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Maate, P. M.

*Faculty of Information Technology (FIT)
Strathmore University*

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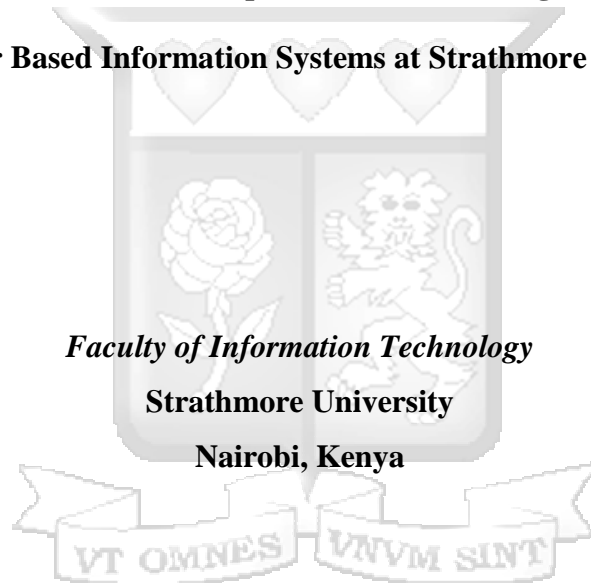
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**E-Portfolio Model for Student Assessment in Education:
A Case of Nairobi Secondary Schools**

Philip Malinga Maate

**Submitted in partial fulfillment of the requirements for the Degree of Master of Science in
Computer Based Information Systems at Strathmore University**



June, 2016

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Declaration

I declare that this research is my sincere effort with guidance from my lecturers and that it is my original work not presented for a degree in any other university. While I acknowledge benefitting immensely from reference to other people's great works, every part cited has been acknowledged and no part within this study was illegally or otherwise used in contravention of copyright regulations or scholarly good practices.

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..... **Philip Malinga Maate** [Name of Candidate]

.....  [Signature]

..... **13th June 2016** [Date]

Approval

The thesis of Philip Malinga Maate was reviewed and approved by the following

Dr. Cyrus Wekesa, PhD
Faculty of Information Technology,
Strathmore University

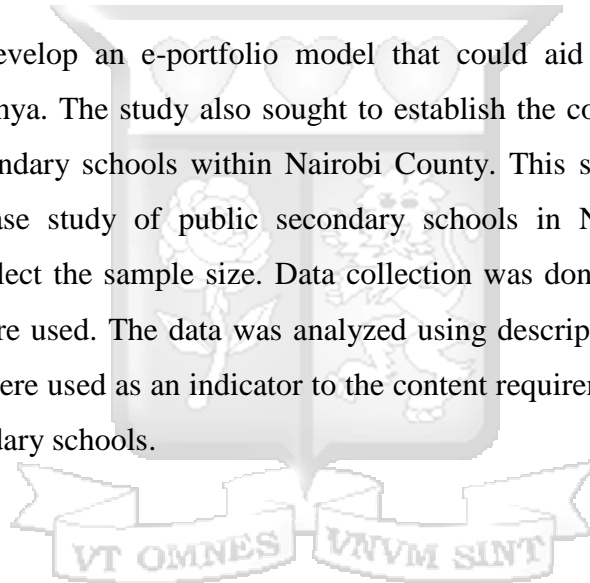
Professor Reuben Marwanga
Faculty of Information Technology,
Strathmore University

Professor Ruth Kiraka
Dean, School of Graduate Studies
Strathmore University

Abstract

A number of public secondary schools in Kenya lack a properly operational information management system to capture student academic and personal data as an evidence to show one's learning journey over time. From the current system it is difficult to isolate student's personal traits or talents such as negotiation skills, public relations, or even other key goals as stipulated in the Kenyan secondary school syllabus like promoting love for and loyalty to the nation. A good information management system in form of e-portfolio in a school would provide data on evidence of student's abilities in a holistic sense and show a complete picture of what a student is. Such a system would be a better basis for informing interested parties like universities and potential employers of the student's abilities other than use of test scores only.

This study sought to develop an e-portfolio model that could aid in assessment in public secondary schools in Kenya. The study also sought to establish the content requirements for e-portfolios in public secondary schools within Nairobi County. This study adopted exploratory research design of a case study of public secondary schools in Nairobi County. Random sampling was used to select the sample size. Data collection was done through survey method where questionnaires were used. The data was analyzed using descriptive statistics. The results from the analyzed data were used as an indicator to the content requirements of an assessment e-portfolio in public secondary schools.



Dedication

This research is dedicated to my family especially my wife Judy who offered invaluable support during the course of doing this study. Special dedication to my little son Immanuel who though not old enough to understand what was going on, his presence provided a lot of peace of mind to me. Again not to forget my two daughters Mercy and Patience for their role they played in inspiring me to move on, I love you all.

All the honor and glory be to the Almighty God for His grace and everlasting peace.



Acknowledgements

I thank the Almighty God for His grace that carried me through up to this far.

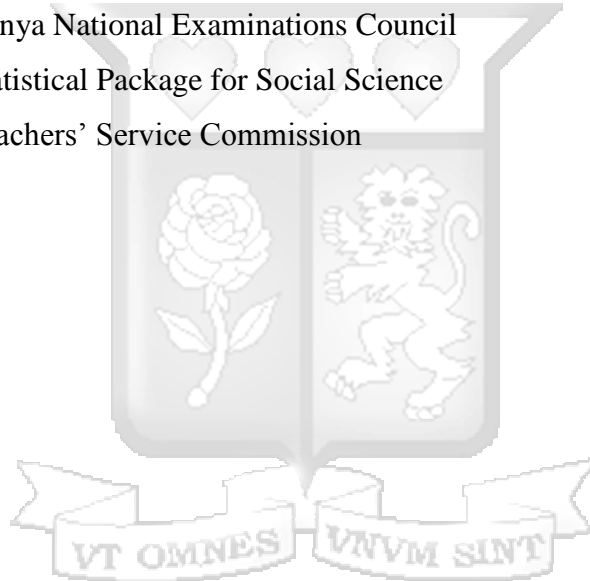
I sincerely thank my family for their overwhelming support during the entire time I devoted to this piece of work. I acknowledge great guidance from my supervisor Dr. Cyrus Wekesa for showing commitment and determination to push me to that extra mile to ensure that I attained the perfection within this study.

My sincere gratitude goes to Professor Ismail Ateya Lukandu for conducting very useful seminars that helped a great deal in developing this research. I can't forget Stephano Mmari who offered his expertise especially in advising on the technical area covered in this research. May the Almighty God bless you all.



