a large number of schools failing to meet the expectations outlined in the Common Core State Standards, efforts need to be made to maximize the instructional time in the school day. Mobile system may help to increase the effectiveness of instructional time when they are selected and implemented effectively in a blended learning program. In any initiative or program designed to improve the quality of the education provided to children, the most important factor in terms of evaluating efficacy is the impact they have on learning (Springer, et.al 2010).

Mobile system use has the potential to enhance teaching and learning. In order to increase the likelihood that Mobile system will have a positive impact in education settings, it is important to identify Mobile system of high quality (Vandevoort, Amrein-Beardsley, and Berliner 2004). Defining high quality Mobile system has not been addressed in the literature.

McCaffrey, Lockwood, Koretz, and Hamilton, (2005) Over the effective evaluation in education: desired program outcomes should be developed with school principals and teachers input, be realistic, and where possible, within the control of the program; strategies and activities selected to attain desired outcomes should be flexible and open to revision as needed by empowered local program managers and school leaders to reflect the evolving program in practice, evaluation in local schools should be participatory, to build local buy-in and capacity to sustain an effective

program and planning for evaluation should start early on. For example, identifying key data indicators and how data will be gathered.

During evaluation process, evaluators and decision-makers can use available data at the national and local levels to analyze key education outcomes such as student proficiency, dropout and graduation rates, achievement gaps between student subgroups, and readiness for postsecondary education and careers (Hassell, 2002). Use of measures of individual student learning growth over time, already in place in some nations, can improve the accuracy of outcomes data (Skinner, 2010). Evaluation can help educational transformation programs define and measure quality indicators and measures of the education transformation process, gauge progress toward desired educational outcomes, increase stakeholder participation, and empower school leaders and teachers to build and sustain transformation in schools.

2.14 Mobile Application School Analysis System

Mobile phones are thought, for several reasons, to be a particularly suitable tool for advancing education in developing regions. First, mobile phones are the most prevalent ICT in the developing world, and the penetration rate is rising rapidly. In Asia, mobile penetration has doubled within a short span of time; in 2001, average penetration was 19.7 per 100 inhabitants while in 2005 the penetration rate rose to 40.9 (Orbicom, 2007). Also relevant is the fact that mobile phone ownership is increasingly more common in the lower socio-economic segments of society (Samrajiva & Zainudeen, 2008). Second, mobile phones are an especially good 'leapfrogger' since they use the radio spectrum. There is, therefore, less need for new physical infrastructure such as roads and phone wires, and base-stations can be powered via generators in places where there is no electrical grid (Economist, 2008). Finally, in addition to voice communication, mobile phones allow the transfer of data, which can be particularly useful for delivering educational content over long distances.

The unique approach to literacy assessment incorporates cutting edge mobile technology into the process of recording and sharing results. Consequently, communication and action surrounding, school's curriculum, teacher lessons, environment, motivation, modification of teaching and learning routines, authentic learning; modification of teaching and learning routines, student test results happens more quickly and has the potential to improve the performance of the children who are assessed (Wilson, & Hallum, 2006).

The recorded information about children's age, sex, enrollment status, and their performance on the literacy test. Once the phones have access to wireless Internet, the surveys can be sent electronically back to form hub, where the data can be organized and disseminated. This allows for automated generation of report cards, which means that data from assessments can be used nearly instantly, thereby benefiting not just school administrators and policymakers, but potentially the students themselves who take the tests (Clotfelter, Ladd, & Vigdor, 2007)

2.15 Designing and Implementing Mobile-based Quality Education Evaluation

Mobile-based systems for evaluation are mainly associated with data collection, with information flowing from the field to a central management or evaluation team. However, the same technology can also be used to improve day-to-day operations, provide feedback to staff, and reach out to beneficiaries and other stakeholders. Therefore, at an organizational level, mobile-based systems can and should be conceived not only as data collection tools, but also as management and communication tools (Alexander, Entwisle, & Olson, 2007). Two critical organizational benefits of a mobile-based managed system are: taking informed decisions in real-time and providing feedback and exchanging information between stakeholders in real time. Mobile data collection offers three new data types which can be very useful for monitoring and valuation. These are as follows: geographic data: locations, paths, and boundaries, multimedia data: photos, audio recordings, videos, etc. and electronic sensors: fingerprints scanners, health-sensors, Smart-card readers, decibel-meters, etc.

2.16 Education Empirical Study

In their study Wouters, van Nimwegen, van Oostendorp, and van der Spek (2013) investigated whether “serious” games were more effective in terms of learning and more motivational than conventional instruction methods. When computer games were used to supplement other instruction methods, both learning and retention were positively impacted. In a meta-analysis conducted by Vogel, Vogel, Cannon-Bowers, Bowers, Muse and Wright (2013), the authors examined the impact computer gaming and interactive simulation had on learning. They reported strong, positive effect sizes when interactive simulations and games were compared with traditional teaching methods for both cognitive gains and attitude. The effect sizes held true across people and situations.

Introducing multimedia into CAI has shown to improve learning outcomes for children at risk of literacy underachievement. Van Daal and Sandvik (2011) conducted a meta-analysis reviewing 35 studies focusing on the effect of multimedia on early literacy development. Medium to large effect sizes were found for alphabetic knowledge (average effect size 0.654), comprehension (average effect size 0.619), phonological awareness (average effect size 0.565) and vocabulary (average effect size 0.565). Small to medium effect sizes were found for non-word reading (average effect size 0.379) and concepts of print (average effect size 0.351). It was concluded that multimedia-literacy programs could be beneficial to children at risk of literacy underachievement, especially with respect to alphabetic knowledge, comprehension, phonological awareness, and vocabulary.

The quality and design of applications used in computer assisted instructional programs has been a recent focus in the research. Ke (2009) conducted a review of 89 research studies published between 1985 and 2007 that focused on the design of computer based games and programs for learning purposes. The findings from this meta-analysis outlined a number of considerations for the design and implementation of computer assisted instruction. Seventeen of the 89 studies reviewed by Ke (2009) examined the instructional design of computer games. Design features focused on pedagogy, interface format, feedback, and alignment with desired learning outcomes. A common finding from these design studies was instructional support features are a necessary part of instructional computer games. The studies generally concluded that learners without instructional support in game would learn to play the game rather than learn domain-specific knowledge embedded in the game (Leutner, 1993). Instructional supports may include alignment of game playing and learning task, feedback, and authenticity level.

Research has begun to demonstrate the need for careful attention to the design features of computer programs in order for CAI to have the greatest impact on student achievement. Sandford, Ulicsak, Facer, and Rudd (2007) reported that teachers' facilitation played an important role in the effective use of instructional games in the classroom. In this investigation, the authors also asserted the focus should be on how games can be carefully aligned with sound pedagogical strategies or learning conditions to be beneficial. While several researchers have articulated the need to align the design of computer games and applications with sound pedagogy, a systematic approach to the design process has yet to be identified.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

The research is aimed at finding the challenges with the current school quality evaluation system platforms and to come up with an effective and efficient way of evaluating the quality of Kenya schools. This chapter describes the research design and methodology that will be employed in the study. This include establishing the components of Education Quality standards in Kenya schools examining the methods (types) of evaluation of quality education in schools in Kenya and developing/designing and implementing mobile-based quality education evaluation system in schools in Kenya.

3.2 Agile Software Development Methodology

Agile software development method allows for faster iteration and more frequent release with subsequent user feedback. Agile processes allow release schedule and user feedback opportunities this allows faster and more controlled improvements (CPrime, 2014).



Figure 3.1: Agile Methodology

Figure 3.1 shows the steps followed in the research to achieve the set objectives for this dissertation, the first step was requirements which involved the collection of the intended product specification or features and specifying what it should do or how it should do it. The second step

was architecture and design which included defining the architecture and design of the system. Development of the system was the third step which involved implementation of the system. Test and feedback was the fourth step which allowed the product improvement. The developed applications were tested independently during every development iteration. The data flow between the different components is also tested to ensure complete test coverage. Testing the application was to make sure that the needed functionalities are working as required.

3.3 Development Process

The study used the following steps as shown in Figure 3.2 to develop system in an effort to achieve the objectives for this dissertation.

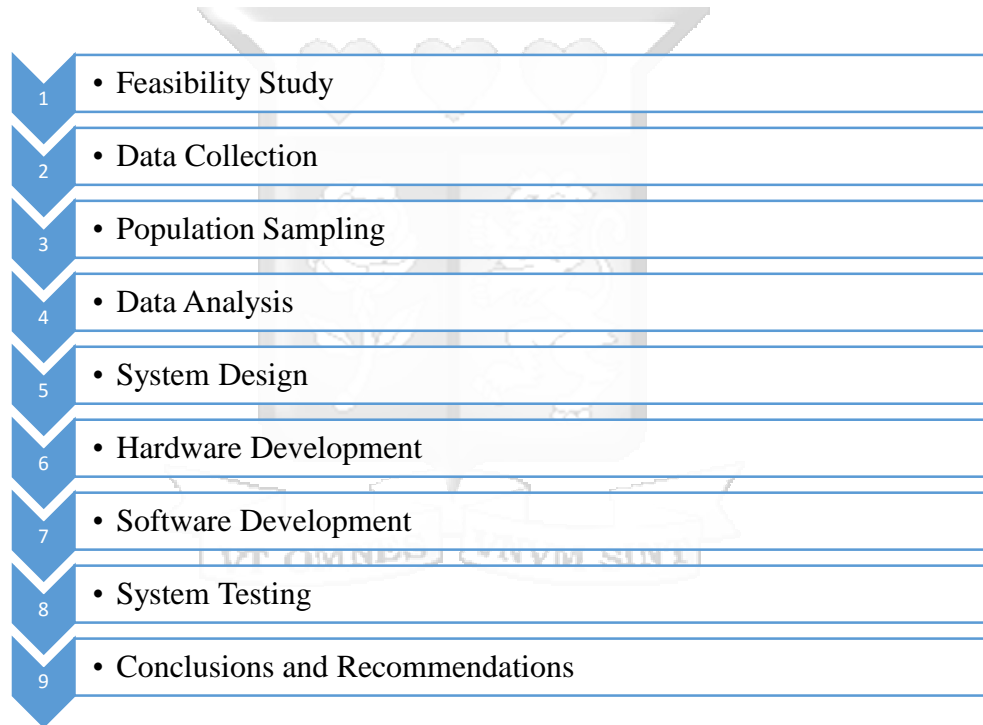


Figure 0.2: Development process of the system

Step 1: Feasibility study aims to show the need for research and see if it adds any value to existing systems and designs. An extensive research of other projects in different parts of the world was carried out to investigate technologies used in curbing speeding on roads. A practical assessment of the proposed system was done to determine its applicability in the real world scenario.

Step 2: Data collection methods such as interviews, online Pre-questionnaires and post-questionnaires as well as observation were used to gather information.

Step 3: Establishment and definition of sample population to which data is to be collected. Identifying the target population possessing same characteristics and categorizing them in order to gather relevant data.

Step 4: Analysis of the collected data from the sample population was done to show the need for the system.

Step 5: Design of the system according to the data collected. Hardware and software designs to represent system was done using circuit diagrams and software mockups diagrams.

Step 6: Hardware development was done by converting the designs into an operational system. Integration of components such as Microcontrollers, sensors, transmitters and display unit was done at this stage

Step 7: Application development according to the data analysis and the mockup designs followed. Establishment of communication channel between the hardware and software was implemented in this phase.

Step 8: System testing to ensure that the required functionalities are working as per the requirements.

Step 9: Discussion of the system in reference to the set objectives and requirements. Recommendations for future work is also highlighted during this stage.

3.4 Research Design

The research incorporated qualitative and quantitative methods of research. Qualitative research objective is to get an enhanced understanding through truthful reporting, firsthand experience, and citations of actual conversations. This was used to understand the current platforms and process of disseminating public health services information. The quantitative research was used to see the number of people who would like use the new system or thought it was a good idea (California State University, 2012).

3.5 System Architecture

Mobile application architecture used in developing the application basically comprises (Sanganagouda, 2011), the network part that which includes the Visitor Location Register (VLR) and Home Location Register (HLR) and complex logic the sustenance of several applications in a sole Android platform. The architecture was implemented in the research with an android application. A back-end web application was integrated with the android application to analyze users' requests. MySQL database was used in development of the application.

3.6 System Analysis

There are 3 approaches in information system development section; data-oriented, process oriented, and object-oriented approaches. The object-oriented method, unlike its two predecessors that lay emphasis either on data or process, combines processes and data into single entities called objects (University of Missouri, 2001). Object-oriented Analysis (OOA) is the concept used in this research. OOA increases the understanding of problem domains because OOA promotes a smooth transition from the analysis phase to the design phase and provides a more natural way of organizing specifications.

This study focuses on use-case modeling, class modeling, data flow diagrams and entity relationship diagram to explore the various approaches that are conducted in the analysis of the system. In the object-oriented system development life cycle, use-case modeling is established in the analysis phase. Use-case modeling is done in the early stages of system development to assist developers gain a perfect understanding of the functional requirement of the system, without worrying about how those requirements will be implemented (University of Missouri, 2001).

A use-case model consists of actors and use cases. An external entity that interacts with the system is referred to as an actor and a use case represents a sequence of related actions initiated by an actor to achieve a precise objective (Hoffer, 2001).

3.7 System Design

Object-oriented design (OOD) techniques was used to refine the object requirements definition identified during system analysis and to define design-specific objects. Design class diagram was used for general conceptual modeling of the systematics of the software, for detailed modeling to translate the models into programming code and for data modeling (Sparks, 2001).

The research adopted design class diagram to hold classes which contain the main objects, methods and interactions of the software. Entity Relationship Diagram (ERD) was also used, which is a graphic that illustrates the relationships between people, objects, places, concepts or events within a system, enabled the research to define business processes and to develop relationships between entities and their attributes in a relational database (TechTarget, 2000).

3.8 System Implementation

Java was used to develop android application. The Web backend dashboard used PHP and HTML 5. MySQL was the relational database management system that was used. MySQL was preferred because it is open source and cross platform. PHP was chosen because it is fast and platform independent (Sakshay, 2013). HTML5 is the markup language that was used to structure and present content in the web backend dashboard.

3.9 Target Population

The target population consisted of schools in Nairobi County. The target populations consisted of two hundred (200) students, teachers and principals and education officials from the Ministry of Education from a population frame from Nairobi County. Mugenda and Mugenda (2003) define a population frame as a list, directory or index of cases from which a sample can be selected. According to Cooper and Schindler (2008) a population frame must thus contain an up-to-date list of all those that comprise the target population.

3.10 Sampling Techniques and Sampling Size

According to Trochim (2005), Sampling is the process of selecting units (people and organizations) from a population of interest so that by studying the sample we may fairly generalize our results back to the population from which they were chosen. According to Oso & Onen (2009), a sample is part of the target (or accessible) population that has been procedurally

selected to represent it. It is a finite part of statistical population whose properties are studied to gain information about the whole (Kombo & Tromp, 2006). Due to a large target population number, a probability sample technique was used, where the sample population was chosen at random from Nairobi county.

$$n = \frac{NZ^2 \times 0.25}{[d^2 \times (N-1)] + (Z^2 \times 0.25)}$$

Equation 3.1 Random Sampling (archive-edu, 2013)

n = Sample size

N = Total Population size (known or estimated)

d= Precision level (usually 0.10 or 0.05)

Z = Z statistic for a level of confidence (e.g. 1.96 for 95% confidence level)

Equation 3.1 shows the formulae that was used to derive the sample population, this means that everyone had an equal chance of being in the sample population.

3.11 Data Collection Instruments and Procedure

Primary data was collected from teachers, principals, parents, students and quality officers from the ministry of Education in Nairobi County using interviews and questionnaires. Kothari (2003) argues that questionnaires generate data in a very systematic and ordered fashion.

In order to determine the degree of reliability and validity of the questionnaire: first the questionnaire design was critiqued by peers who offered suggestions, secondly, a random sample of fifteen (15) respondents drawn from the target population and who were not part of the final sample to fill the pilot version of the questionnaire. The results of the pilot test were analyzed using Cronbach alpha with a set lower limit of acceptability of Cronbach alpha of 0.7.

The researcher used drop and pick method in administering the questionnaire to all the respondents as it is cheaper and quicker to administer, it is flexible and facilitates the promotes respondent

cooperation and is highly convenient for the respondents as they could fill them during free times or when workloads are manageable (Patton, 2002). Each respondent received the same set of questions in exactly the same way. The questionnaires were also attached with a cover letter which was personalized to the extent possible, stressing why the study is important and why the particular respondent should fill in the questionnaire.

3.12 Data Analysis Procedures

Content analysis was used to analyze the research data. Directed content analysis was used to validate study objectives, user and system requirements. Research objectives, system and user needs helped to determine the initial coding scheme. As guidance for initial codes, a directed approach analysis begins with relevant research findings or a theory (Hsieh, 2005). Data that cannot be classified are identified and analyzed later to determine if they represent a new category or a subcategory of an existing code. This method was employed since initial classification will not bias the identification of relevant application objectives and needs. In addition, the methodology helps focus the interview questions thus simplifying data analysis.

3.13 Data Validity

Content validity was settled on to validate the research by systematically examining the test content to ascertain whether it covers a chosen sample of the behavior domain to be measured (KENPRO, 2012). The researcher maintained the validity of the dissertation by investigating the initial concept, notion and research questioned that discerns which data is to be collected and how it is to be gathered and by ensuring that the system developed was made in a way that it was as close as possible to a real application that a school evaluation system would want to adopt. Content validity was chosen since it establishes the degree to which the content of the test matches a content domain associated with the construct.

3.14 Data Reliability

Inter-rater reliability was singled out in the dissertation to measure the extent to which information being collected by different interviews, is collected in a consistent manner (Keyton, King, Mabachi, Manning, Leonard and Schill, 2004). The researcher maintained reliability of the interviews through a number of interventions. The study made use of one-on-one interviews with standardized questions. Moreover, the interviewers were trained about the interview process and

on how to avoid biases (Conway, Jako and Goodman, 1995). Inter-rater reliability was selected because it ensures that the data collection instruments and the procedures used to gather the information are solid enough that the same results can repeatedly be obtained.

3.15 Ethical Considerations

During data collection respondents were informed of the purpose of the study, the procedures that was used to collect the data and assured that there were no potential risks or costs involved and that anonymity and confidentiality would be maintained throughout the study and even after the study. In the study, confidentiality was maintained in keeping the data collected confidential and by not revealing the subjects' identities when reporting or publishing.



CHAPTER FOUR: SYSTEM ANALYSIS AND DESIGN

4.1 Introduction

The chapter details the design and structure of the proposed solution by incorporating the user requirements collected in the previous chapter. This was realized through system architecture and design.

4.2 System Analysis

System analysis helps us to understand and specify the detail of the system under study. And the design process helps us to specify how the components of the system would be implemented. For any successful system, it is required to apply proper analysis and design techniques to understand the system in detail.

The data was collected mostly using questionnaires that were formulated on QuestionPro Survey to help in analyzing the data. But some of the data was collected using questionnaires and observation. This is by using the pre-questionnaire in Appendix A.

4.2.1 Degree of Response

The target population included general population i.e. students, teachers, parents and educators from them it was necessary to see how their patterns where with regards to the quality of Kenya school evaluation. Due to time constraints on the researcher and an availability of some of the targeted people were not involved. the researcher therefore ended up with 76.9% of the target population.

4.2.2 Demographic

This depicts how the target population was spread, the general population had a response rate of 53% which is over half of what was expected, schools had 70% which shows good cooperation from them, finally, Ministry of Education had an 80% response rate which was encouraging.

4.2.3 Users Response on Current System

After giving the questionnaires to the various sample populations, this is the reply that we got from them;

School Evaluation and Ranking in Kenya

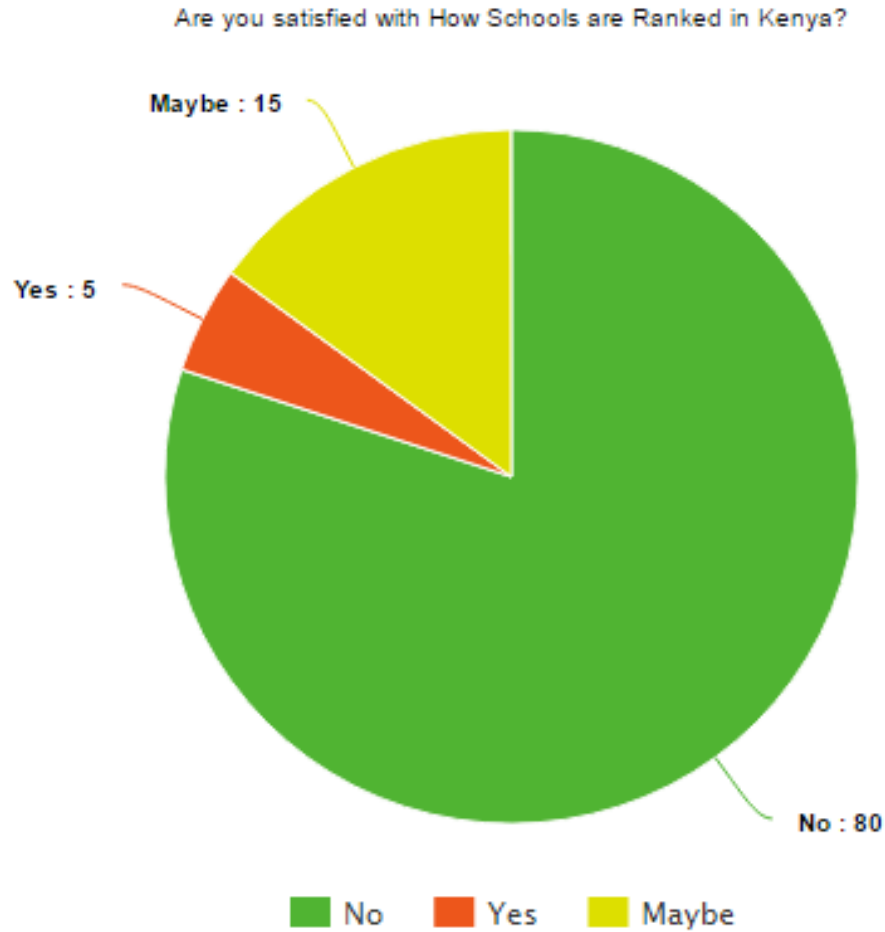


Figure 4.1: Satisfaction of the Ranking of Kenya Schools

Figure 4.1 shows that if schools could be ranked in a broader way, it would resolve most of the problems schools face during the evaluation. Hence majority of the sample space 80% said no to the current school ranking.

4.3 Data Analysis Conclusions

The response received was very positive and helped in decided whether or not to build the application. From the response, the researcher was able to decide on some of the functionalities to include in the system. Most people agreed that the proposed application would enhance and make school evaluation and ranking more efficient. the rate of acceptability would be high for the application.

4.4 System Design and Architecture

4.4.1 Introduction

This section covers the system design and architecture of the application, then it goes through how the application is developed and tested. the design used UML diagrams to elaborate the researcher's conclusion. This was achieved by the use of use case diagrams to show how the users interacted with the system requirement.

4.4.2 System requirements

These system requirements included the functional and non-functional requirements of the system that the researcher came up with from the data analysis conducted. The requirements collected BY the researcher came up with a system architecture to show how the system works, Figure 4.4 shows how the architecture of the system is and its various components. it shows the two modules in the application the web module and the mobile module.

The developed solution has the following main actors: system user (uses the system to check school information), system administrator (enrolls the school administration and activates and deactivates school) and school administrator (registers and updates school information).

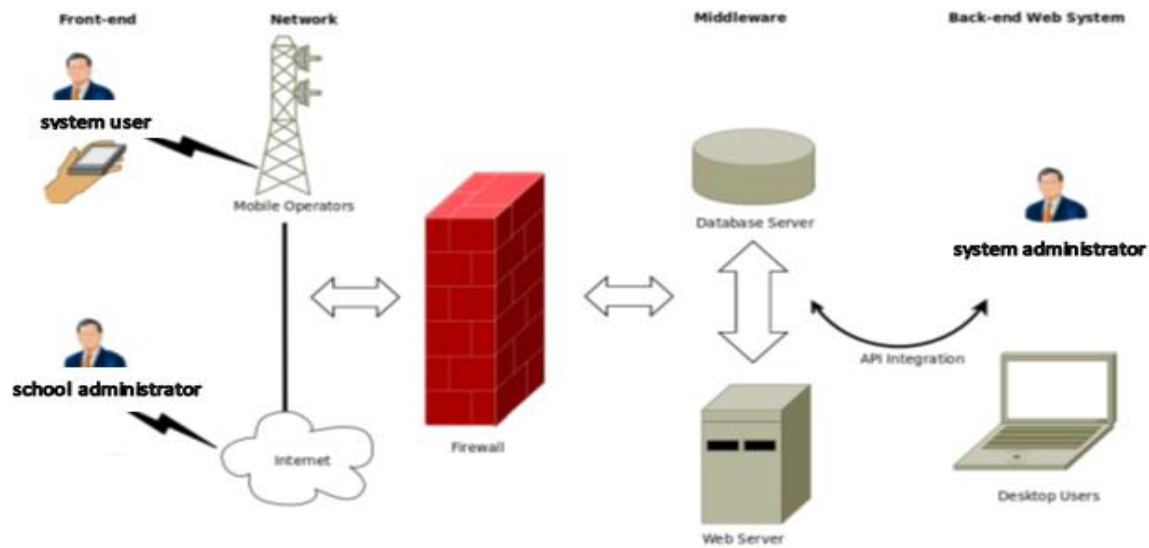


Figure 4.2: System Architecture

Figure 4.2 provides an architectural overview of how the system is designed to function and the flow of interaction for the various operations. The flow of information between all the involved entities in the architecture is bidirectional. As shown above, the system user accesses the mobile application school quality evaluation system using the application, and communicates with the web server through the internet using data communication. The mobile operator is responsible for routing the communication between the mobile applications and the web server while the firewall, filters any communication between the server and the external systems thus ensuring security and integrity of information. the school administrator uses the back-end web system to register school and update school information and the system administrator use the back-end web system to enroll the system administrator and activate or deactivate the school. Information in the database on the web server is accessible on the web server through use of an API (Application Programming Interface)

4.5 System Design

The collection of the requirements from potential users were merged with the ideas that the researcher has in mind to come up with an application design with desirable functionalities to fulfil its objectives. The following design diagrams and corresponding information were used to guide the actual implementation of the system:

4.5.1 Use-case Diagram

Figure 4.3 illustrates the major interactions that will take place between the various sub-systems and actors in the mobile application school quality evaluation system.

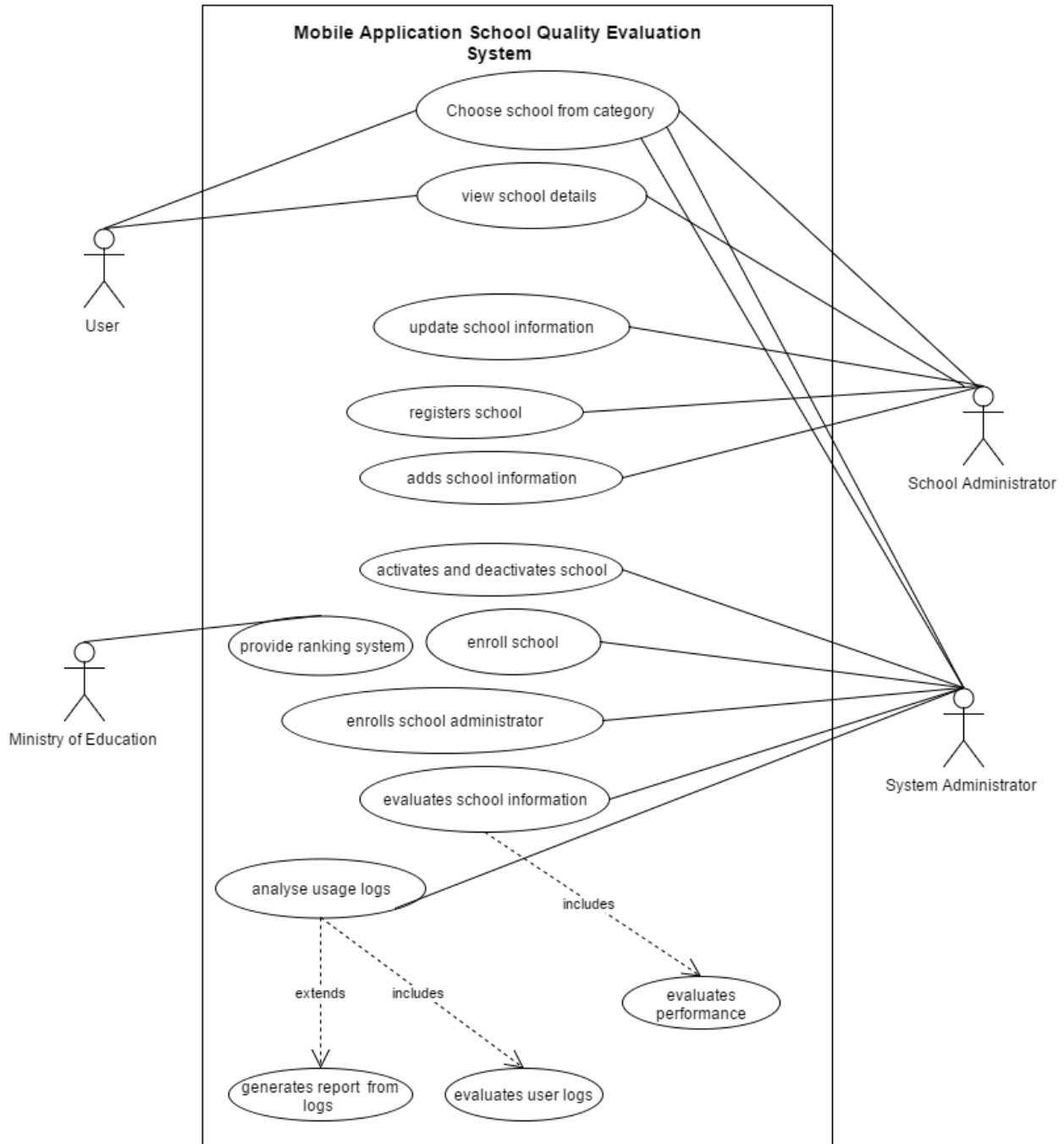


Figure 4.3: Mobile School Quality Evaluation System Use-Case Diagram

The various use-cases are explained beneath:

a) Use-case: choose school from category

This use-case allows the user to choose a school category from the school category list.

Preconditions:

User loads the application.

Postconditions:

User choose a certain category from the school category list.

Main Success Scenario:

1. User downloads the application.
2. User loads the application.
3. User selects the category of school, He/she is interested in.
4. System displays the list of schools in the category selected.

Alternative Flow: Error downloading.

At step 1, user has no enough internet to download the application.

- Customer access better internet.
- Customer cancels download and try's downloading again.

Alternative Flow: School category list not loading.

At step 3, system fails to load the school category.

- Replicate the process.
- Check Internet connectivity.

b) Use-case: view school details

This use-case details the viewing of the school selected in the category.

Preconditions:

User identifies the school details.

Postconditions:

Users is able to view the details of the school and check the overall report of the school.

Main Success Scenario:

1. User selects the category.
2. User chooses the school he/she is interested in.
3. User views the school details.
4. User checks the school analytical report.

Alternative Flow: System failure.

At step1, system fails to display school details.

- Repeat the process.
- Check Internet connectivity.

c) Use-case: update school information

This use-case allows the school administration to update school information.

Preconditions:

School administrator adds school information to the system.

Postconditions:

Users get to view updated information of the school.

Main Success Scenario:

1. School Administrator add school information to the system.
2. School Administrator get new school information.
3. School Administrator change current information of the school.
4. School Administrator saves changes.
5. New school changes are updated.

Alternative Flow: Error updating.

At step 1, user has no enough internet to update the application.

- Retry updating.
- Get better internet connections.

d) Use-case: register school

This use-case allows the school administration register the school.

Preconditions:

School administrator registers her/himself in the system.

Postconditions:

School gets registered.

Main Success Scenario:

1. School Administrator registers themselves in the system.
2. School Administrator get enrolled by the system administrator.
3. School Administrator registers and adds school information.
4. New school is created.
5. System administrator enrolls the school.

Alternative Flow: Error registering.

- Poor internet connectivity.
- Retry registering.
- Get better internet connections.

e) Use-case: add school information

This use-case allows the school administration to add school information.

Preconditions:

School Administrator registers school information to the system.

Postconditions:

Users get to view the school information.

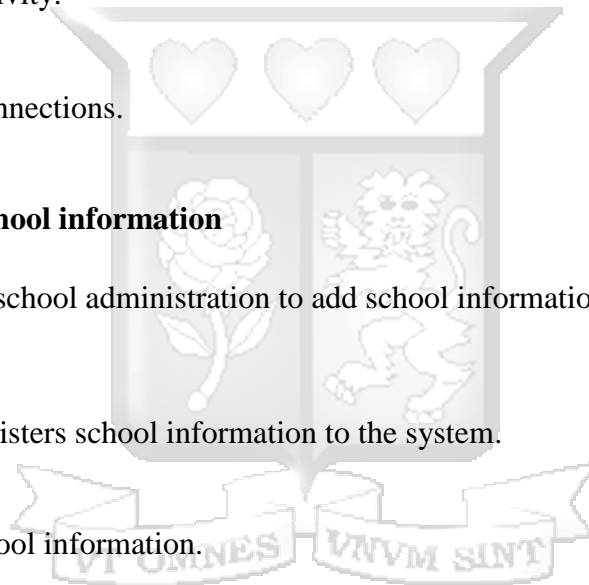
Main Success Scenario:

1. School Administrator registers school information to the system.
2. School Administrator adds school information.
3. School Administrator saves changes.
4. New school information is added.

Alternative Flow: Error adding school information.

At step 1, user has no enough internet to add the application.

- Retry adding.
- Get better internet connections.



f) Use-case: activate/deactivate school

This use-case allows the system administration activate a school after it has been registered and is also able to deactivate a school from the information if they include false information or misuses the system.

Preconditions:

School administrator adds school information to the system.

Postconditions:

School no longer exist in case of deactivation and school is visible for users in the case of activate.

Main Success Scenario:

1. School Administrator adds false school information in the system.
2. System administration notices the misuse of system.
3. System Administrator gives the school administrator a warning through mail or call.
4. School administrator ignores the warning.
5. System administrator deactivates school.
6. School is deactivated.

Alternative Flow: Error deactivating or activating.

At step 1, system administration has no enough internet to update the application.

- Retry deactivating/activating.
- Get better internet connections.

g) Use-case: enroll school administrator

This use-case allows the school administration to be enrolled by the system administrator.

Preconditions:

School Administrator registers in the system.

Postconditions:

School administrator can access the system.

Main Success Scenario:

1. School Administrator registers.
2. School Administrator waits to be enrolled by system administrator.

3. School Administrator registers school.
4. School Administrator waits for system administrator to enroll the school.
5. School Administrator can access the system.

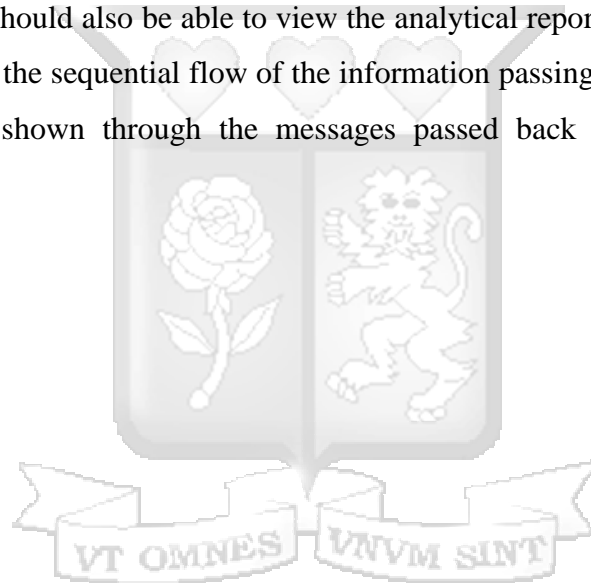
Alternative Flow: Error enrolling the school administrator and school.

At step 2, user has no enough internet to update the application.