Acronyms /Abbreviations

BEd.	-	Bachelor of Education
EMIS	-	Education Management Information System
e-Portfolio	-	Electronic Portfolio
HOD	-	Head of Department
ICT	-	Information and Communication Technology
ID	-	Identification
KCSE	-	Kenya Certificate of Secondary Education
MEd.	-	Master of Education
MOE	-	Ministry of Education
KNEC	-	Kenya National Examinations Council
SPSS	-	Statistical Package for Social Science
TSC	-	Teachers' Service Commission



Definition of Terms

- Assessment:** - Classification of students with respect to their performance and attainment in education
- e-portfolio:** - A digital repository of evidence of student's learning over time
- Holistic:** - Considering all factors of a student during assessment
- Personality** - Set of characteristic or qualities that make up someone's distinctive character
- Trait** - Quality or characteristic that distinguishes somebody



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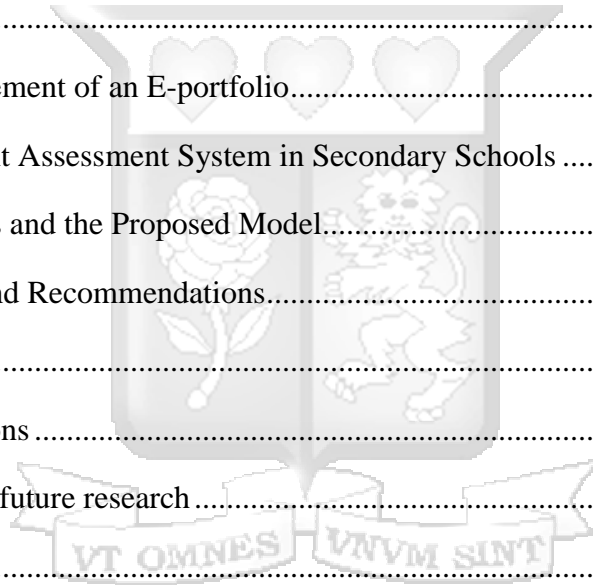


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Chapter 1 Introduction

1.1. Background of the study

Information management system in a number of public secondary schools in Kenya do not adequately capture and use students' academic as well as personal data as evidence to what a student has learned over time (Ndiku, Oyoo, & Owano, 2014). The system in the Kenyan public secondary schools hardly captures video as well as audio relevant student's data that can be used as a means of assessing the students' academic achievement. Student e-portfolio can be incorporated in the school's information management system to enable capture evidence of student's capabilities. Lack of proper alignment between curriculum intentions and quality assessment of students hampers implementation of the curriculum in the classroom (World Bank, 2008). Such a situation results in a scenario where assessment results may not be able to show or bring out the intended attributes of the students as described in the curriculum. Beyond test scores some other means can be incorporated to include substantive descriptions or evidence of what the students do or experience. To be able to document progress of high order goals like application of skills and synthesis of experience requires obtaining information beyond what can be provided by norm based or standardized tests (Sewell, Marczak, & Horn, 2016). Paper and pencil examination results can be limited in their meaningfulness (World Bank, 2008). E-portfolio can be useful in providing information beyond what can be provided by norm based or standardized tests.

Electronic portfolio also known as digital portfolio is a collection of work that demonstrates one's achievement or improvement over time. It is a "purposeful collection of learning over time that document academic, personal and professional development" (Kember, 2010). An electronic portfolio uses digital platforms or electronic technology as medium to collect and organize academic artifacts in form of audio, video, text and graphic to provide evidence in relation to learning goals and outcomes. Digital portfolios can be very useful tools to provide information about academic progress of students and also connect evidence to appropriate goals, outcomes and standards in education (Kember, 2010). The primary purpose for which e-portfolios are used is assessment, career and reflection (Drury, 2006). Research acknowledges importance of e-portfolios as tools of learning and assessment (Lorenzo & Itellson, 2005). It is worth noting that

what is important in assessment is the ability of the assessment system to have adequate information generated about the students to support decision making (Clarke, 2011). Currently the ministry of education science and technology is reviewing the curriculum to move from norm based or standardized tests to competency based assessment system (Daily Nation, 2015). With such a move e-portfolio can be very useful in providing a means for students to accumulate their artifacts showcasing evidence of their competencies and can also be used as an assessment tool on the competencies.

There is very little or no established framework for capturing students' data in Kenya. The data available in secondary schools mainly, which is captured electronically and usually forwarded to the Ministry of Education Science and Technology on Education Management Information System (EMIS), is majorly on school management, (Ndiku, Oyoo, & Owano, 2014). On the other hand the assessment body Kenya National Examination Council (KNEC) does not have a provision for using electronic system to assess students, except for a pilot rolled out in 2015 to a few secondary schools (Standard digital, 2015). This probably is the reason why secondary schools in Kenya are not keen on capturing students' data for use in determining student attainment of educational goals and objectives.

1.2. Problem statement

Public secondary schools in Kenya lack a properly operational information management system to capture student academic and personal data as an evidence to show one's learning journey over time (Ndiku, Oyoo, & Owano, 2014). From the current system it is difficult to isolate student's personal traits or talents such as negotiation skills, public relations, or even other key goals as stipulated in the Kenyan secondary school syllabus like promoting love for and loyalty to the nation (Ministry of Education (MOE), 2012). A good information management system in form of e-portfolio in a school would provide data on evidence of student's abilities in a holistic sense and show a complete picture of what a student is (Drury, 2006). Such a system would be a better basis for informing interested parties like universities and potential employers of the student's abilities and traits other than use of test scores only. Research shows that use of education results test scores as selection criteria among job applicants may keep some very good people from getting a job and may also result in hiring some very unproductive people (Boyes &

Melvin, 2012). There is need for an e-portfolio model for secondary schools that would facilitate students to showcase evidence of their abilities and competencies in a digital repository.

1.3. Research Objectives

- i. To determine the content requirements of an e-portfolio
- ii. To review models of e-portfolios
- iii. To develop a model for e-portfolio
- iv. To validate the model

1.4. Research questions

- i. What is the content requirement of an e-portfolio?
- ii. What are the available models for e-portfolios?
- iii. How can an e-portfolio model be developed?
- iv. How can an e-portfolio model be validated?

1.5. Justification

Although there is a lot of data generated in public secondary schools in Kenya, the information system in place is not well defined to enable capture student academic and personal data that can be used as evidence for holistic student abilities (Ndiku, Oyoo, & Owano, 2014). The ministry of Education acknowledges that the data available for student academic record does not adequately measure the capabilities of the students (Ministry of Education (MOE), 2012) . This statement points to the fact that information management systems in public secondary schools are inadequate to capture relevant student data which can be used as evidence to student's achievement of educational goals and objectives. This research aimed at addressing this challenge by proposing an e-portfolio model that would enable students an opportunity to showcase their abilities and competencies in a digital repository or e-portfolio.