- Retry enrolling.
- Get better internet connections.

4.5.2 System Sequence Diagram

The main feature of the solution is when a user is able to view all the school categories and school lists available. The user should also be able to view the analytical report of the school of interest. Figure 4.4 puts on show, the sequential flow of the information passing through the main entities in the system. This is shown through the messages passed back and forth the respective components.



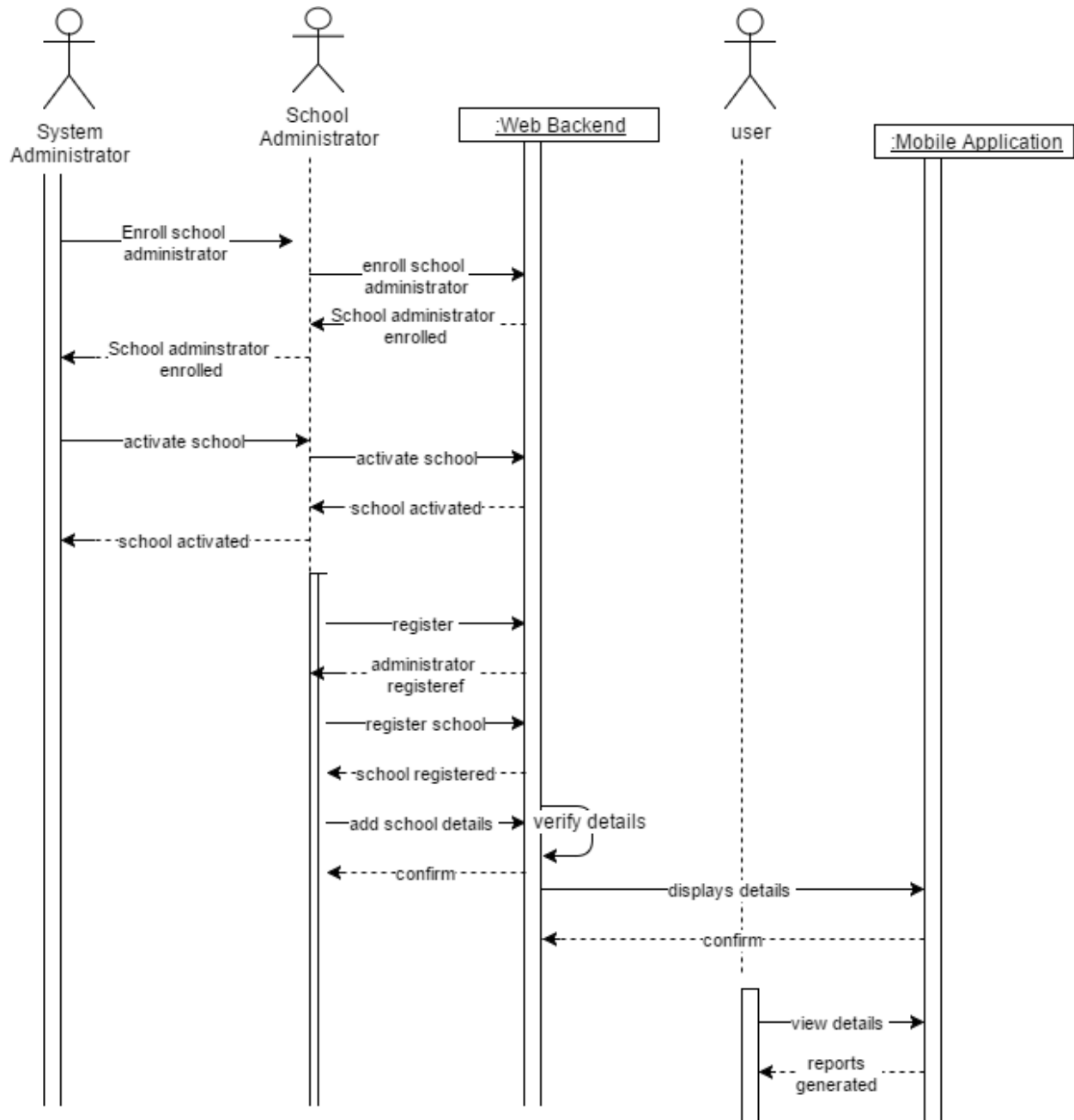


Figure 4.4: Mobile School Quality Evaluation System Sequence Diagram

4.5.3 Design Class Diagram

The interaction of all the classes in the system and the corresponding attributes and methods they need to implement, which are depicted in the figure below:

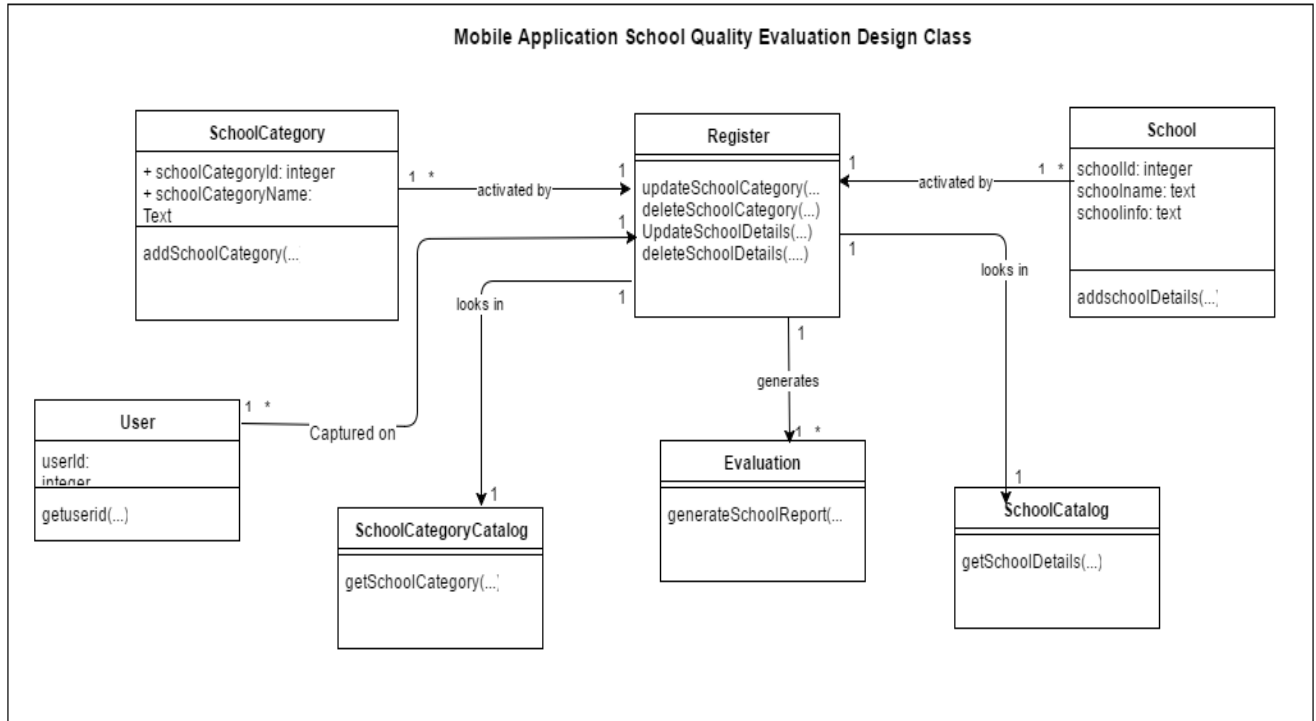


Figure 4.5: Mobile School Quality Evaluation System Class Diagram

4.5.4 Data Flow Diagram

A data flow diagram shows interactions between external entities and the system. A DFD also shows the various transformative processes that act on the data, as well as data stores where data resides after some form of action by the processes.

i. Context Diagram

A context diagram is high level data flow diagram showing the movement of data in the system. It shows the entire system as a single entity interacting with external entities and the processes that take place between the system components. In the system, there are three main external entities whose interactions with the systems have been clearly shown.

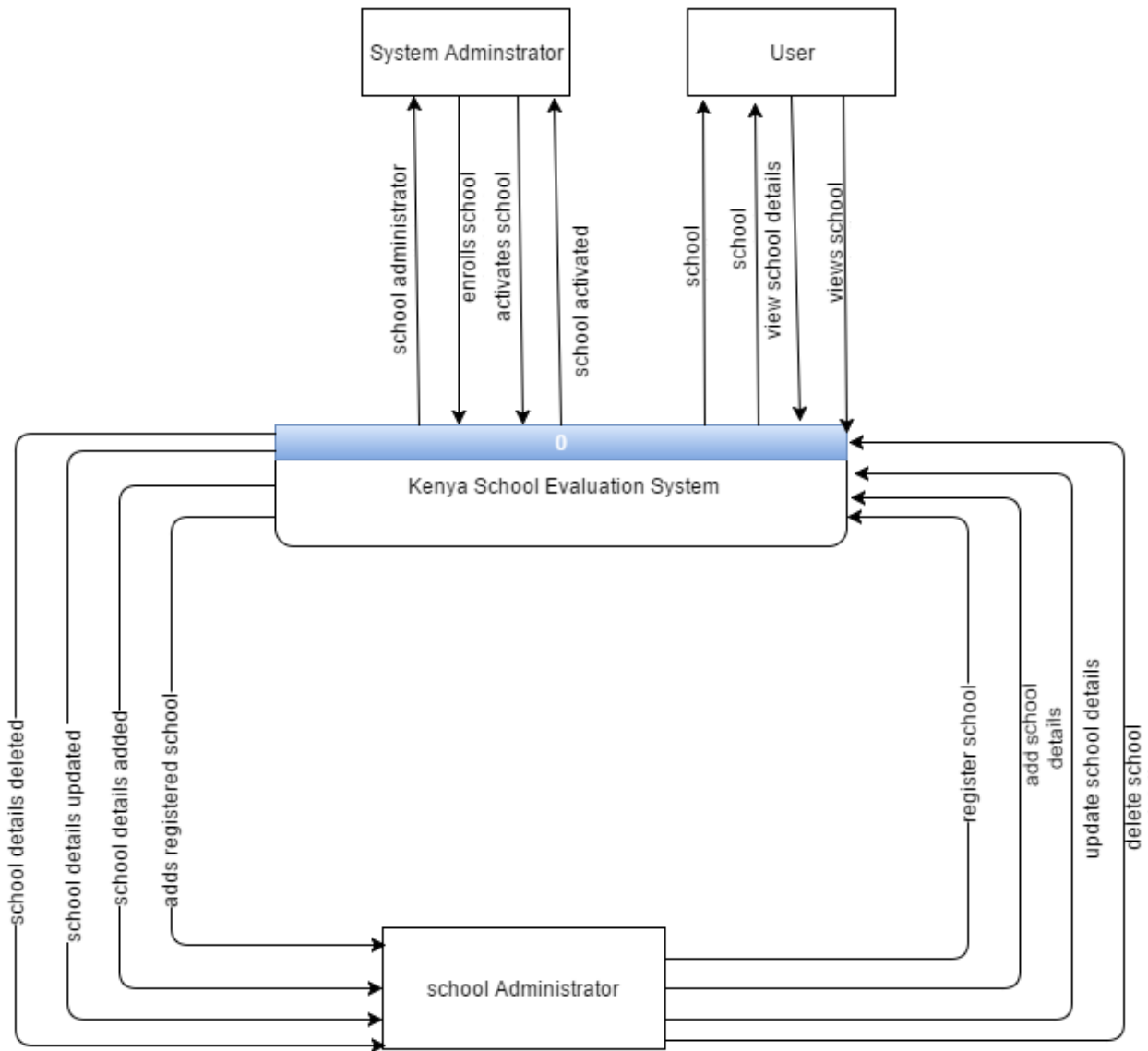


Figure 4.6: Context Diagram

ii. DFD Level 0

Figure shows the flow of data between the various users and the processes in the system. The Level 0 DFD diagram is a more elaborate design of the system as compared to context diagram finally, it shows the data stores available.

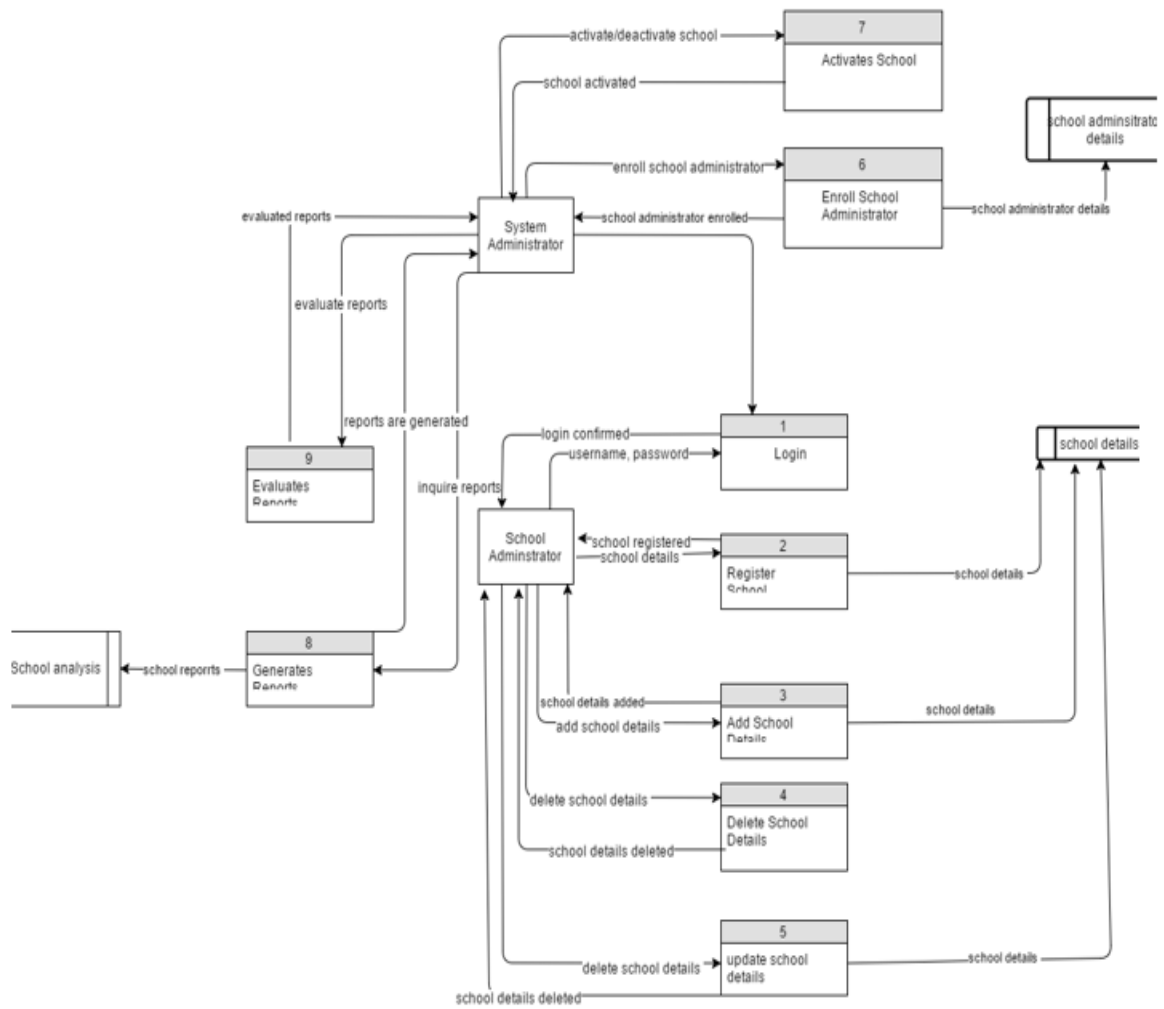


Figure 4.7: DFD Level 0

4.5.5 Entity Relationship Diagram

All the entities used in the database to save data that can be accessed both from the mobile application and the back-end web system are represented in the Figure 4.9. The User table holds information of the clients. The School table holds school information. The schooladmin table holds personal information of the school administrator while the systemadmin holds personal information of the system administrator.

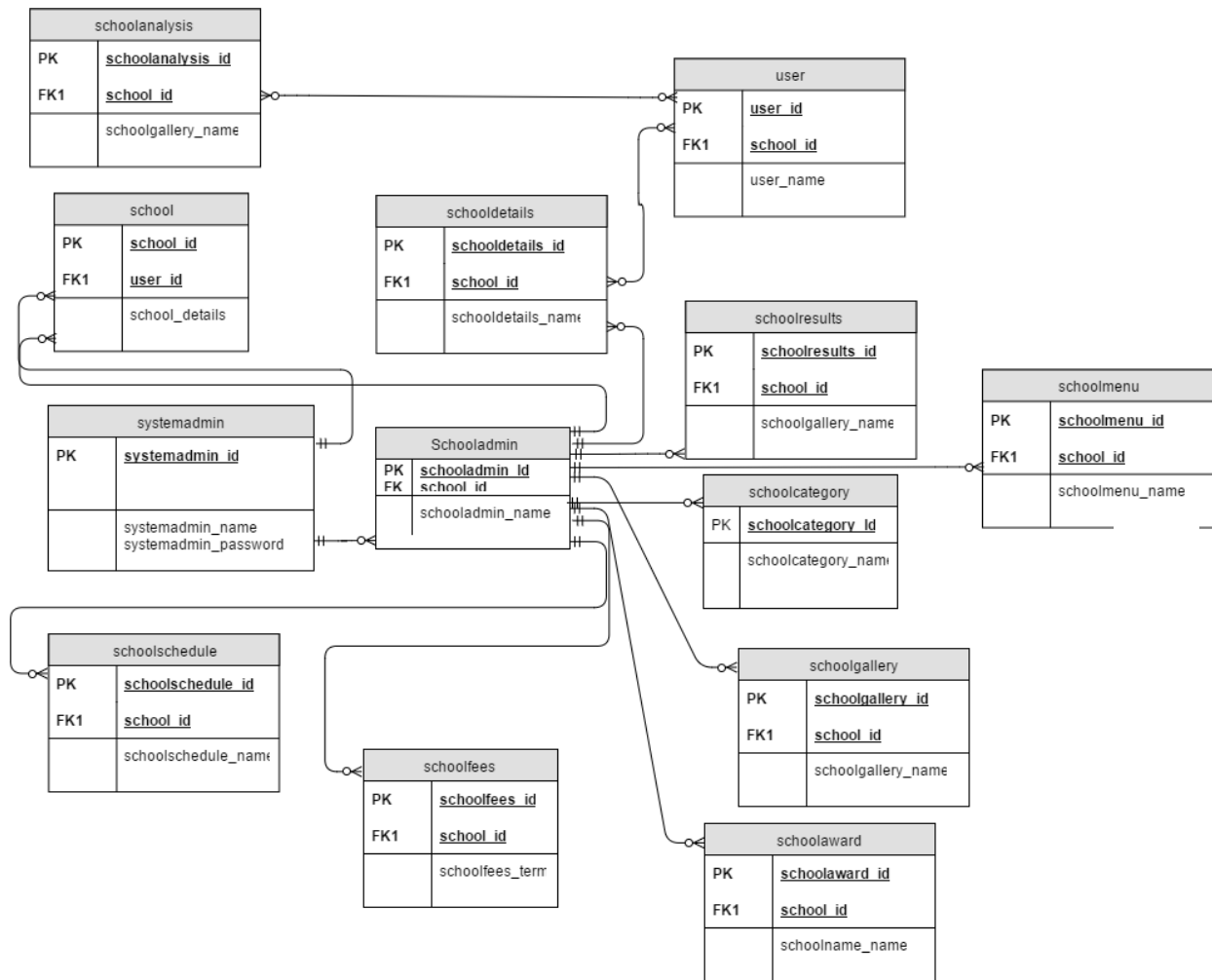


Figure 4.8: Mobile School Quality Evaluation System Entity Relationship Diagram

4.6 School Ranking System

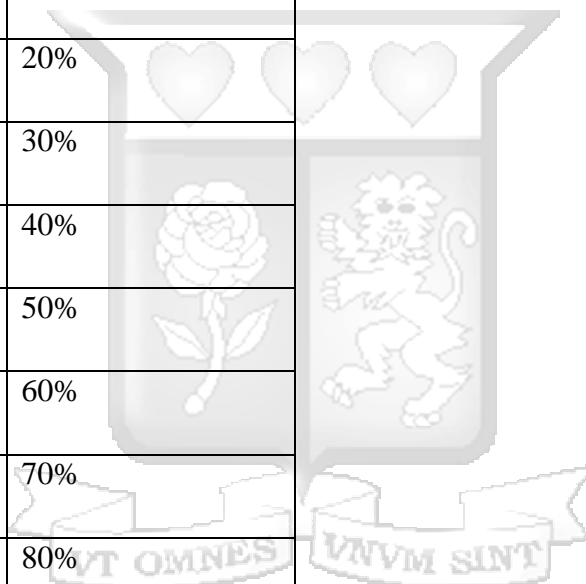
The ranking system depicted a relationship between a set of school evaluation factors. The schools were ranked such that the first school is either ranked higher than, ranked lower than or ranked equal to. The ranking is totally ordered from the school ranked best in terms of percentage and results analyzed through non-parametric statistics. The following ranking schemes were used according to specific factors:

4.6.1 Fees Ranking Scheme

According to the research done, the public is more concerned with fees when it comes to admitting their children in school. Most people want the best and cheapest schools for their children. Fees was ranking according to the most expensive school to the least expensive school through the following scheme:

Table 4.1: Fee Ranking Scheme

Fee Value	Percentage given
100,000 and above	10%
99,000-80,000	20%
79,000-70,000	30%
69,000-60,000	40%
59,000-50,000	50%
49,000-40,000	60%
39,000-30,000	70%
29,000-20,000	80%
19,000-10,000	90%
9,000 and below	100%



4.6.2 Results Ranking Scheme

Results are the most useful and reliable way of evaluating the quality of schools. Every parent wants their children to perform well in exams. results are depicted by exam performance. The table below show the ranking scheme used for ranking student's results.

Table 4.2: Result Ranking Scheme

Mean score per National Exam	Percentage given
90 and above	100%
90-85	90%
84-80	80%
79-70	70%
69-60	60%
59-50	50%
49-40	40%
39-30	30%
29-20	20%
20 and below	10%

4.6.3 Number of Teachers Ranking Scheme

The number of teachers in a school varies as much in a school as the other performance factors. The high the number of teachers the more the concentration per students there is. In cases where the teachers are few in number, students don't get much attention from the teachers as required especially in case where the student needs special attention, Therefore, it is very necessary to rank the number of teachers a school has as it is going to help when it comes to evaluating the quality of the school. The ranking scheme below vary accordingly depending on the number of students. A case study of 400 students per school was undertaken to come up with an appropriate scheme, though the scheme will change in cases where the number of students is high and when low.

Table 4.3: Number of Teachers Ranking Scheme

Number of Teachers per 400 students in one school	Percentage given
50 and above	100%
49-45	90%
45-40	80%
39-35	70%
34-30	60%
29-25	50%
24-20	40%
19-15	30%
14-10	20%
9 and below	10%

4.6.4 Facilities Ranking Scheme

Schools with better facilities offer more to the students in terms of practical's and co curriculum activities. It is necessary for a school to have better and more facilities in order to enhance the capabilities of the students. The ranking scheme below displays the percentage of facilities according to the number of extra facilities in a school. In this study extra facilities may entail all the facilities that are in a school excluding the classes and dormitories.

Table 4.4: Facilities Ranking Scheme

Extra facilities	Percentage given
30 and above	100%

29-25	90%
24-20	80%
19-14	70%
13-10	60%
9-5	50%
5-4	40%
4-3	30%
2	20%
1	10%

4.6.5 Co-curriculum Activities Ranking Scheme

All parents and teachers want their students to do well in exams but there is a need to understand not every student is good in exams. Every person is born with a different talent, some are good in various things, some are good in only one thing. Co-curriculum activities are necessary in a school as it enhances and build the students talent. A student could be very good in football but poor in exams. Many people in the world have focused on their given talents and are world champions. The ranking scheme below displays the number of extra co-curriculum activities in the school in percentage. The larger the number of co-curriculum activities in a school the higher the percentage.

Table 4.5: Co-curriculum Activities Ranking Scheme

Number of co-curriculum activities	Percentage given
20 and above	100%

19-15	90%
14-12	80%
11-10	70%
9-8	60%
7-6	50%
5-4	40%
4-3	30%
2	20%
1	10%

4.6.6 Awards Ranking Scheme

The school performance can be measured in terms of their overall performance. Performance in the county or location in various activities e.g. science congress, math contest, swimming contest, basketball and county mock-exam performance. The award ranking scheme below shows the number of awards in percentage. The larger the awards the higher the percentage.

Table 4.6: Awards Ranking Scheme

Number of awards	Percentage given
50 and above	100%
49-40	90%
39-35	80%
34-25	70%

24-20	60%
19-15	50%
14-10	40%
9-5	30%
4-3	20%
2 and below	10%

4.7 Data Quality

Data quality was enhanced by controlling through automation of the flow of questions and data-entry process on a device. The data-entry software and questionnaires were programmed with as many of the following functionalities as possible: sequential, single question display which forces the surveyor to focus on and fill in one question at a time, skip/piping logic which ensures that the device does not display questions that are not applicable. The questions were displayed based on dependencies of previous answers, mandatory questions are not left blank or skipped, input masks which control the number and types of characters that are entered, validation rules which are programmable rules that limit surveyors to entering ‘valid’ responses only, pre-filled, pre-loaded or auto-complete lists, specifically for identifier names or codes, if the data to be filled is available in advance (list of school names), it can be pre-loaded and displayed as a selection list, rather than have an open-ended text entry question; answer confirmation by prompting the surveyor to confirm the answer that has been answered, provision of error feedback if answers are incorrect, provide details of the error type and finally post-completion review which required a review of answers after completion before sending data to server.

4.8 Data Security

Data security is important for the sanctity of the operations, stakeholders and the research participants. The data might contain Personally Identifiable Information (PII) (information that

can be used to uniquely identify, or locate a single person) and other sensitive data which were kept private and inaccessible to most users of the mobile school evaluation system.

Using mobile devices that have lock and unlock password protection for smart phones, tablets or notebooks. Encrypt locally stored data and encrypting PII data at time of entry. Other general principles for data security included: differentiating PII and consent forms from other information right from the beginning when data is being collected, transmitting and storing PII separately, using link or reference ids or both to match data sets with PII, designating limited individuals who will have access to PII, and have them sign confidentiality agreements and avoiding making hard copies of PII.

4.9 Application Wireframes

The system is an android based system where the users are able to access different school categories, view different schools and their details. They are also able to view the evaluation of the total analysis of the school details in a graph. The actions applied appear as follows:

4.9.1 School List

The school category is the home page and the first page a user sees after downloading the application. It displays the categories of schools available in the system. when the specific categories are clicked, a list of available schools are displayed on the specific category.

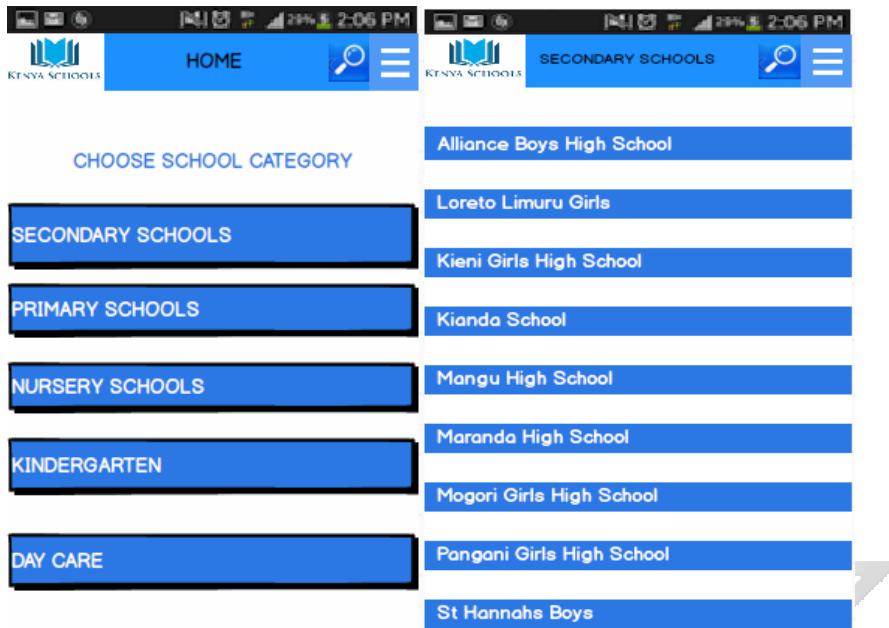


Figure 4.9: School Category and List

4.9.2 School Information

School information informs the user about the basic and general information of the school. It displays basic information such as where the school is located, when it was started, what system is it, its contacts, motto and logo, while the general information displays the school factors that are evaluated such as fees, exam results, co-curriculum activities, awards, meals, facilities and the total analysis.

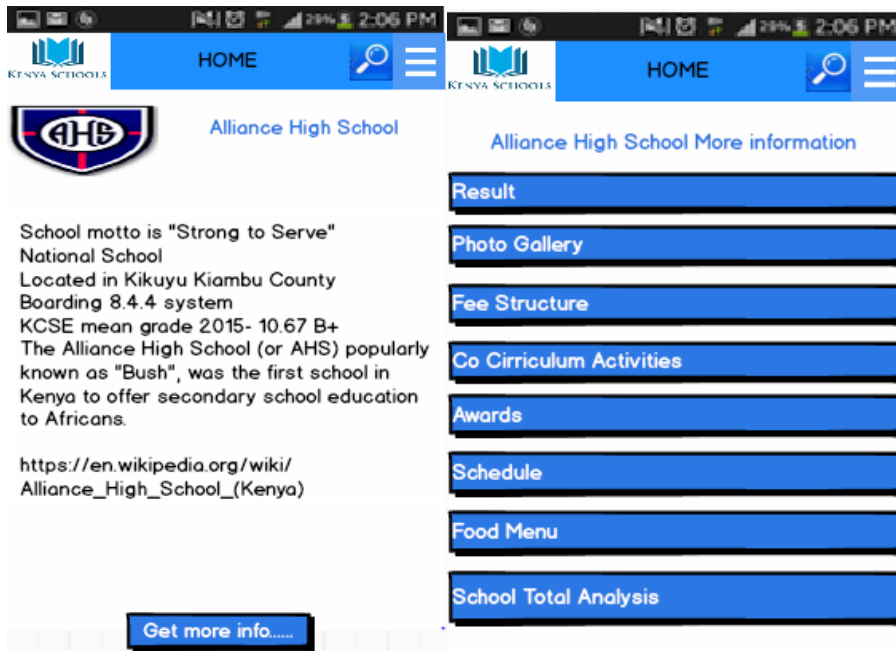


Figure 4.10: School Information

4.9.3 School Information Details

School information is details displays all the relevant information in different factors. the figures below display all school details in general.

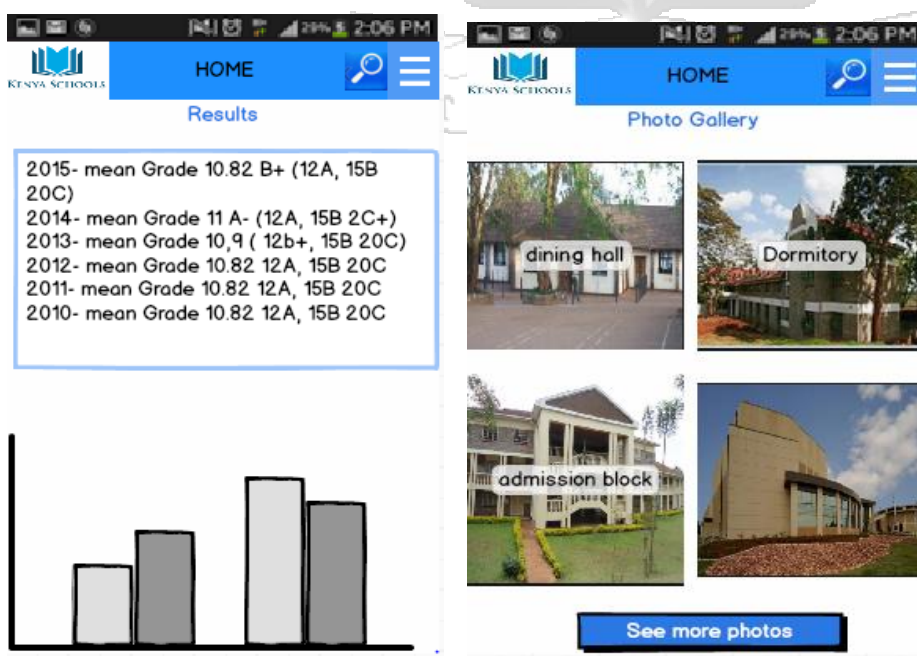


Figure 4.11: Results and Photo Gallery Display

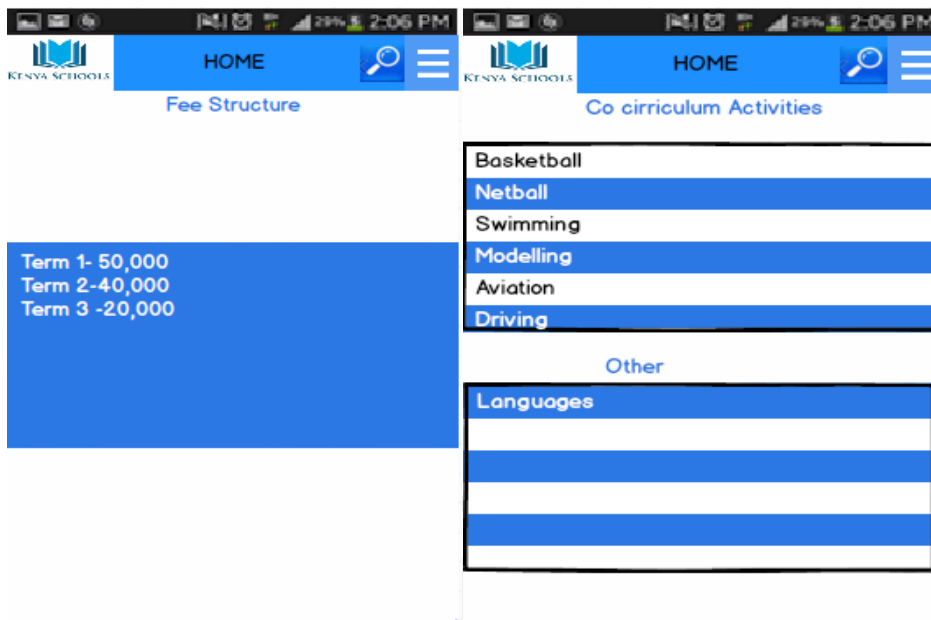


Figure 4.12: Fee Structure and Co-Curriculum Activities

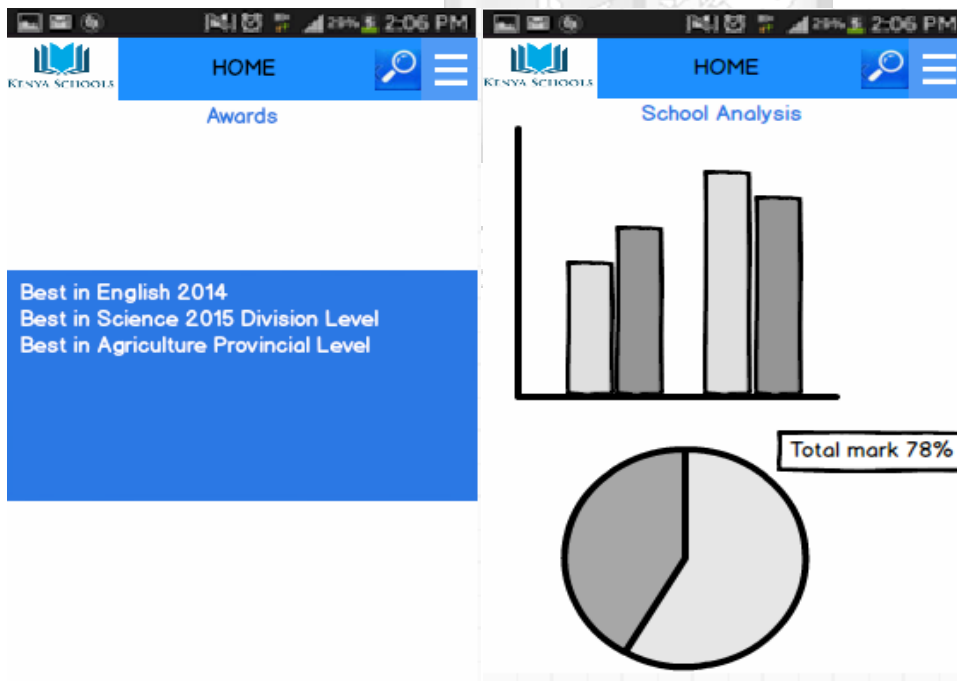


Figure 4.13: Awards and School Analysis

School Analysis displays the overall performance for all the chosen factors.