The findings of this research will assist in providing a better information management system in schools in form of student e-portfolio that can enhance assessment to establish student capabilities in a holistic sense. The results of the findings can further be applied as a basis for student placement in various university programs.

1.6. Scope

This study is a case of public secondary schools in Nairobi County. The study limits itself to an e-portfolio model that enhances information management system of students' data that can provide evidence of their abilities and competencies. The research does not necessarily focus on how to assess students, but rather on means to facilitate quality assessment. However the data so captured can be used as a basis for student assessment. The scope of this study does not include standards for assessing contents of e-portfolios.

1.7. Limitations

The study limited itself to an e-portfolio model for public secondary schools to enhance information management system of students' data that can provide evidence for their abilities and competencies. It did cover user acceptance or support of the proposed model.

1.8. Ethical Issues

1.8.1. Permissions

In the process of carrying out this study the researcher interacted with various people as respondents and sourced for information that can be deemed personal. All required permissions to interact with these respondents or otherwise to facilitate this study, were sought and granted from the relevant authorities.

1.8.2. Informed Consent and Reciprocity

The researcher revealed full intentions of the study with the participants before interacting with them. This was done by encouraging respondents to read the information on the study tools as per the instructions (see Appendix A). Participants were further informed that they would be free to withdraw from the research at any point if they so wished.

1.8.3. Anonymity and Confidentiality

In order to protect the identity of the participants used in this research the researcher never divulged any names of the participants or their schools. Where necessary pseudonyms were used in descriptions of the context and participants so as to make it difficult to establish their identity

even to those who know them. The information given by participants was held in confidence and used solely for the purpose intended.



Chapter 2 Literature Review

2.1 E-portfolio Definition

An e-portfolio (electronic portfolio) is an electronic collection of evidence that shows ones learning journey over time (Barrett, 2010). It is a “purposeful collections of learning over time that document academic, personal and professional development” (Kember, 2010). E-portfolio can be viewed as a combination of process (series of activities) and the product which is the end result of the process. E-portfolio is a showcase of what one has been able to do over time in the process of learning.

The process of developing an electronic portfolio basically considers two aspects; multimedia development and portfolio development (Barrett, 2010)

2.2 E-portfolio content

E-portfolios normally contain a profile of students learning journey over time. The content includes any relevant material that can be stored in a digital form and that forms evidence of student’s learning (Scottish Qualifications Authority, 2012). The preliminaries page for an e-portfolio basically should have the student’s profile and brief introduction of the content in the portfolio. Student’s profile can be subdivided into various categories such as personal details; contact; personal statement; awards, prizes and grants; beliefs and values; abilities and skills; hobbies and interests; and roles and responsibilities. The teacher should include, as part of the content performance and assessment criteria and expected evidence required to be provided by the student. Evidence in form of artifacts should be matched to the corresponding expected learning outcomes and/or learning as per set standards. Students should further include their own reflections for the evidence provided in line with the expected learning outcome. It is prudent for e-portfolio to contain assessors (teacher’s) comments, a witness testimony and the student’s own reflective account (Scottish Qualifications Authority, 2012). Third party (Teacher’s and witnesses) statements require to be read only to avoid alterations to them after assessment, so as to ensure authenticity. The e-portfolio need to include teacher’s observation records to provide feedback to the students on their progress as well as an assurance that the teacher has observed the student carrying out particular tasks recorded in the e-portfolio.



Figure 2.1 content of e-portfolio showing student's profile

2.3 Analysis of e-portfolio Models

Different e-portfolio models exist based on the focus or usage of the e-portfolio. A recent study mentions four common types of conventional portfolio usage, which are assessment, showcase, development and reflective portfolios (Mazlan, Sui, & Jano, 2015). The study proposes a model in which students collect artifacts from learning experiences, link the artifacts to a variety of online sources such as WebPages, articles and YouTube videos so as to get a clearer picture on them, review them through reflections, then present and share them to e-portfolio followers as well as on social media platforms with an aim of getting feedback, then after feedback the artifacts are presented to digital repository, where assessors can assess them based on a rubric (Mazlan, Sui, & Jano, 2015). This model does not put emphasis on summative assessment and the main focus is higher institutions of learning, neither does it allow provision for a way to know students personality traits.

Another study notes that in order to prepare students as lifelong students there is need to evaluate them on core competencies and that an effective way to do so is through development of an e-

portfolio. It continues to note that student involvement on the design of e-portfolio is key to motivation by the same students on the use of the e-portfolio (Ring & Ramirez, 2012). However no “one-size fits all” system would provide students the flexibility they desire while providing assessors the ability to assess their work and collect data on this assessment (Ring & Ramirez, 2012). Ring and Ramirez (2012) proposed a model which uses two systems; one for e-portfolio interface and on the other, students would tag their work to connect digital evidence to competencies and the assessors review the work. In this model the digital platform used is Google Apps, which means all students are provided with Gmail accounts and have to access Google Docs. Therefore they adopt Google Sites as e-portfolio tool. Students further peer review their work in the e-portfolio and provide feedback while assessors assess the work based on developed rubrics. However the challenge in this model is that it has limited portability of the student’s work and access to the work is a challenge after the students graduate.

A model by Raymond allows for creation of assignments and embedded rubrics that can be used for grading or course assessment purposes (Papp, 2014). Gerbic (2009) proposes an e-portfolio model for universities that allows student reflections, feedback from peers and digital repository materials. He further goes ahead to describe a model that focuses on students time and attention, facilitates assessment, review and evaluation by teachers, promotes consistency within curriculum across students, and facilitates new forms of assessment especially authentic assessment (Gerbic, 2009). Gerbic argues that models in practice occur at different levels. These levels are learning outcomes for a single course, like graduate profiles or outcome for a program, for example skills or competency descriptors for students e.g. leadership, creativity, writing, life management, values based decisions as so on. The other level is on regional or national standards and generally relating to professional or occupational requirements (Gerbic, 2009). He proposes a matrix model which has many advantages including its ability to facilitate both summative and formative assessments and supports learning among the students. Gerbic (2009), asserts that e-portfolios build on a matrix model have the potential to introduce new forms of thinking, which are integrated and relational.

2.4 The Concept in e-portfolio model Development

While there are a variety of models for e-portfolio, the model by Helen C. Barret demonstrates that e-portfolio is not just a digital repository of learning evidence over time but rather a combination of the process of learning and the product or evidence stored digitally (Barrett,

2010). Such evidence may be voice, video, audio or text. Most e-portfolio models tend to emphasize on the showcase or the product with little emphasis if any on the workspace (the process) (Barrett, 2010). Both are very important just like two faces of one coin. Helen C. Barret model focuses on both the process and the product. It goes further to capture documentation for learning on one side and documentation for achievement on the other side. Documentation for achievement can be captured in an assessment management system to enable the e-portfolio act as an assessment portfolio. The model is as illustrated below.

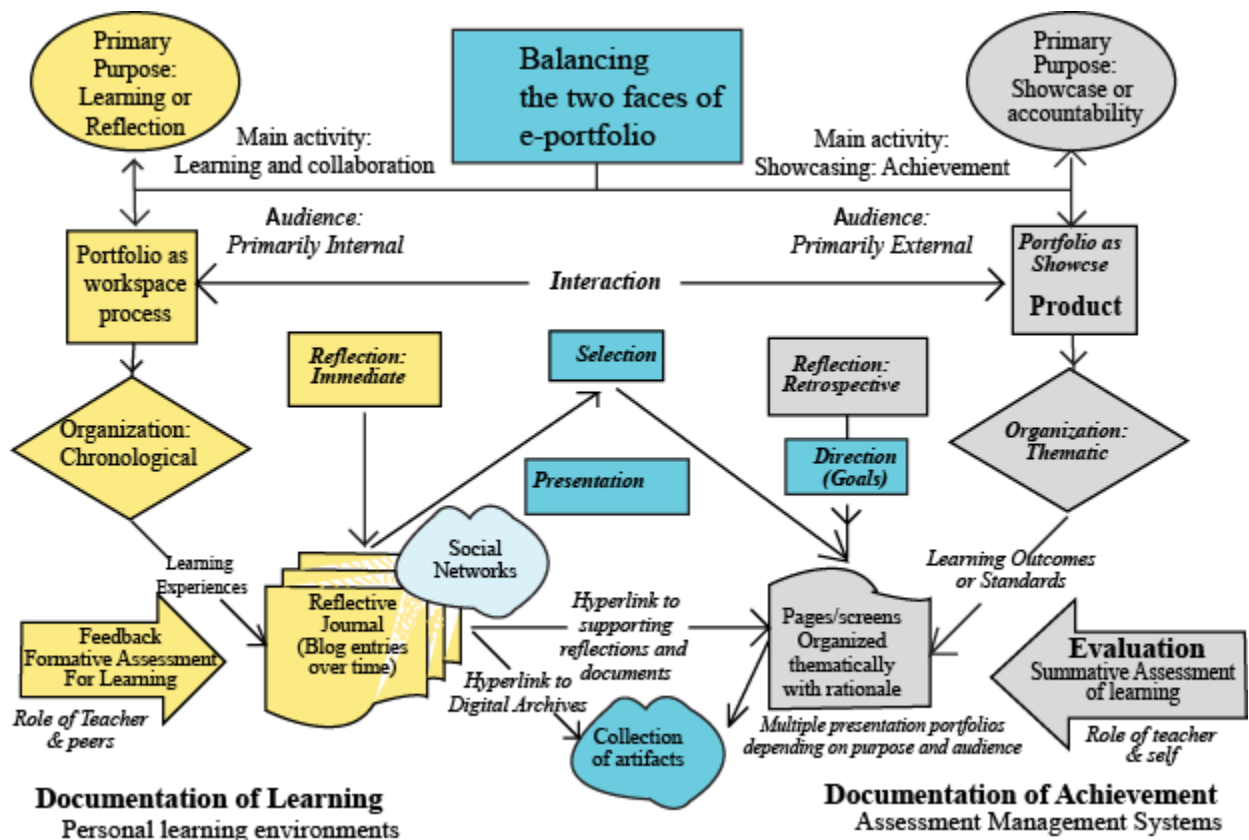


Figure 2.2 Balancing the two faces of e-portfolio

2.5 Parts of e-portfolios

Basically an e-portfolio can be viewed as containing three parts or levels. The first part can be viewed as the part that involves storage of artifacts or whatever contents the e-portfolio should contain. The second part can be viewed as the process of collecting and organizing the materials for the e-portfolio also referred to as workspace and the final part is the product or the contents of the e-portfolio. The three levels or parts are illustrated in Figures 2.3, 2.4 and 2.5. Storage

would entail fundamentally identifying areas in the curriculum that need to be contained in digital archive and the specific storage areas where specific folders and files should be stored. This could be in the school’s server or even in a particular computer within the school or in an online environment. The model would be as shown in Figure 2.3.