CHAPTER FIVE: SYSTEM IMPLEMENTATION AND TESTING

5.1 Introduction

The chapter focuses on the implementation and testing of the proposed system. The implementation part, explores different parts of the system, how they were implemented and how they function. The testing section of this chapter focuses on usability testing and functional testing to verify if the application attains the objectives of the proposed solution.

5.2 Implementation

The application developed is Kenya School Analysis. It comprises of 2 various sub-systems. One Web Back-ends comprising of the system administration and school administration and the mobile android application. They are explained below:

5.2.1 Web Based System

The web back end is made using a bootstrap template that comprises of JavaScript, CSS, ajax and html files. For the back-end to work with the application, PHP scripts were creating to connect to the database. The android mobile application and the back-end share the same connection files and database which was creates using MySQL. This was to make sure that the data visibility in both ends was the same. CSS, Ajax and JavaScript codes were used for the design on the user interface and the PHP scripts were used to connect the applications in the database.

The Web Based system is mainly employed in the study of managing and controlling the entire system. The web-based system includes:

5.2.2 System Administrator

The system administrator gets to verify information entered by the school administrator, is able to deactivate and activate a school, enroll a school administrator and display the information of the school to the users. The system administrator controls most of the actions in the system. After the school administration registers, they have no authority to input school details or edit before the system administrator enrolls then in the system. this is necessary in order to verify that the school administrator and the school are valid. The figure below shows the enrollment of the school administrators.

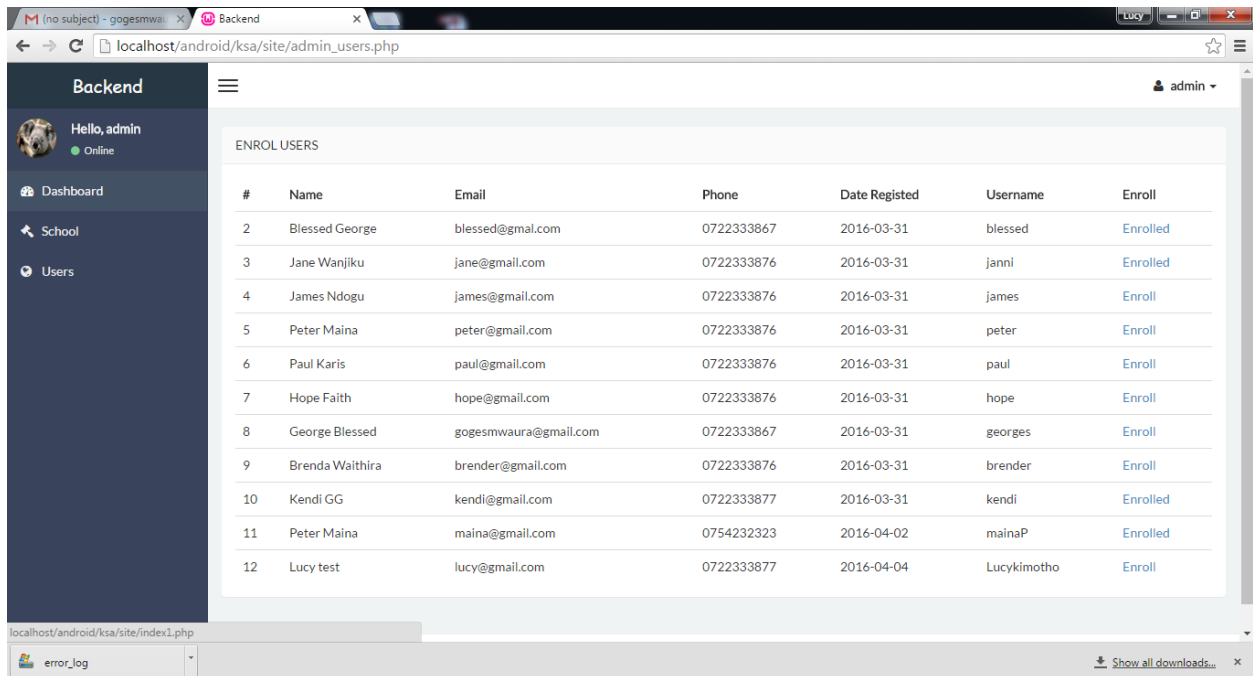
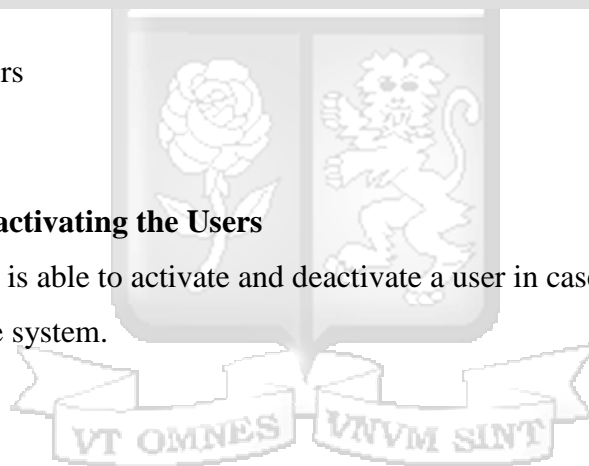


Figure 5.1: Enrolling Users

5.2.3 Activating and Deactivating the Users

The system administrator is able to activate and deactivate a user in case they give legit information or misuse the system.



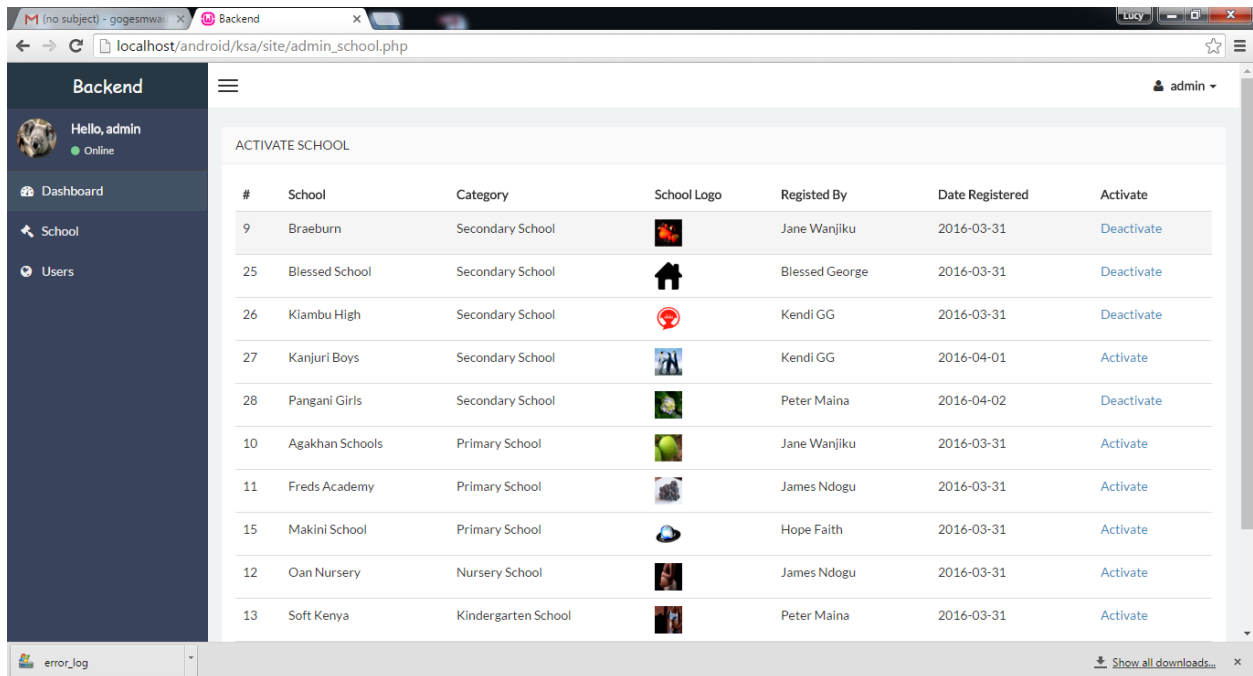


Figure 5.2: Activate/ Deactivate User

5.2.4 School Administrator

The school administrator registers, adds, updates and deletes information about the school. The school administrator is enrolled in the system by the system administrator, after being enrolled he is supposed to sign up as an administrator. After signing in and being enrolled by the system administrator he/ she is able to register a school in the system and make relevant changes. The system administrator submits the information to the users for viewings after the school administrator updates or adds the school information in the system. The figure below shows the display of where the school administration signs up in the Web-Back end.

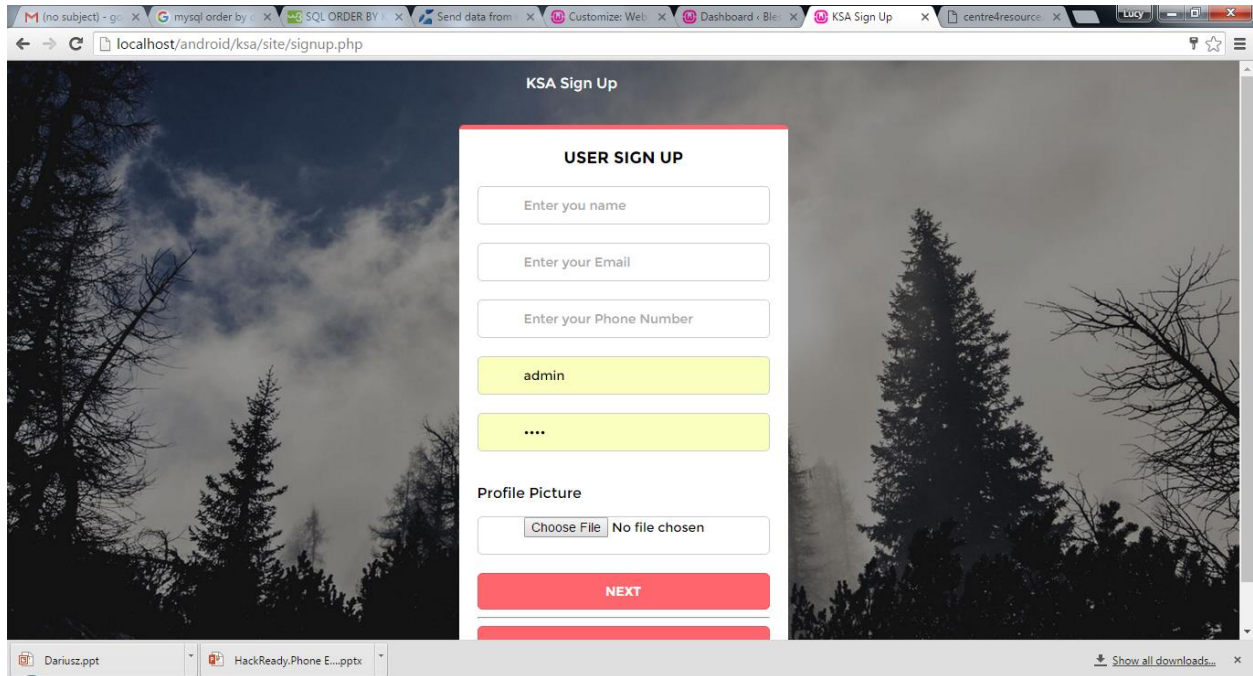


Figure 5.3: School Administrator Sign up

5.2.5 Add New School

After logging in, the school administrator is able to add a new school and input school information.



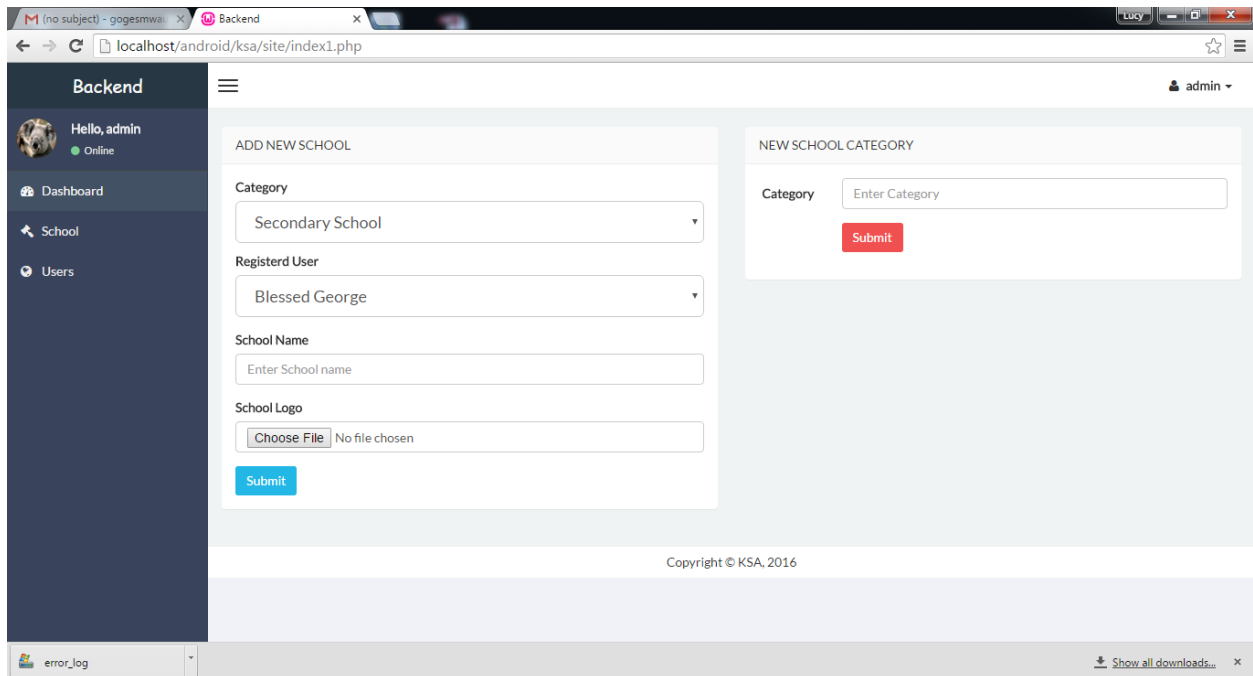


Figure 5.4: Adding New School



5.2.6 Mobile Application.

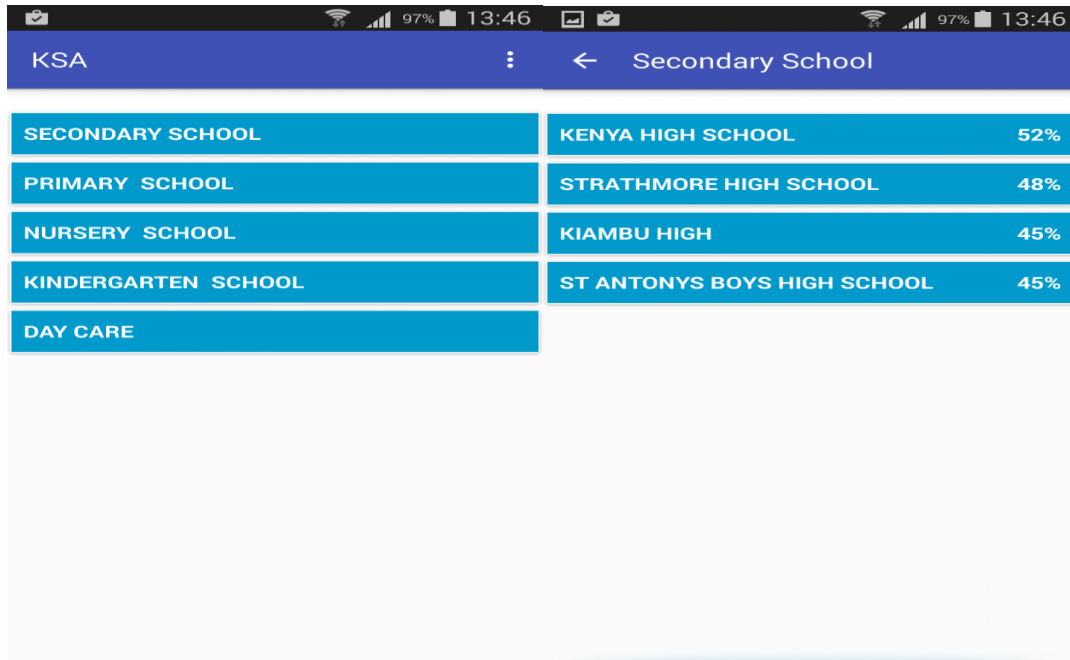
The application is dynamic in such a way that all the information displayed is fetched from the database. A HTTP library called volley was used to connect the android application to the database. Volley connects the mobile application to the server using a HTTP requests using a URL.

The server has PHP scripts that connect to the server and help in inserting, updating and retrieving data from the database. All the data is stores in My SQL database using a PHP connection file and through this a connection between the android application and the database is made. Data retrieval from the database is sent to the application as a JSON file which is then decoded as a string. The application uses cards and recycle view to manage its list-view.

Android uses java and XML. The java side is used to give the application functionality while the XML is used in creating the interface. The android interface created can be viewed below:

5.2.7 Ranked School List

School list displayed school that were registered by the specific school administrator. The schools are displayed from the highest performer to the lowest performer generally after considering the ranking system in chapter 4.



School Name	Percentage
SECONDARY SCHOOL	KENYA HIGH SCHOOL 52%
PRIMARY SCHOOL	STRATHMORE HIGH SCHOOL 48%
NURSERY SCHOOL	KIAMBU HIGH 45%
KINDERGARTEN SCHOOL	ST ANTONYS BOYS HIGH SCHOOL 45%
DAY CARE	

Figure 5.5: Schools Ranked List

5.2.8 Ranked School Information

The ranked school information is displayed according to the ranking scheme in chapter 4. The schools ranked information is accordingly for each school ranked.

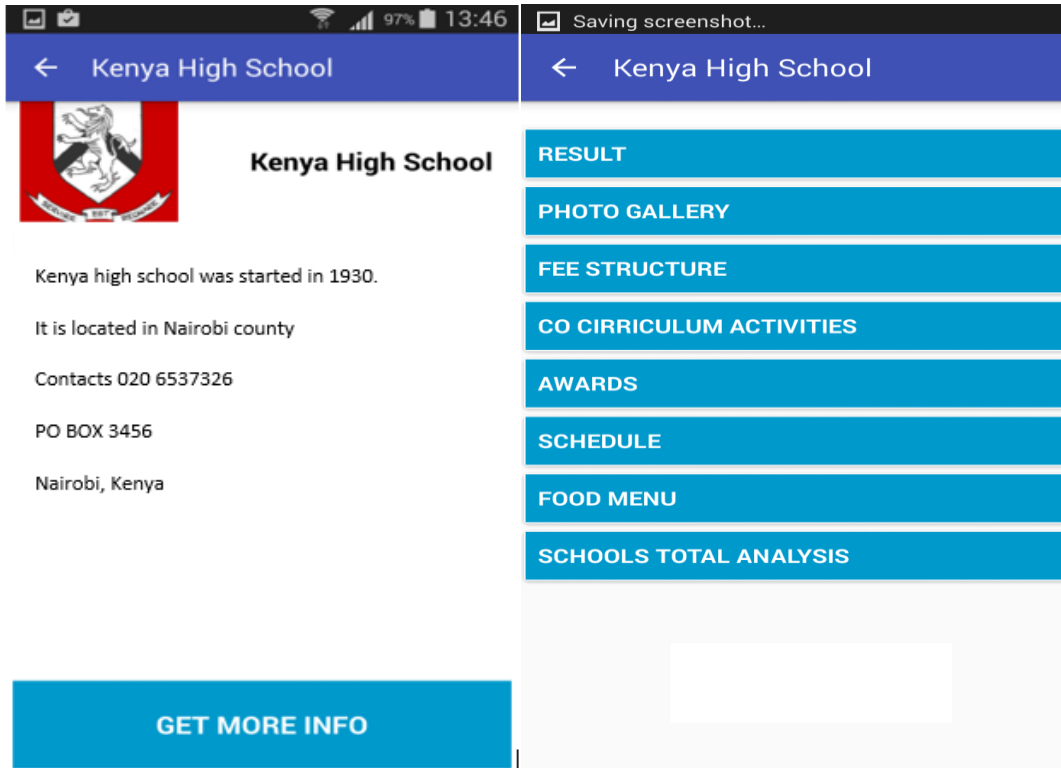


Figure 5.6: Ranked School Information

5.2.9 Ranked School Gallery

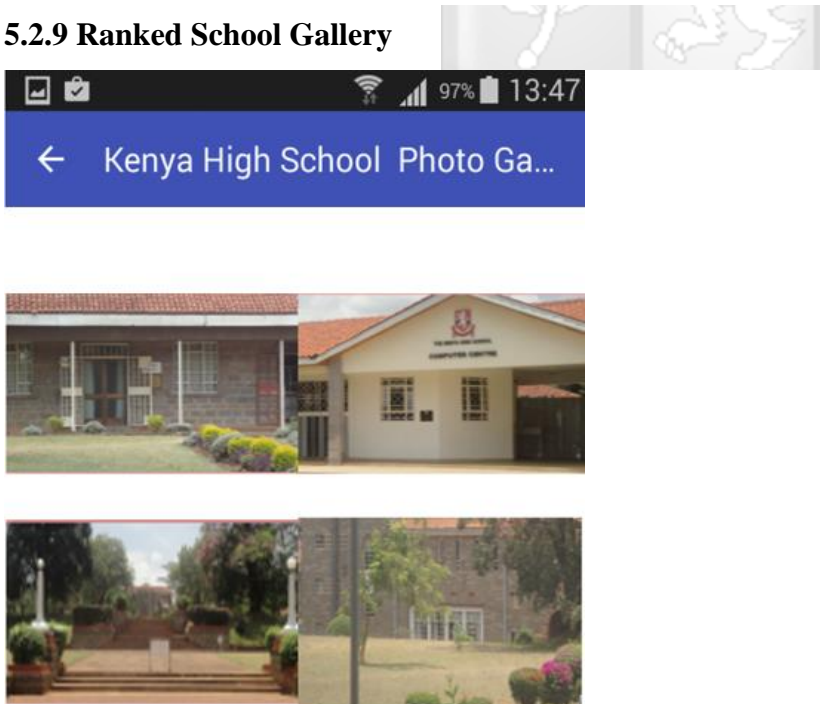


Figure 5.7: Ranked School Gallery

5.2.10 Ranked School Total Analysis

The total school analysis is a constituent of the overall results from all the factors in the application that are used to rank the school. With this, the parents and teachers not only see exam performance but can evaluate and see the overall performance of a school in regards to all the factors evolving around a school.

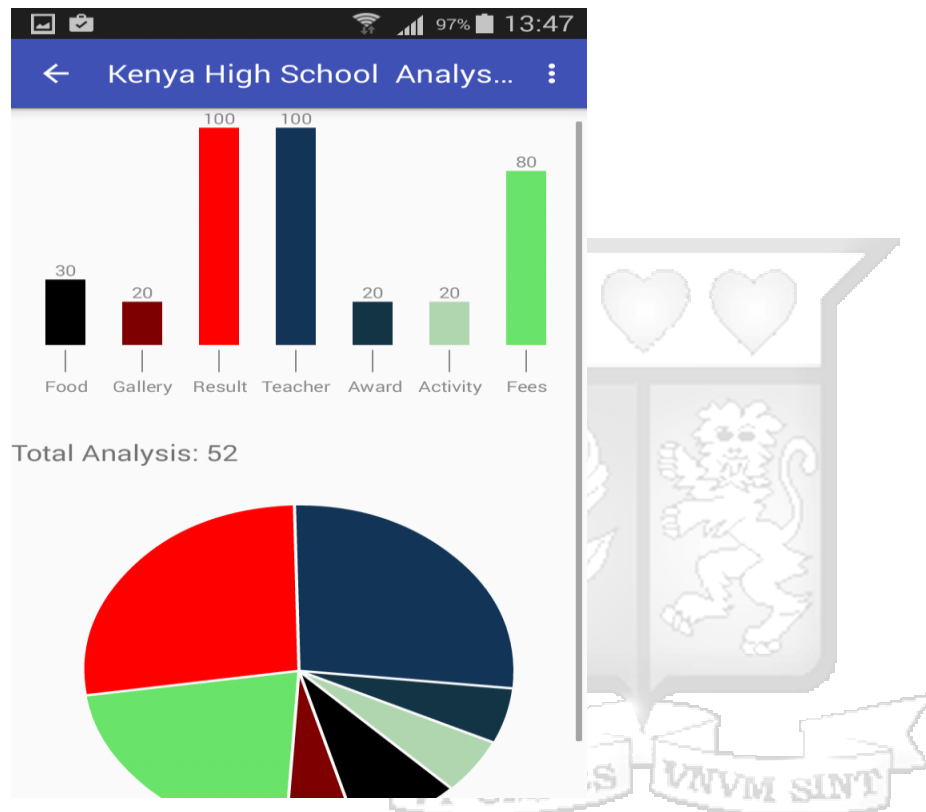


Figure 5.8: Ranked Total School Analysis

5.3 System Testing

Testing is usually a quality gate and the QA test group often serves as the quality gate keeper. Agile testing was used in the research which involved testing software for bugs and performance issues. Agile testing was applied continuously in the software development. This Section therefore, covers testing of the mobile application to ensure that it works well, the testing was divided into two sections, developer testing and user testing. The first tests done by the developer were to ensure that the various functionalities were working well, the tests included:

5.3.1 Installation and Compatibility Testing

Installation testing was done on a phone that has never had the application installed in it, this was to ensure that the application wouldn't have any issues when the users downloaded it from the store. Then compatibility testing to ensure that the application runs on all device versions, this would ensure that users with different Android API level phones would all get to use the application with ease. Table 5.1 show the results of the test;

Table 5.1: Installation and Compatibility Testing

Test Case Name: Installation and Compatibility Testing				
Date Tested: 2 nd Dec 2015				
Tested by: Grace Kendi				
Test Description:				
Pre-Condition:				
Post-Condition:				
Test Steps				
Steps	Actions	Expected Response	Pass/Fail	Comments
1.	Download the application from the store or website	Application is downloadable	Pass	Installed successfully
2.	Check if the application is running well	Application runs well	Pass	None

3.	Repeat steps 1 and 2 on multiple phones with different API levels	Installs and runs well	Pass	None
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5.3.2 User Testing

After the developer finished his testing the study sought to see the reaction of the users to the application. Post questionnaires were supplied to the sample population to get their feedback on the application. Users were given instructions on how to download the application and have it running on their phones, plus credentials for the working accounts.



Figure 5.9: User Test Results

5.4 The User Acceptance Survey

The Mobile Services Acceptance Model (MSAM) developed by Gao, et al, (2008) is an instrument used to estimate the usefulness and usability of mobile applications. Usability testing generally involves measuring how well test subjects respond in four areas: efficiency, accuracy, recall, and emotional response, which relate to Nielsen and Shneiderman’s principles of good system design. It bases its assumption on a set of quantifiable data gathered from a group of users, which are likely

to be among the intended target group. The survey respondents were those who also participated in the usability test. The respondents were asked to evaluate the system according to the set constructs. To measure the impact of these constructs on mobile service adoption, the respondents were asked to specify their degree of agreement with statements (measurement items). A 5-point scale, with 1 being the positive end of the scale (Strongly agree/ excellent) and 5 being the negative end of the scale (Strongly disagree/poor), was used to measure participants' responses to items in the questionnaire. These ratings were then analyzed to estimate the individual's intention to use the application and the results were as presented in the next chapter.

5.5 Downloading the Application

The application was hosted in a server from where the sample population could be able to download it and test it.

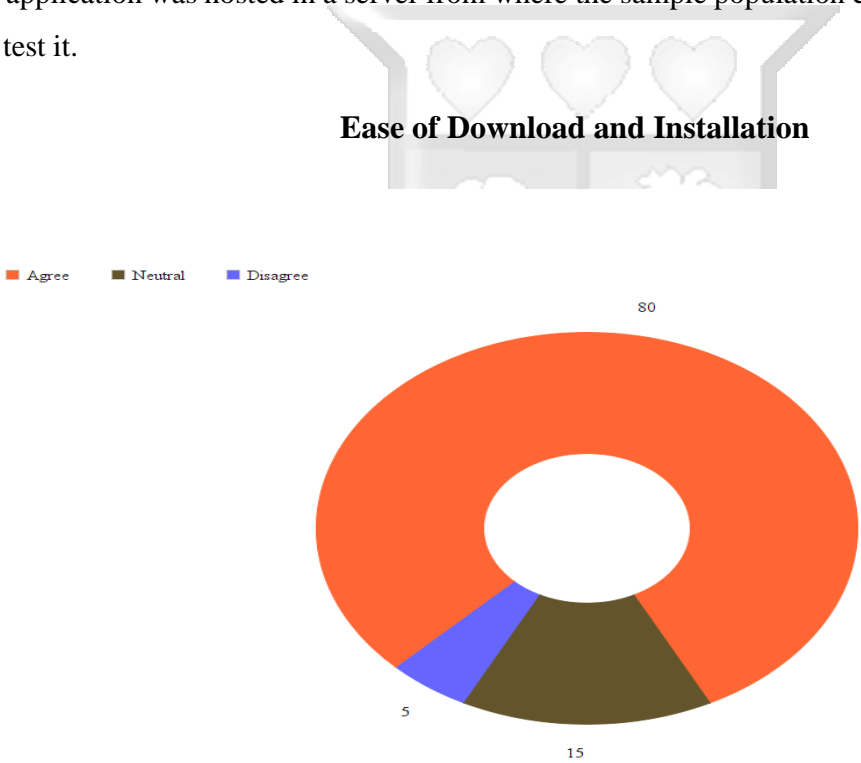


Figure 5.10: Ease of Download and Installation

Figure 5.10 shows how the response in percentage of the ease of downloading and installation of the application. Due to having the application on a private webserver then this cause issues at times as the server was not always live, but by having the application in Google Play store then all this will be covered.

5.6 Usability

The dissertation sort to see if the application was easily understood and the users could interact with it without need for someone to explain how to use it. The dissertation shows the response from users with regards to their interaction with the application. Did they ask for help with using the application or they were able to user stand the application with ease?

5.7 Finding Core Functionalities

After the users loads the application, the next thing is how easy it will be for them to find core functionalities in the application using the least amount of time possible, the study sought find out from the users how easy it was for them to locate what they were looking for.

5.8 Application Responsiveness

When an application is engaging the users and giving responses to them, it is more appealing to the use as compared to ones without responses to them, when an action is being performed in the background the user should be notified so as to be patient with the application, these responses are what make the application rate more in stores, Figure F.4 shows the response from the users with regards to this.

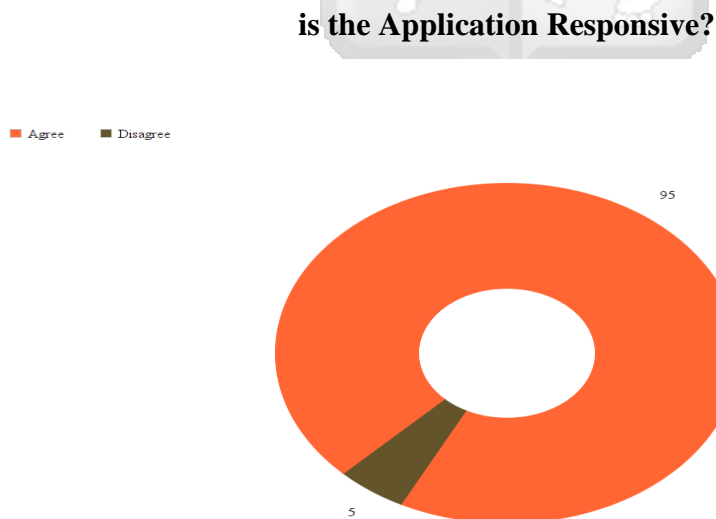


Figure 5.11: Application Responsive



Figure 5.12: Testing Review

5.9 Usefulness of the mobile System

5.9.1 Perceived Usefulness of the mobile System

Guided by the scale: - 1 = Agree, 2 = Strongly Agree, 3 = Not Sure, 4 = Disagree and 5 = Strongly Disagree, table 6.3 below sought to establish the perceived usefulness of the mobile system.

Table 5.2: Perceived Usefulness of the Mobile System

Statement		SA	A	NS	D	SD
Using the system would increase the efficiency of evaluation process	F	40	80	10	20	23
	%	23.1	46.2	5.8	11.6	13.3
The system makes it easier to keep track of my evaluation process	F	62	54	18	22	17
	%	35.8	31.2	10.4	12.7	9.8
The system improves the accuracy of outcomes data.	F	46	48	20	34	25
	%	26.6	27.7	11.6	19.7	14.5

If the system helps educational transformation programs and process	F	48	58	9	26	32
	%	27.7	33.5	5.2	15.0	18.3
If the mobile system increases stakeholder participation,	F	66	48	14	22	23
	%	38.2	27.7	8.1	12.7	13.3
If the system continuously gauges' progress toward desired educational outcomes	F	51	59	11	27	25
	%	29.5	34.1	6.4	15.6	14.5
If the system empowers school leaders and teachers to build and sustain school performance	F	60	46	9	22	36
	%	34.7	26.6	5.2	12.7	20.8
If the system facilitates the analysis of key education outcomes	F	55	55	13	25	25
	%	31.8	31.8	7.5	14.5	14.5

Based on the study analysis on table 5.2 above, majority of the respondents agreed and strongly agreed that; Using the system would increase the efficiency of evaluation process (46.2%); The system makes it easier to keep track of their evaluation process (35.8%); The system improves the accuracy of outcomes data (27.7%); The system helps educational transformation programs and process (33.5%); The mobile system increases stakeholder participation (38.2%); The system continuously gauges progress toward desired educational outcomes (34.1%); The system empowers school leaders and teachers to build and sustain school performance (34.7%); and finally, the system facilitates the analysis of key education outcomes (31.8%).

5.9.2 Perceived Ease of Use

The study shown on table 5.3 below indicates the perceived ease of use of the mobile school quality evaluation system.

Table 5.3: Perceived Ease of Use

Statement		SA	A	NS	D	SD
Learning to operate the system would easy for me	F	41	65	9	31	27
	%	23.7	37.6	5.2	17.9	15.6
I would easily find the information I am looking for using the system	F	57	55	12	25	24
	%	32.9	31.8	6.9	14.5	13.9
I would find the user interface of the system clear and intuitive	F	47	60	8	29	29
	%	27.2	34.7	4.6	16.8	16.8
I would find the system to be flexible to interact with.	F	49	45	19	29	31
	%	28.3	26.0	11.0	16.8	17.9
I would find the system to easy to use (user-friendly).	F	66	48	5	24	30
	%	38.2	27.7	2.9	13.9	17.3

Results of the study on table 5.3 above shows that majority of the respondents agreed and strongly agreed that: Learning to operate the system would easy for them (37.6%); They would easily find the information they are looking for using the system (32.9%); They would find the user interface of the system clear and intuitive (34.7%); They would find the system to be flexible to interact with (28.32%); and lastly, they would find the system to easy to use (user-friendly) (38.2%).

5.9.3 Functionality

Guide by the scale: - 1 = Excellent, 2 = Very Good, 3 = Good, 4 = Satisfactory and 5 = Poor, table 5.4 below sought to establish the functionality of the mobile system.