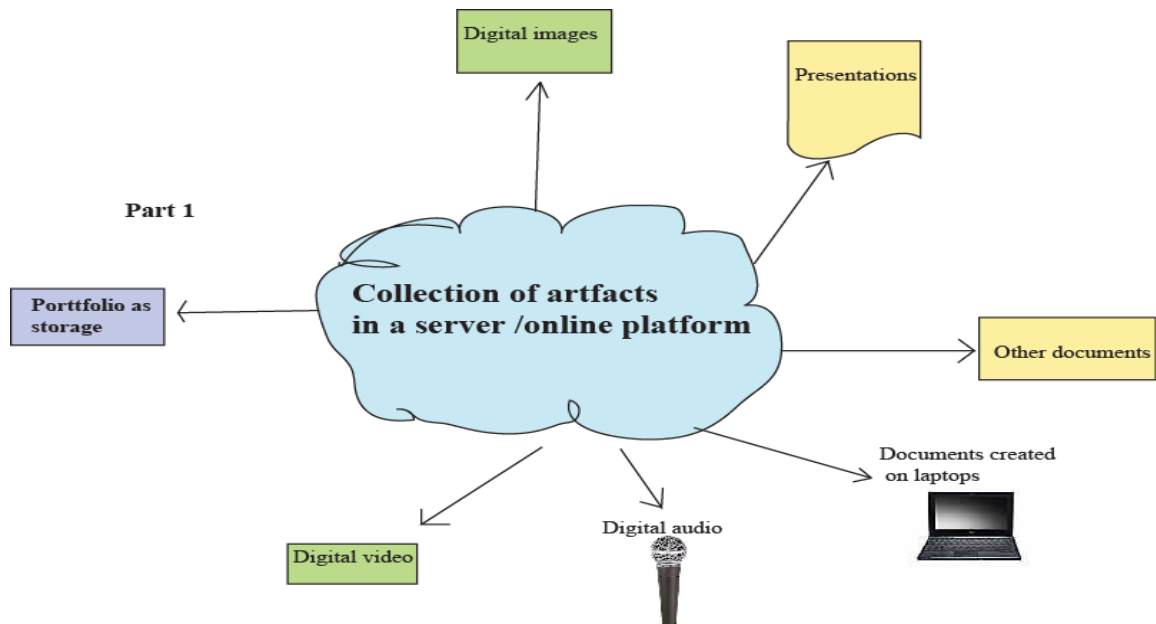


Figure 2.3 e-portfolio as storage

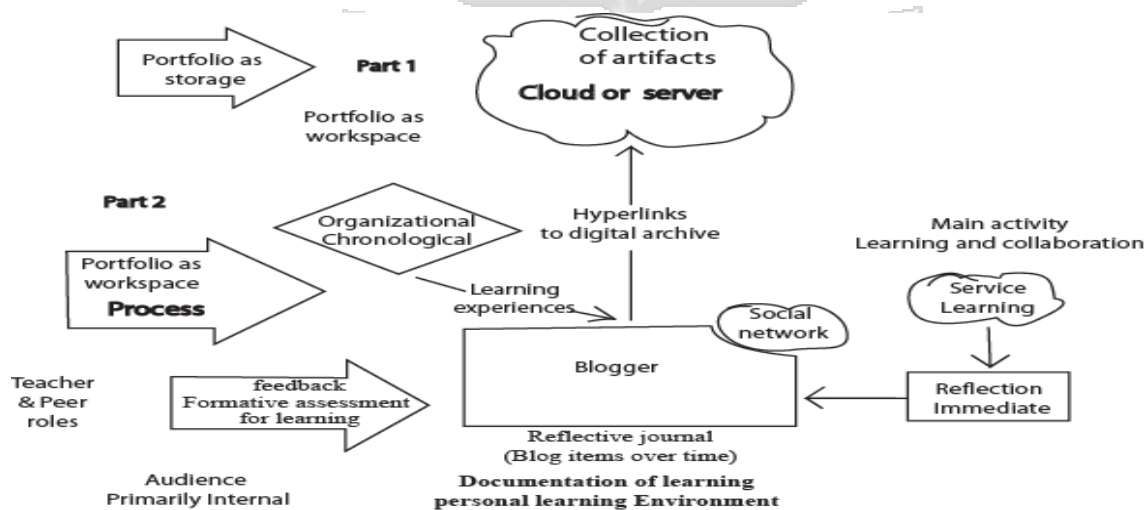


Figure 2.4 e-portfolio as a process

The other part is the process as shown in Figure 2.4.

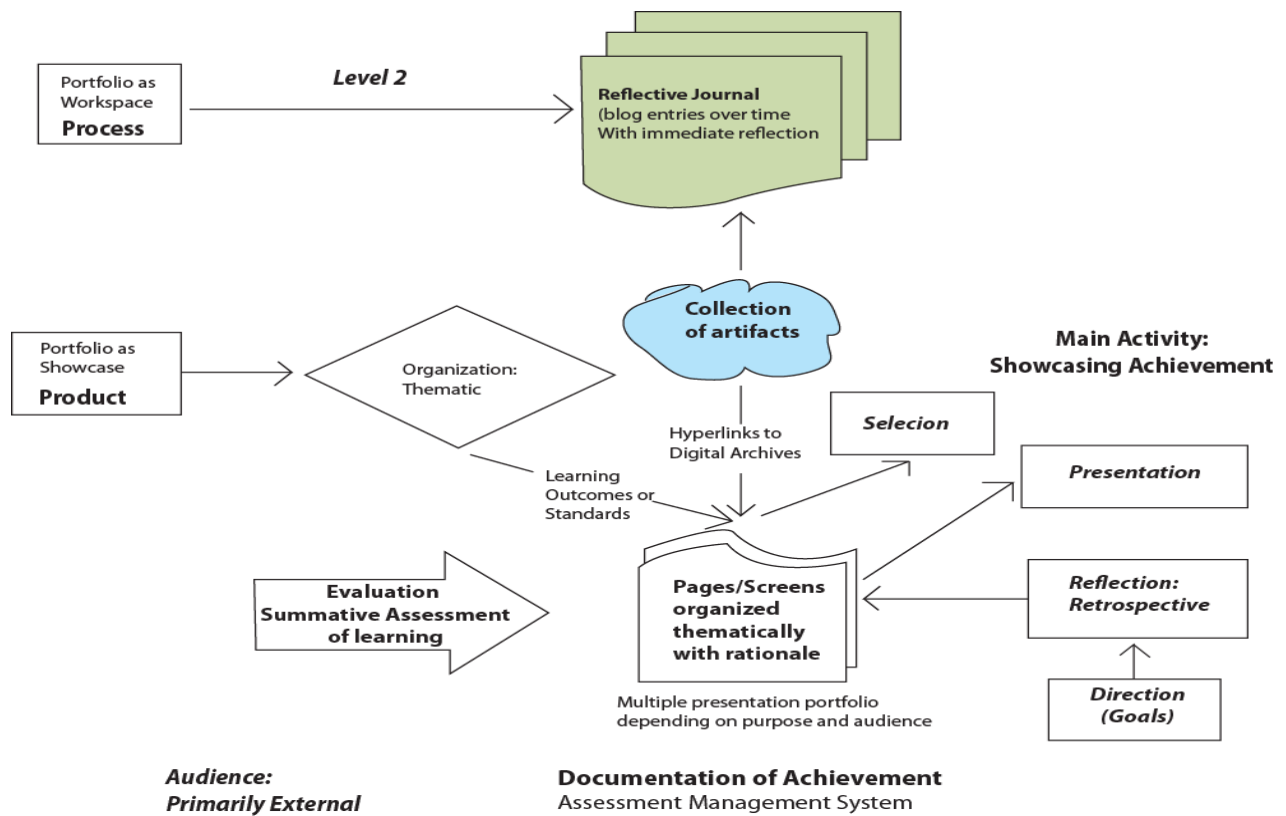


Figure 2.5 e-portfolio as a product

2.6 Value of Data on e-portfolios

2.6.1 Personal traits on e-portfolios

As mentioned earlier, e-portfolios document evidence of one's academic journey over time. An e-portfolio provides data on evidence of student's abilities in a holistic sense and show a complete picture of what a student is (Drury, 2006). Such data can include what can be referred to as student's personality traits. "Personality traits are distinguishing qualities or characteristics that are the embodiment of an individual. They are habitual patterns of behavior, temperament and emotion" (Denham, 2010). Personality traits reflect what a person is all about. Psychologists through decades of research in personality uncovered what they call big five personality traits as extraversion which refers to ones level of sociability and enthusiasm; agreeableness referring to ones level of friendliness and kindness; conscientiousness meaning ones level of organization and work ethic; emotional stability which is ones level of calmness and tranquility; and Intellect referring to ones level of creativity and curiosity (Rentfrow, 2009). However it's worth noting that these dimensions represent broad areas of personality. These dimensions of personality tend