Table 5.4: Functionality

Statement		E	VG	G	S	P
Navigability	F	77	65	7	13	11
	%	44.5	37.6	4.0	7.5	6.4
User-friendliness	F	69	78	5	12	9
	%	39.9	45.1	2.9	6.9	5.2
User-interface	F	74	71	8	12	9
	%	42.8	41.0	4.6	6.9	5.2
Ease of learning	F	68	74	6	15	10
	%	39.3	42.8	3.5	8.7	5.8
Consistency	F	70	77	9	11	6
	%	40.5	44.5	5.2	6.4	3.5
Predictability	F	66	68	5	19	15
	%	38.2	39.3	2.9	11.0	8.7
Responsiveness	F	77	65	7	11	13
	%	44.5	37.6	4.0	6.4	7.5
Usefulness	F	72	78	6	9	8
	%	41.6	45.1	3.5	5.2	4.6
User satisfaction	F	64	71	10	16	12
	%	37.0	41.0	5.8	9.2	6.9
Ease of finding content	F	63	74	12	10	14

	%	36.4	42.8	6.9	5.8	8.1
Efficiency	F	72	75	6	11	9
	%	41.6	43.4	3.5	6.4	5.2
Task completion time	F	62	72	7	16	6
	%	35.8	41.6	4.0	9.2	3.5
Guideline violations	F	64	71	12	16	10
	%	37.0	41.0	6.9	9.2	5.8
Suggest solutions or improvements	F	67	76	9	13	8
	%	38.7	43.9	5.2	7.5	4.6
Ease of connectivity	F	64	77	5	15	12
	%	37.0	44.5	2.9	8.7	6.9
Response time	F	69	74	7	12	11
	%	39.9	42.8	4.0	6.9	6.4
Security	F	21	59	23	29	41
	%	12.1	34.1	13.3	16.8	23.7
Latency	F	20	60	28	30	35
	%	11.6	34.7	16.2	17.3	20.2
Ease of completion of a task	F	29	59	32	28	25
	%	16.8	34.1	18.5	16.2	14.5
Accuracy	F	25	70	23	19	36

	%	14.5	40.5	13.3	11.0	20.8
Recall	F	32	54	28	37	22
	%	18.5	31.2	16.2	21.4	12.7

Based on the study analysis on table 5.4 above, majority of the respondents acknowledged that the following elements of functionality of the mobile system are Excellent and Very good respectively: Navigability (44.5%); User-friendliness (45.1%); User-interface (42.8%); Ease of learning (42.8%); Consistency (44.5%); Predictability (39.3%); Responsiveness (44.5%); Usefulness (45.1%); User satisfaction (41.0%); Ease of finding content (42.8%); Efficiency (43.4%); Task completion time (41.6%); Guideline violations (41.0%). Suggesting solutions or improvements (43.9%); Ease of connectivity (44.5%); Response time (42.8%); Security (34.1%); Latency (34.7%); Ease of completion of a task (34.1%); Accuracy (40.5%); and finally recall (31.2%).

5.9.4 Accuracy

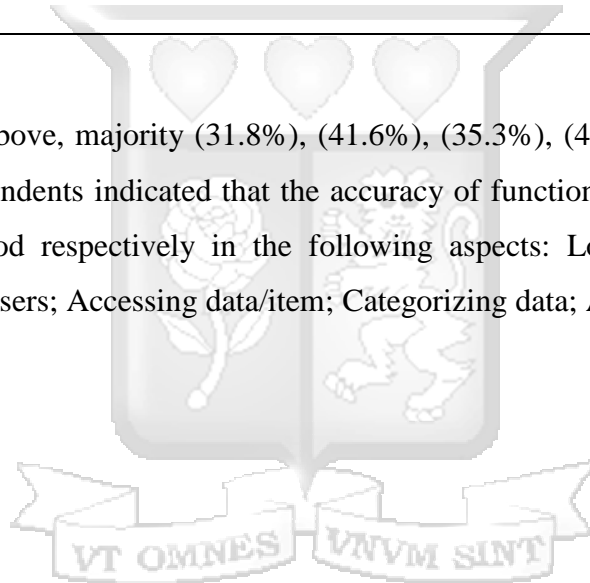
The study shown on table 5.5 below sought to examine the accuracy of the functionality of mobile system.

Table 5.5: Accuracy

Statement		E	VG	G	S	P
Log in/out	F	7	55	37	51	23
	%	4.0	31.8	21.4	29.5	13.3
Manage Permissions	F	12	72	37	36	16
	%	6.9	41.6	21.4	20.8	9.2
Manage users	F	44	61	32	16	20
	%	25.4	35.3	18.5	9.2	11.6
Access data/item.	F	33	74	22	20	24

	%	19.1	42.8	12.7	11.6	13.9
Categories data.	F	26	67	25	25	30
	%	15.0	38.7	14.5	14.5	17.3
Analyze data	F	5	57	30	49	32
	%	2.9	32.9	17.3	28.3	18.5
Manage reports	F	13	73	24	37	26
	%	7.5	42.2	13.9	21.4	15.0

According to table 5.5 above, majority (31.8%), (41.6%), (35.3%), (42.8%), (38.7%), (32.9%), and (42.2%) of the respondents indicated that the accuracy of functionality of mobile system is Excellent and Very Good respectively in the following aspects: Logging in/out; Managing Permissions; Managing users; Accessing data/item; Categorizing data; Analyzing data; and lastly managing reports.



CHAPTER SIX: DISCUSSION OF RESULTS

6.1 Introduction

Findings obtained during the research formed the basis on which mobile application school evaluation system was developed. The application was tested to ascertain all its functionalities according to the research. This chapter analyzes the findings in relation to the research objectives and extent to what the finding agrees with the literature review.

6.2 Mobile Application for School Evaluation Systems Information Needs

The first objective in section 1.3 was to determine the mobile application school evaluation systems information needs of the people of Kenya. From the study findings, it was found that most respondents need a mobile application school evaluation system for the purpose of identifying the best schools that suit their references accordingly. This was in harmony with literature review section which indicated that the reason as to why people will be interested with an appropriate mobile application school evaluation system revolved around their children's education concerns.

6.3 Mobile Application for School Evaluation System Information Approaches

The second objective was to investigate how school evaluation system information services are currently conducted in Kenya and precisely in Nairobi county. From the findings, it was found that most respondents receive school performance evaluation information through radio and televisions, written materials like newspapers, banners, school brochures, education conferences and various websites. Due to the abolished school ranking in the country, some indicated that they do not receive school evaluation information at all.

The study findings also show that respondents face challenges such as unclear data, outdated information from newspapers, media and websites and distance between them and the school hence the challenge of visiting various schools to get proper information offered. The literature reviews discuss the current methods of school evaluation systems and their challenges which is in harmony with the study findings.

6.4 Mobile Application for School Evaluation System Information Technologies

The third objective was to analyze technologies available to support the school evaluation system information. Research findings show that the users are conversant with mobile and digital media

technology. Digital media technology includes online newspapers, social media sites and websites. The literature review discusses the smartphone technology and digital media technology which is in line with the study findings.

6.5 School Evaluation Mobile Application Development

The fourth objective was to develop a mobile application school evaluation system for Nairobi County. Research findings shows that respondents find it necessary to develop a mobile application system for Kenya school Evaluation system. The literature review discusses mobile application elements and architecture which is in harmony with the developed system.

6.6 School Evaluation Mobile Application Testing

The last objective was to carry out testing of the mobile application. The literature review discusses approaches in regards to the testing. The usability questionnaire in appendix A was used to test the developed application. All the respondents who participated in the usability testing did not experience any problem downloading the application and navigating through it, with this it is therefore noted that the application is reliable. Out of the total respondents who participated in the application usability testing, 97% rated navigability 'excellent' and 3% rated 'very good'.

6.7 Advantage of the Application as Compared to the Current System

Currently in the country most of school evaluation are done by the Ministry of Education and can be accessed through websites and newspapers. the evaluation done is not relevant enough as it only relies on exam performance. The mobile application school evaluation system will be more relevant as it will evolve around the school. it will focus on other factors such as co curriculum activities, facilities, fees, awards and number of teachers among others to do the evaluation of the entire school performance hence making it more reliable than the current system. it being a mobile application will make the school information more diverse since most individuals can access mobiles.

6.8 Disadvantage of the Mobile Application

The application will be easily accessed in a smart phone which are not affordable to some of the people. It will also need internet connectivity to download the application and for data display hence making it a challenge for the individuals who are not able to access the internet easily. It would also be difficult to access the application when out of network range or dead zones. The analyzing tool is not as accurate as it should be hence the need for the ministry of education should provide a relevant analysis tool, in order to get the best criteria in evaluating Kenya schools.

6.9 Summary

The responses from the study were encouraging especially regarding the usefulness of the mobile system and its functionalities which proved effective in enhancing the evaluation of quality in schools in Kenya. However, the results of the study were able to unearth the problems and issues which required further attention in order to make it effective in its application

The study established that majority of the target population were enthusiastic about the value of the system and clearly will adopt the mobile school evaluation system in actual school context. The usability study was equally encouraging but there is more room for improvement of the system. However, since the system work with other system or software hence its operation might be affected by factors inherent in these systems, but its noteworthy that systems are in a continuous process of development.

From the results of the study, it is also important to appreciate that there are considerable pockets of respondents enthusiastic and ready to adopt and use the system, however this cannot be concluded with certainty as to the level of adoption and use because of various contextual environmental aspect in most schools in Kenya. However, the study results provide a good indication of the target users willingness to adopt and use the system.

CHAPTER 7: CONCLUSIONS, RECOMMENDATIONS AND FUTURE WORK

7.1 Introduction

The chapter provides a discussion on the researcher's conclusions of the dissertation, recommendations and suggestions for future work in the area of mobile application school quality evaluation system in Kenya.

7.2 Conclusions

The study reveals the mobile application quality evaluation system needs of the people of Nairobi County. From the research findings most respondent face challenges using the current methods of evaluating school. Key of these challenges they face include undeveloped structural support systems and technological issues. Using available technologies discussed led to the development of a mobile application school evaluation system. During the system development, agile software methodology was used. Agile software methodology enabled more frequent release with subsequent user feedback which led to the development of a usable and reliable system. The system usability testing was performed thoroughly and respondents found it useful and satisfying. if this system is adopted it will help curb existing school evaluation challenges. This will enable a larger number of users to benefit from the platform because of the ability to work on smartphones.

The researcher reviewed several literatures to identify the components suitable for realizing mobile school quality evaluation system and the appropriate technologies which were used to implement mobile application school quality evaluation system software.

In the literature review it was highlighted that android enable mobile phones were the most appropriate piece to use in the application. Further, the literature also established that a PC was also important in realizing the desired solution. Research was carried out to obtain information. Findings collected from the research revealed that mobile phones using android operating system were the preferred components for use in mobile school quality evaluation system.

A mobile application school quality evaluation system that allows students and parents in Kenya get a better understanding of Kenya schools analysis can be realized through KSA, School administration back-end web system and the System administration back-end web system. Finally,

usability and functionality tests were carried out on the system to help ensure system and user requirements were captured. The research had an excellent feedback.

7.3 Recommendations

The mobile application school evaluation system was of great importance to users. However, the researcher noted that there was more that could be done in the area of school evaluation and gave the following recommendations; in order to increase adoption of the system public awareness should be conducted to enable the users know about the mobile application. Secondly, due to the realization of the mobile school quality evaluation solution, the software can be advanced by collaborating with Ministry of Education to add most of the unique features in the KSA system. Thirdly, a security module needs to be integrated in the mobile school quality evaluation software to reduce reliance of the solution on existing security measures which might not be compatible in administrators that give false information. The KSA system supports android 2.3 and higher.

The ministry of education should provide a better method for analyzing the school data and information collected.

7.4 Future work

There is need for well-built and open APIs for mobile evaluation platforms. This will help minimize integration efforts and increase efficiency since most APIs are closed. Finally, the application should be developed for iOS and windows 8 platforms to widen the reach of the system and hence serve more people.

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APPENDICES

Appendix A: Questionnaire

Mobile Application School Quality Evaluation System Questionnaire

The questions were used to obtain biographical data from the respondents, to establish familiarity of the respondents with mobile applications and to gather system and user requirements.

Introduction

I am a graduate student at Strathmore University undertaking a Master's degree in Mobile Telecommunication and Innovation. I am currently conducting a study on the use of mobile self-checkout system for retail stores in Kenya. This interview is aimed at collecting information on system and user requirements. Your response will be treated with confidentiality and used for academic purposes only. Please answer all the questions as best as you can.

Kind Regards,

Grace Kendi Gitonga.

*Required

Select your Age group.

Mark only one square

- 10 years – 17years
- 18years- 30 years
- 31 years – 40years
- 40 years -50 years
- 50 years – 60 years
- Over 61 years

On a scale of 1-5 with 5 being the highest and the lowest, rate your experience in use of a mobile phone *

Mark only one square


- 5
- 4
- 3
- 2
- 1

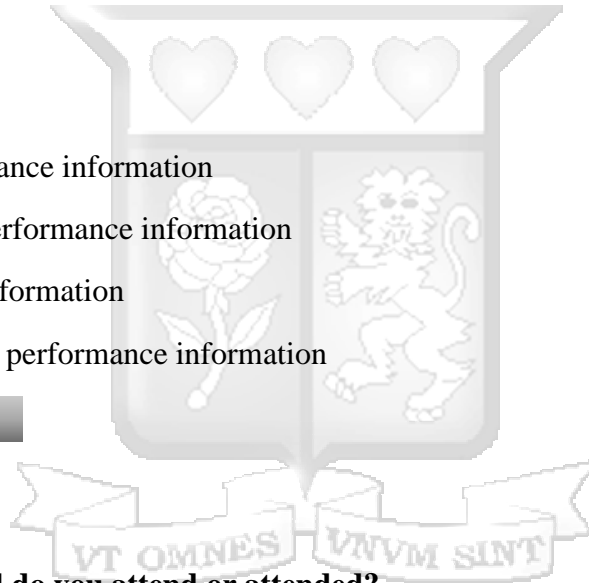
Section A: Mobile Application School Quality Evaluation System

A1. What information do you get from your school in regards to your school performance?

*


Check all that apply

- Exam performance information
- School total performance information
- Only results information
- Co-curriculum performance information
- 



A2. What kind of school do you attend or attended?

Check all that apply

- Public school
- Private school
- Special schools
- International school
- Other 

Section B: Mobile Application School Quality Evaluation System Information Approaches

B1. Which method of communication has helped you receive school evaluation information? *

Check all that apply

- Radio and Television Stations
- Written Materials E.g. Newspapers, Brochures, Banners
- Social media
- Websites
- School Workshops and Campaigns
- Other

B2. What challenges did you face while using the above methods of communication? *

Check all that apply

- Ambiguous or unclear information
- I rarely listen or watch news
- I receive information that is not relevant or information that is incomplete
- I receive outdated information especially on newspapers and banners
- Other

Section C: Mobile Application School Quality Evaluation System Technologies

C1: Which technologies are you familiar with? *

Check all that apply

- Mobile technology
- Digital Media Technology (e.g. online newspapers, websites, social media sites)
- Other

Section D: School Quality Evaluation System Mobile Application

D1: Do you think a mobile application to inform the public on school evaluation is necessary? *

Check only one square

- No
- Yes

Thank You for your time



Appendix B: Usefulness of the Mobile Application

Section A: Perceived Usefulness of the mobile Application

This section of the questionnaire contains several statements on Perceived Usefulness of the mobile school quality evaluation System. For each of the statements, indicate the extent to which you agree or disagree with these statements. Your response is guided by the scale below where: - 1 = agree, 2 = Strongly Agree, 3 = Not Sure, 4 = Disagree and 5 = Strongly Disagree

Only tick once per option

Table B. 1: Perceived Usefulness of the mobile System

		1	2	3	4	5
	Using the system would increase the efficiency of evaluation process					
	The system makes it easier to keep track of my evaluation process					
	The system improves the accuracy of outcomes data.					
	If the system helps educational transformation programs and process					
	If the mobile system increases stakeholder participation,					
	If the system continuously gauges' progress toward desired educational outcomes,					
	If the system empowers school leaders and teachers to build and sustain school performance					

	1	2	3	4	5
If the system facilitates the analysis of key education outcomes					

Section B: Perceived Ease of Use

This section of the questionnaire contains several statements on perceived ease of use of the mobile school quality evaluation system. For each of the statements, indicate the extent to which you agree or disagree with these statements. Your response is guided by the scale below where: - 1 = agree, 2 = Strongly Agree, 3 = Not Sure, 4 = Disagree and 5 = Strongly Disagree

Only tick once per option

Table B.2: Perceived Ease of Use

	1	2	3	4	5
Learning to operate the system would easy for me					
I would easily find the information I am looking for using the system.					
I would find the user interface of the system clear and intuitive					
I would find the system to be flexible to interact with					
I would find the system to easy to use (user-friendly).					

Section C: Functionality

This section of the questionnaire contains several statements on the functionality of the mobile system. Rate each aspect based on the scale of 1-5 where: - 1 = excellent, 2 = Very Good, 3 = Good, 4 = Satisfactory and 5 = Poor.

Only tick once per option

Table B.3: System Functionality

		1	2	3	4	5
	Navigability					
	User-friendliness					
	User-interface					
	Ease of learning					
	Consistency					
	Predictability					
	Responsiveness					
	Usefulness					
	User satisfaction					
	Ease of finding content					
	Efficiency					
	Task completion time					
	Guideline violations					

	Suggesting solutions or improvements					
	Ease of connectivity					
	Response time					
	Security					
	Latency					
	Ease of completion of a task					
	Accuracy					
	Recall					

Section D: Accuracy

This section of the questionnaire contains several statements on the accuracy of the functionality of mobile system. Rate each statement based on the scale of 1-5 where: - 1 = excellent, 2 = Very Good, 3 = Good, 4 = Satisfactory and 5 = Poor.

Only tick once per option

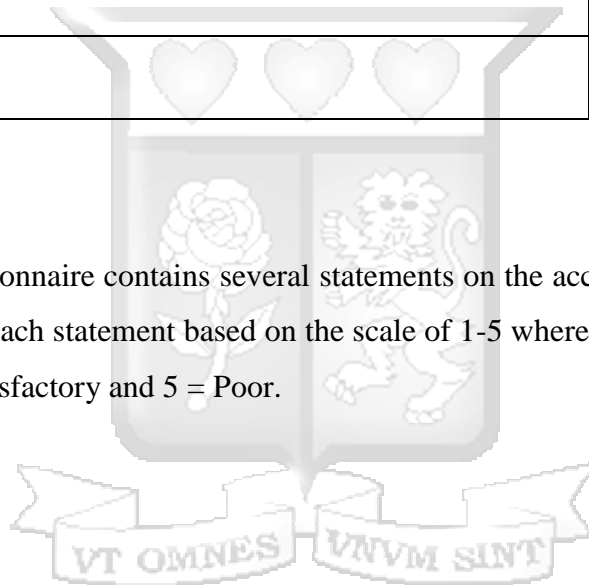


Table B.4: Accuracy

		1	2	3	4	5
	Loading application					
	Managing Permissions					
	Managing users					
	Accessing data/item					
	Categorizing data					

	Analyzing data					
	Managing reports					

Appendix C: Implementation Screenshots

User login

The figure below displays the log in page for the administrator in the Web-Back end.

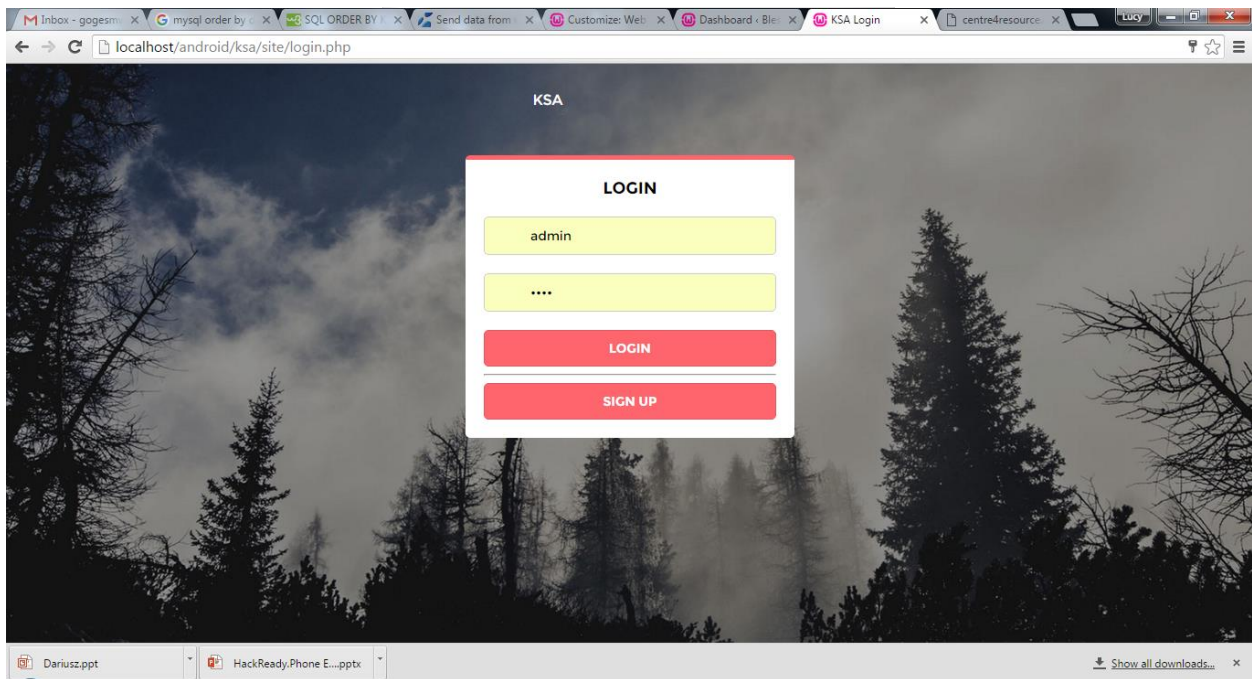


Figure C.1: User Login

Register School Back-End

After the school administrator logs in and logs the school in the system. he/she is able to register school which appears in the figure C.1 below. the system administrator is able to edit or delete a school or a category of school in the system

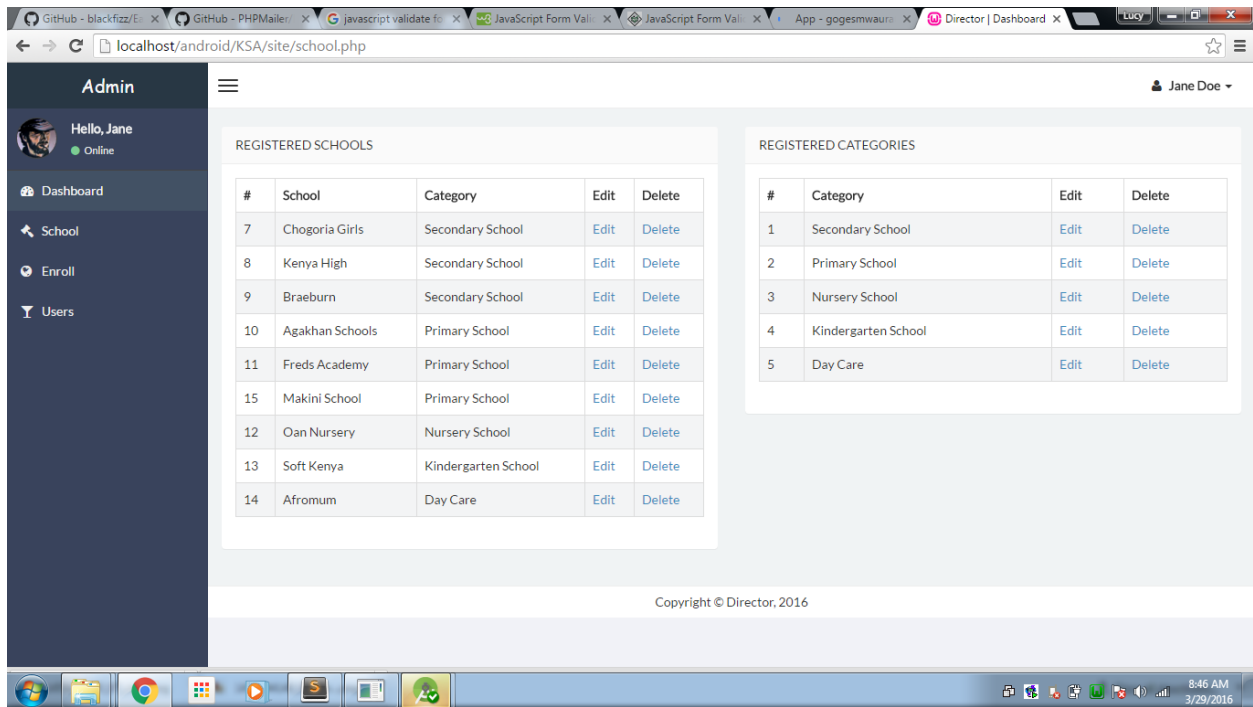
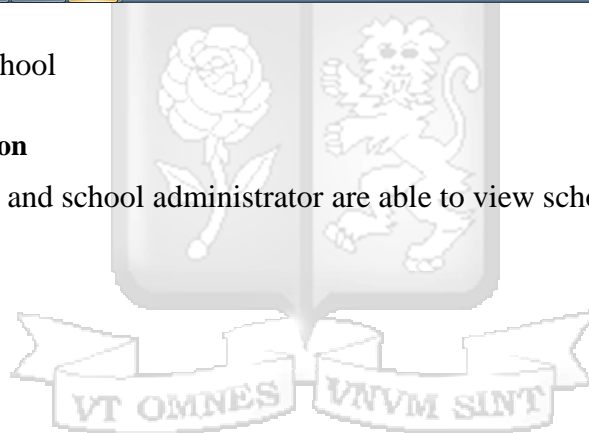


Figure C.2: Registered school

Viewing School Information

The system administrator and school administrator are able to view school information as in the figure C.3 shown below;



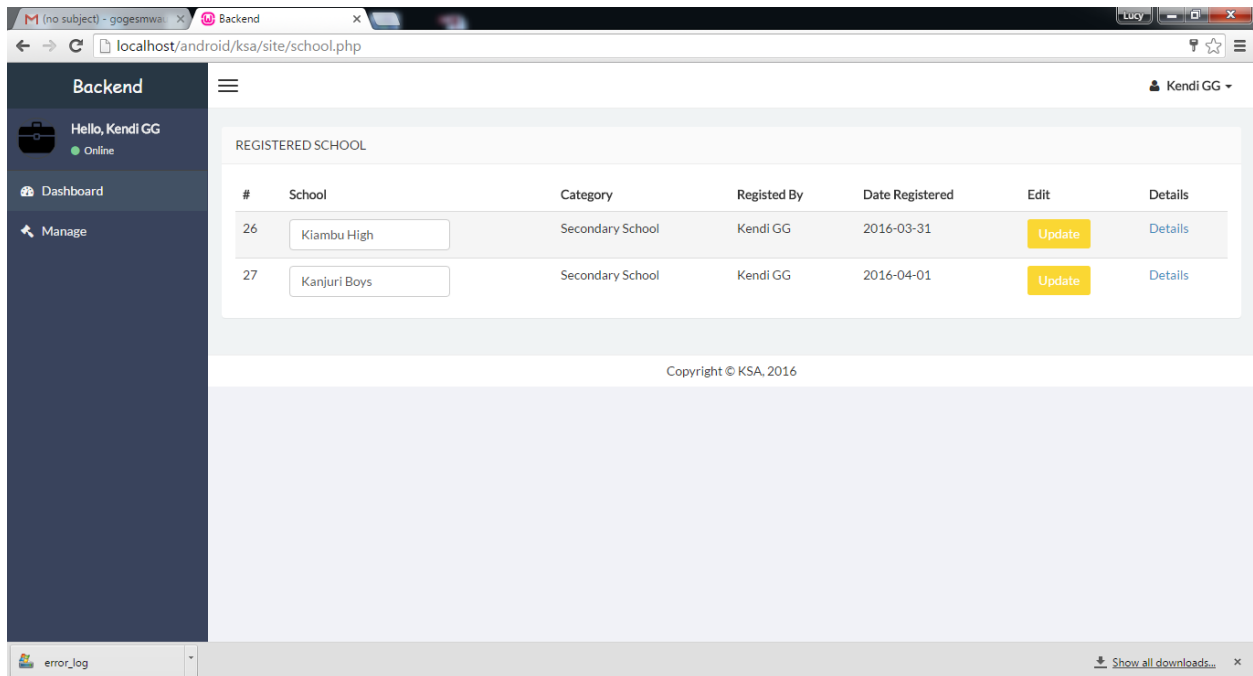


Figure C.3: Viewing Register Schools

Adding School Information

As shown in the Figure C. 4 below the school administrator is able to add school information.

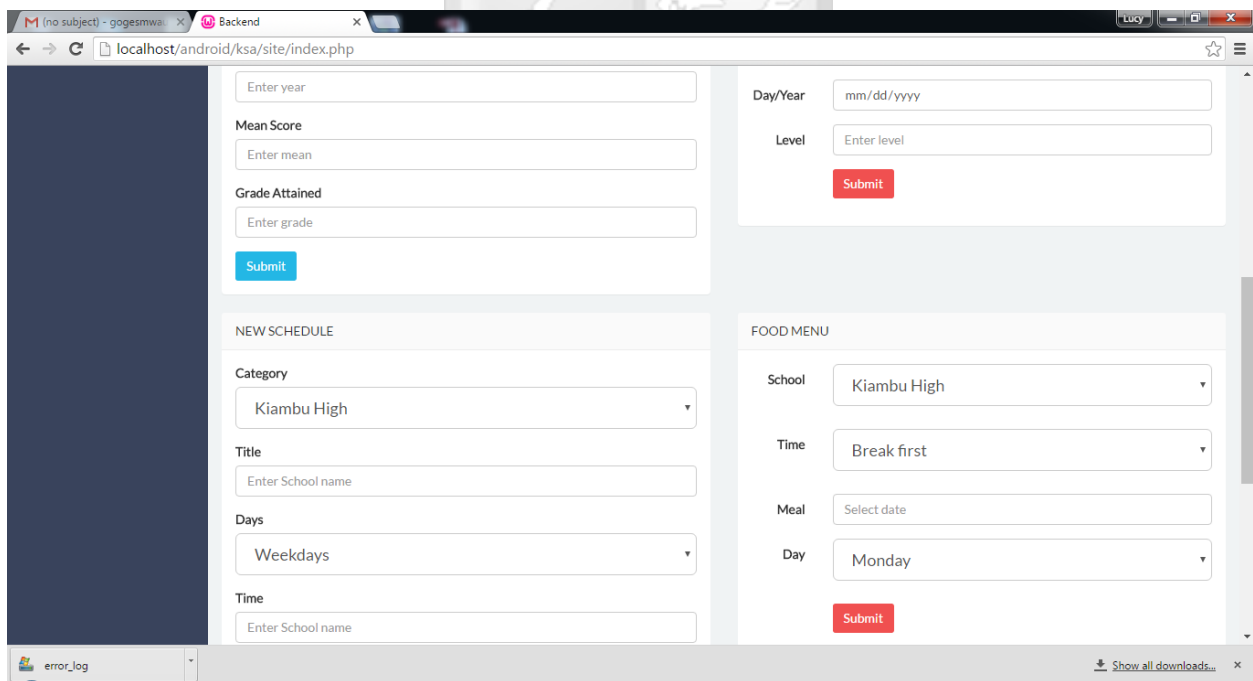


Figure C.4: Adding School Information

Updating and Editing School Information

As Shown in the figure C.5 the administrators' are able to update school information.

The screenshot shows a web browser window with the URL `localhost/android/ksa/site/user_details.php?id=26`. The page displays six administrative panels for 'KIAMBU HIGH'.

- KIAMBU HIGH AWARDS:** A table with columns #, Title, Year, Level, and Edit. Row 3: Math Contest, 2015, 2, Update.
- KIAMBU HIGH FEES:** A table with columns #, Term, Amount, and Edit. Row 5: Term 1, 27000, Update.
- KIAMBU HIGH INFORMATION:** A table with columns #, Info, No of Teachers, and Edit. Row 2: This is the best place to be when you want to..., 20, Update.
- KIAMBU HIGH FOOD MENU:** A table with columns #, Category, Day, Meal, and Edit. Row 4: Lunch Break, Monday, Tea with Bre, Update.
- KIAMBU HIGH ACTIVITIES:** A table with columns #, Name, and Edit. Row 3: Basket Ball, Update.
- KIAMBU HIGH IMAGES(GALLERY):** A table with columns #, Name/Title, Image, and Edit. Row 31: Hills, Update.

Figure C.5: Updating and Editing School Information



School Fee Structure

Term	School Fee
term1	50000
term2	70000
term3	45000

Figure C.6: School Fee Structure

School Activities

BASKET BALL
RUGBY

Figure C.7: School Activities

School Awards



The screenshot shows a mobile application interface for 'Kenya High Awards'. At the top, there is a status bar with icons for signal, Wi-Fi, and battery (45%), and the time 08:52. Below the status bar is a blue header with a back arrow and the text 'Kenya High Awards'. Underneath is a table with three columns: 'Award', 'Year', and 'Level'. The table contains one row of data: 'Math Contest', '2016', and '1'.

Award	Year	Level
Math Contest	2016	1

Figure C.8: School Awards

School Meals



The screenshot shows a mobile application interface for 'Kenya High Food Menu'. At the top, there is a status bar with icons for signal, Wi-Fi, and battery (45%), and the time 08:54. Below the status bar is a blue header with a back arrow and the text 'Kenya High Food Menu'. Underneath is a table with three columns: 'Time', 'Meal', and 'Day'. The table contains three rows of data: 'Break first' with 'Tea with Bread' on 'Monday', 'Lunch' with 'Chips' on 'Monday', and 'Super/Dinner' with 'Ugali with Meat' on 'Monday'.

Time	Meal	Day
Break first	Tea with Bread	Monday
Lunch	Chips	Monday
Super/Dinner	Ugali with Meat	Monday

Figure C.9: School Menu

Total School Analysis

This give the total evaluation of the school accordingly

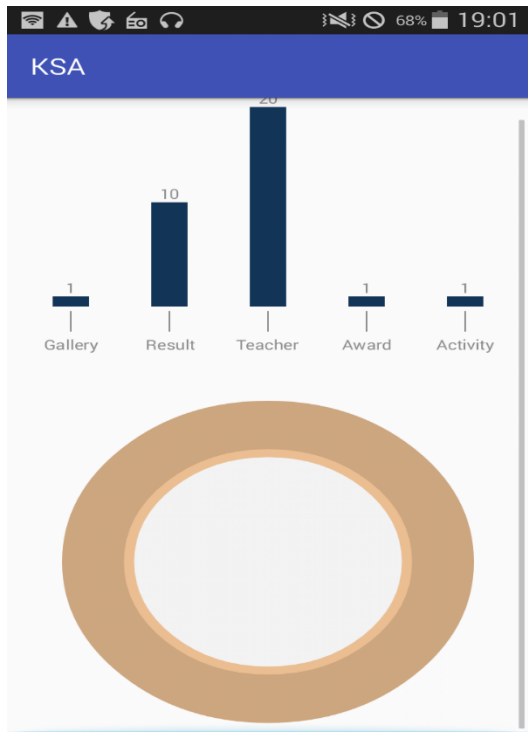


Figure C. 10: Total School Evaluation



Appendix F: Turnitin Report

Figure F.1 shows the originality results of the dissertation obtained from the turnitin software.

The screenshot displays a Turnitin report for a document titled "mobile school quality evaluation systems" by Grace Gitonga. The report shows a 29% similarity score. The main text area contains the title "MOBILE SCHOOL QUALITY EVALUATION SYSTEM", the author's name "GITONGA, GRACE KENDI", and a paragraph of text with highlighted matches. A "Match Overview" sidebar on the right lists 10 sources with their respective similarity percentages.

Rank	Source	Similarity
1	daim.idl.ntru.no Internet source	4%
2	www.theclearinitiative.org Internet source	4%
3	Submitted to Kenyatta ... Student paper	1%
4	smmcta.com Internet source	1%
5	pmworldjournal.net Internet source	1%
6	cgso.columbia.edu Internet source	1%
7	www.irrodi.org Internet source	1%
8	experts.niu.edu Internet source	1%
9	tradlosetrondheim.no Internet source	1%
10	www.lis.uzulu.ac.za Internet source	1%

Figure F.1: Turnitin Report