to occur together in many people but at different levels, but a person's behavior is consistent with the underlying personality trait (Cherry, 2016). Researchers have further categorized a variety of personality traits into constituting what they call personality types. According to Holland's theory there are six personality types, namely Realistic, Investigative, Social, Artistic, Enterprising and Conventional. Realistic students possess personality traits that make them to be shy, genuine, persistent, stable, conforming and practical (Robins, 2015). This category of people prefers involvement in physical activities that require skill, strength and coordination (Robins, 2015). Personality traits for investigative students include being analytical, original, curious and independent. Investigative students prefer activities that involve thinking, organizing and understanding (Robins, 2015). Personality traits for social students are sociable, friendly, cooperative, and understanding. Social students prefer activities that involve helping and developing others (Robins, 2015). Conforming, efficient, practical, unimaginative, and being inflexible are personality traits for conventional students. Such students prefer activities that are rule-regulated, orderly and unambiguous (Robins, 2015). Enterprising students who prefer verbal activities where there are opportunities to influence others and attain power possess personality traits of being self confident, ambitious, energetic and domineering (Robins, 2015). Artistic students prefer activities that are ambiguous and unsystematic. Their personality traits are being imaginative, disorderly, idealistic, emotional and impractical.

Through e-portfolio the student and the teacher document artifacts that reflect the student's academic journey over time. These artifacts are student's activities in the process of learning which can be used as an indicator of the student's capabilities. The teacher can review and attach a rating to the artifacts, based on agreed criteria. With student capability it is possible for the e-portfolio to identify the personality types and traits of the student by use of information filtering software such as Personality Diagnostic Algorithm or a matching algorithm. This algorithm is a collaborative information filtering algorithm which is pretty accurate (Kayima, Kivisi, & Shibwabo, 2015). By populating students' artifacts over time, the e-portfolio should be able to assess the students and reflect their abilities including personality types and/or traits.

According to Villano as quoted by Drury (2006) the whole idea of e-portfolio is to give others a complete sense of what you are all about. The idea is to make people inspect it and come up with an idea of what you are capable of accomplishing ... a completely new understanding of yourself

and in actual sense who you really are (Drury, 2006). Drury further asserts that e-portfolio can contain co-curricular activities and can be populated by a student with artifacts in the process of learning to create a history of their personal life (Drury, 2006).

Geoff Rebbeck as quoted by Helen C. Barret asserts that e-portfolio is a reflection of a student as a person undergoing continuous personal development, not just store of evidence (Barrett, 2010). E-portfolios have the capability of reflecting student's personal traits. This study goes further to help identify student's personal traits through information or data filtering.

2.6.2 Authenticating Information Captured

According to research by Crichton and Koop as quoted by Helen C. Barrett, blogs provide the ideal tools to construct learning journals or e-portfolios and they make e-portfolios more authentic and relevant (Barrett, 2010). A blog is an online journal that encourages communication of ideas and individual entries appear in reverse chronological order (Blog n.d, 2016). A blog is a web social software tool. Social software tools allow co-authoring of content on a digital platform and hence allow peers to scrutinize and critique information posted by an individual in turn posting comments. Such scrutiny enhances authenticity of the information posted. The model in Figure 2.2 shows this process on the left hand side called portfolio as workspace process.

2.7 Requirements and development of e-portfolios

To be able to develop an e-portfolio software tools that can capture and store data such as digital camera, voice recorder, word processors, mobile phone with a camera etc are necessary. These tools are used to capture students' data or artifacts that reflect successes or growth opportunities in the course of student learning, such could result from interaction with the teacher, other students or even community in various social functions. Multimedia software for presentation is also required. Relational database may also be required to link the artifacts to standards. The growth opportunities or successes are based on agreed standards with the teachers or mentors, not everything is recorded. Even what is recorded is later reviewed against the set standards.

A server or storage facility is required to store this information captured. The information can be stored in free online apps like Google drive, Windows one drive, etc. The information so captured can also be posted to school's website via an appropriate web authoring tool. Wikis can

also be developed to reflect the students' portfolios. The other obvious requirement is power connectivity. Internet connectivity is optional but important.

2.8 Conceptual Model

A model was developed, which incorporated the three levels of e-portfolio of storage, process and showcase. The model further incorporated use of free online resources as storage of artifacts with a parallel back up at school level in a server or stand alone computer. The collection of artifacts was linked to an online blog, wiki or social media platform like Facebook to enable peer reviews and reflections. A final collection organized periodically according to themes and accepted or agreed standards was then presented on a platform (assessment management system) for assessment which could be a school website. Within the e-portfolio there was the process of information filtering and matching which enables the e-portfolio to show the personality type as well as the abilities, skills and talents of the student, based on the artifacts posted or what the student inputs through the input device.

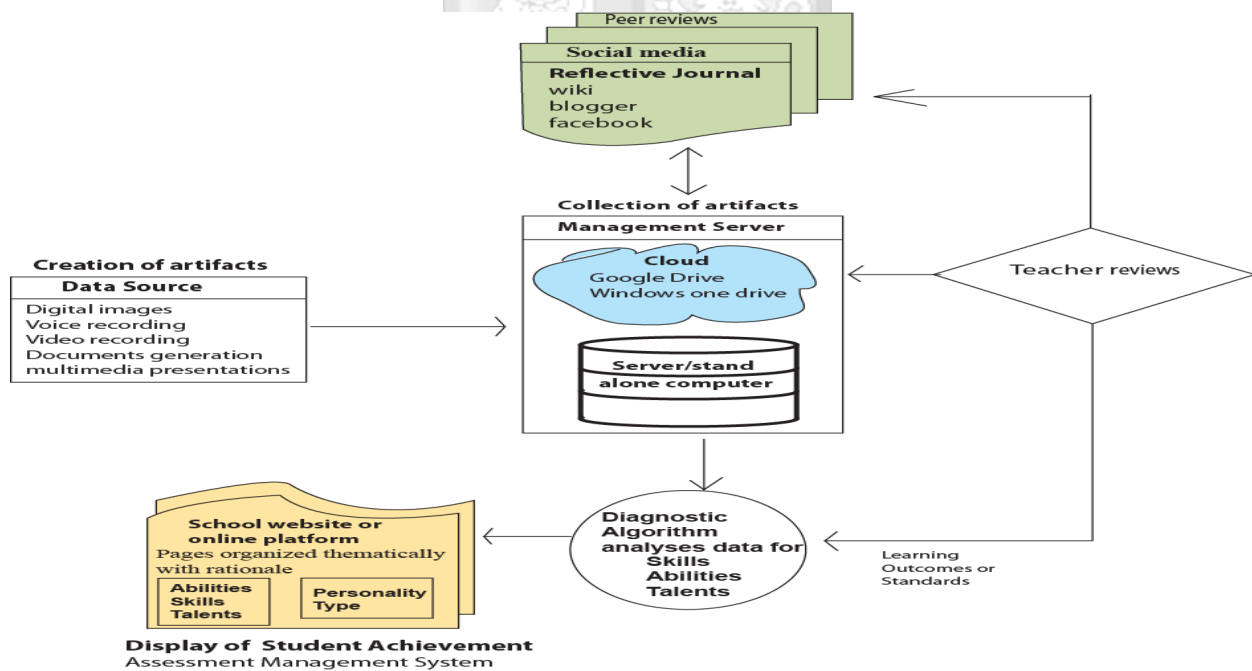


Figure 2.6 Conceptual e-portfolio Model

2.9 Validation of the model

Model validation is an enabling methodology for developing a suitable mechanism that can be used to make predictions of the model with quantified confidence (Thacker, et al., 2004).

Validation is the process of determining the extent to which a model is an accurate representation of the real world in respect to the intended uses of the model. Verification on the other hand is the process that determines a model implementation accurately, represents the developer's conceptual description of the model and its intended solution (Thacker, et al., 2004). Although validation may not prove that a model is accurate for all possible applications and conditions it provides evidence that a model is sufficiently accurate and hence can be used for the purposes for which it was developed.



Chapter 3 Research Methodology

3.1 Introduction

This chapter describes the research methodology that was used to carry out the study. Research methodology refers to steps taken in studying the research problem and the logic behind it (De Vaus, 2001). This chapter explores research design, target population, sampling procedure, sample size, data collections and data analysis methods.

3.2 Research Design

Research design refers to the structure of an inquiry (De Vaus, 2001). It is a logical task undertaken to ensure that the evidence collected enables a researcher to answer questions or to test theories as unambiguously as possible (De Vaus, 2001).

This study used exploratory research design in which a case of Nairobi County was considered. This is because the study sought to establish e-portfolio content for secondary schools that could be used for assessing students' ability. Exploratory research design tries to develop working hypotheses from an operational point of view with the main focus or emphasis on discovery of ideas and insights (De Vaus, 2001). The main aim of exploratory research design is to identify the boundaries of environment in which the problems or opportunities of interest are likely to reside and identify the salient features that may be found relevant to the study (Wyk, 2016). This research design was appropriate for this study because it allowed collection of large and repeated amount of responses from the target respondents with the main emphasis of establishing from them the content requirements for an e-portfolio for secondary schools.

A survey was used to collect data from teachers who teach in public secondary schools in Nairobi County. Both qualitative and quantitative approach was used. This is because in the real world there are both objective and subjective aspects of any phenomenon to be studied (Jupp, 2006); and therefore to be able to establish content requirements for an e-portfolio for a secondary school from respondents the study used both qualitative and quantitative data. This study was a case of public secondary schools in Nairobi County. Case studies are good at showing how things occur in practice and hence good at informing decisions. They also give a more realistic understanding of phenomena and also provide flexible ways of collecting,

analyzing, and interpreting data and information (Rosham, 2009). The study sought to establish the perception of teachers on the student information that can demonstrate student ability, talents and personal traits. This was achieved through administering questionnaires to teachers. A student e-portfolio model was then designed and validated and its content was based on the data generated.

A pilot on the tools was done by administering them to some few teachers. The tools were then refined, based on the findings from the pilot study to ensure reliability. To ensure validity the tools were reviewed to reduce ambiguity, leading questions, stressful questions or emotive questions; in other words this was done to ensure that the tools measured what they were supposed to measure.

3.3 Target Population

A target population is generally the entire group of individuals or objects to which researchers are interested in generalizing conclusions from a scientific inquiry (Explorable.com, 2009). The study targeted all teachers in public secondary schools in Nairobi County. The population for the study was all the teachers in these public schools, numbering 1,788 (Teachers Service Commission (TSC), 2016). These teachers were targeted because they teach schools that are cosmopolitan in nature and also due to their proximity and convenience to the researcher, hence minimizing cost.

3.4 Sampling Procedure and Sample Size

Random sampling was used to pick teachers who responded to the questionnaires. The formula $n = \frac{N}{1+N(e)^2}$ (Israel, 1992) was applied, where n = sample size, N = population size; and e = allowed error. Due to its nature, this study allowed a sampling error of 10%. A sampling error results from data collection process because of taking a sample rather than using the whole population (Israel, 1992). There are a total of 1,788 public secondary schools teachers in Nairobi County (Teachers Service Commission (TSC), 2016). Applying this formula resulted in administering data collection tools to 95 teachers. From 1,788 teachers, 95 teachers were selected randomly to answer the questionnaires. The questionnaires were administered online, by use of SurveyMonkey online tool. The calculation was done as shown;

$$n = \frac{1788}{1 + 1788(0.1)^2} = 94.70 \approx 95$$

3.5 Data Analysis

Data was analyzed using SPSS software and presented in various forms including graphs to make it easy to read. Qualitative data from free responses of the questionnaire were coded. Coding was based on reading through the responses and identifying key comments. These key comments were then grouped into themes.



Chapter 4 Data Analysis and Interpretation of Results

4.1 Introduction

Findings are based on data collected from respondents using questionnaires. The data analyzed was mainly based on demographic information, respondent's perception of data that can be used to assess students' talents, ability and personal traits and adequacy of the current assessment system in secondary schools to assess ability, talents and personal traits.

Data was collected through 120 questionnaires administered online by use of online tool called *SurveyMonkey*. Out of the 120 questionnaires administered, 95 were filled successfully. Data from 95 respondents who represented the population of the study was analyzed. Data representation was through charts and graphs to make it more clear and for ease of readability.

4.2 Demographic Information

Demographic information for the study constituted teaching experience, teaching subjects, academic qualification and responsibility in the school.

4.2.1 Teaching experience

As shown in figure 4.1, 90.9% of the respondents had a teaching experience of above 10 years. This implies that majority of the respondents were experienced teachers and therefore well versed with students' data that can be used for students' assessment.

4.2.2 Qualification

Quite a great percentage (over 60%, see figure 4.2) of the respondents had BEd. or MEd. implying that they were highly qualified as teachers and therefore their opinion regarding teaching content is reliable.

4.2.3 Responsibility

From figure 4.3, the study found out that a bigger percentage of the respondents (46.52%) are Heads of Department, Deputy Principals or Principals. These are senior responsible teachers whose opinion can be relied upon.

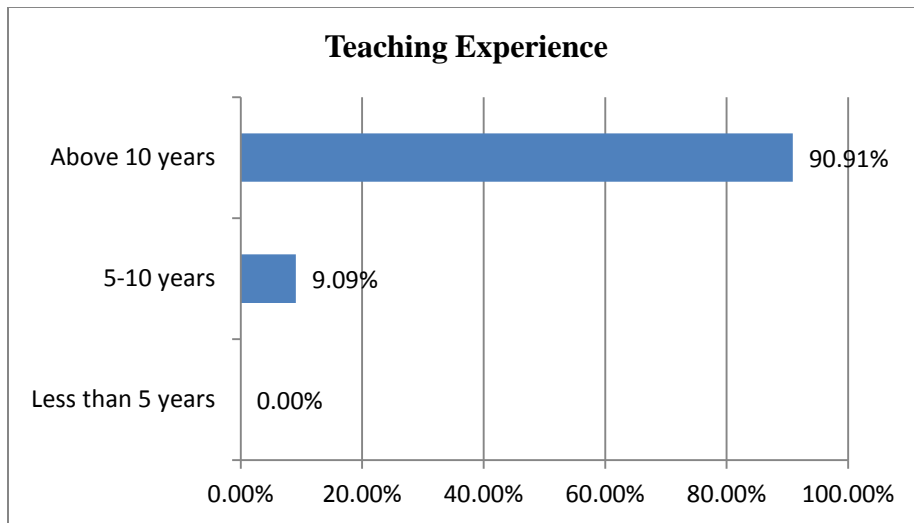


Figure 4.1 Teaching Experience

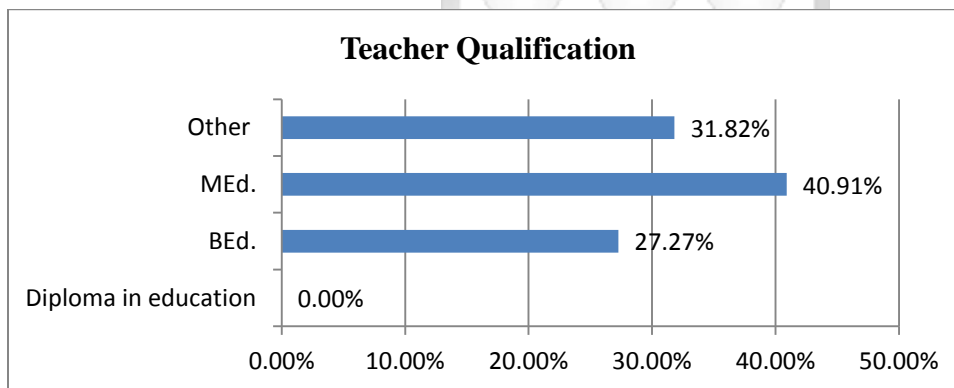


Figure 4.2 Teacher Qualification

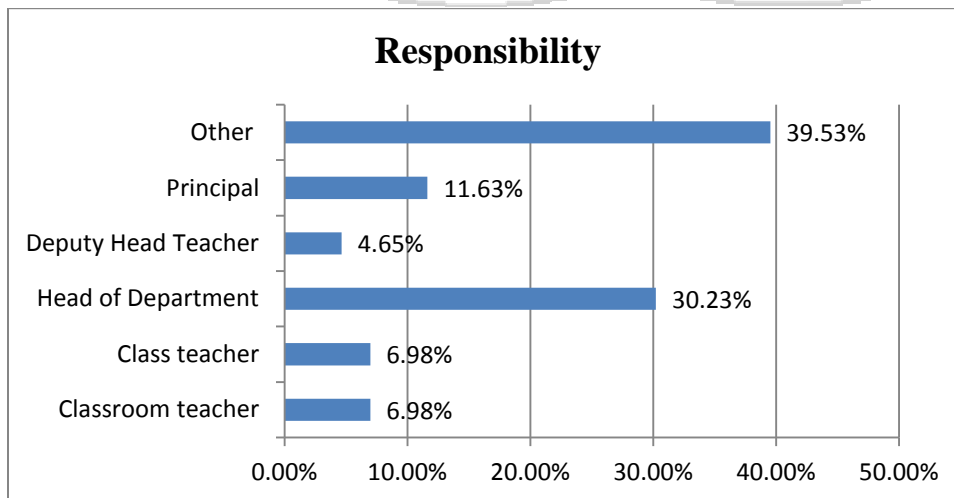


Figure 4.3 Responsibility

4.2.4 Perception on Students' Assessment Data

Majority of the respondents at 77.8% agree that examination test scores can be used to assess students' abilities, 22.2% strongly agree with this statement. On whether the same assessment can be used to assess students' talents majority are of a different opinion at 50% and 5.6% disagreeing and strongly disagreeing. From the study it was observed that majority of the respondents disagree with the statement that examination test scores can be used to measure students personal traits. This is a pointer that the assessment system in secondary schools is not adequate to assess personal traits. 16.7% strongly disagreed with this statement, 38.8% disagreed while 22.2% were not sure. The study found out that majority of the respondents was of the opinion that the extent to which students participate in games can be a measure of their talents. 61.1% agree with this statement, with 27.8% strongly agreeing. This means that to measure talents, part of the data that should be considered is the extent of students' participation in games. On whether students' extent of participation in music can be used as a measure of personal traits, majority agreed at 64.7% and 11.8% strongly agreeing. In other words 76.5% of the respondents are of the opinion that the extent of students' participation in music can reflect their personal traits. It was also established that 68.4% of the respondents agreed with the statement that students' extent of participation in music could be used as a measure of personal traits and 70% agreed that the same (extent of students' participation in music) can be used as a measure of students' talents. 27.8% strongly agreed with the statement. 80% of the responded were of the opinion that the extent of students' participation in the students' council can be a measure of their ability. The same percentage (80%) indicated that the extent of students' participation in the students' council can also be used as a measure of students' personal traits. The study found out that 22.2% strongly disagreed with the statement that the existing assessment system in secondary schools is adequate in assessing students' talents, and 44.4% disagreed with it. On whether the existing assessment system in secondary schools is adequate in assessing the students' ability, 11.1% strongly disagreed, 55.6% disagreed while 22.2% were not sure. Only 11.1% agreed with this statement. 66.6% of the respondents were of the contrary opinion that the existing assessment system in secondary schools is adequate in assessing personal traits. 11.1% agreed with this statement.

Other student data perceived as necessary for students' assessment on their ability included extent of participation in science and engineering fairs, extent to which students can design

items, extent to which they can work with others, students' level of creativity, and their level of participation in community work. To assess students' personal traits the respondents suggested using information about the students' hobbies and clubs, their level of participation in social work, the extent of their participation in drama and comedy, their level of organization in general. On data useful to assess students' talents, the respondents suggested use of students' data on their level of participation in music, drama and games.

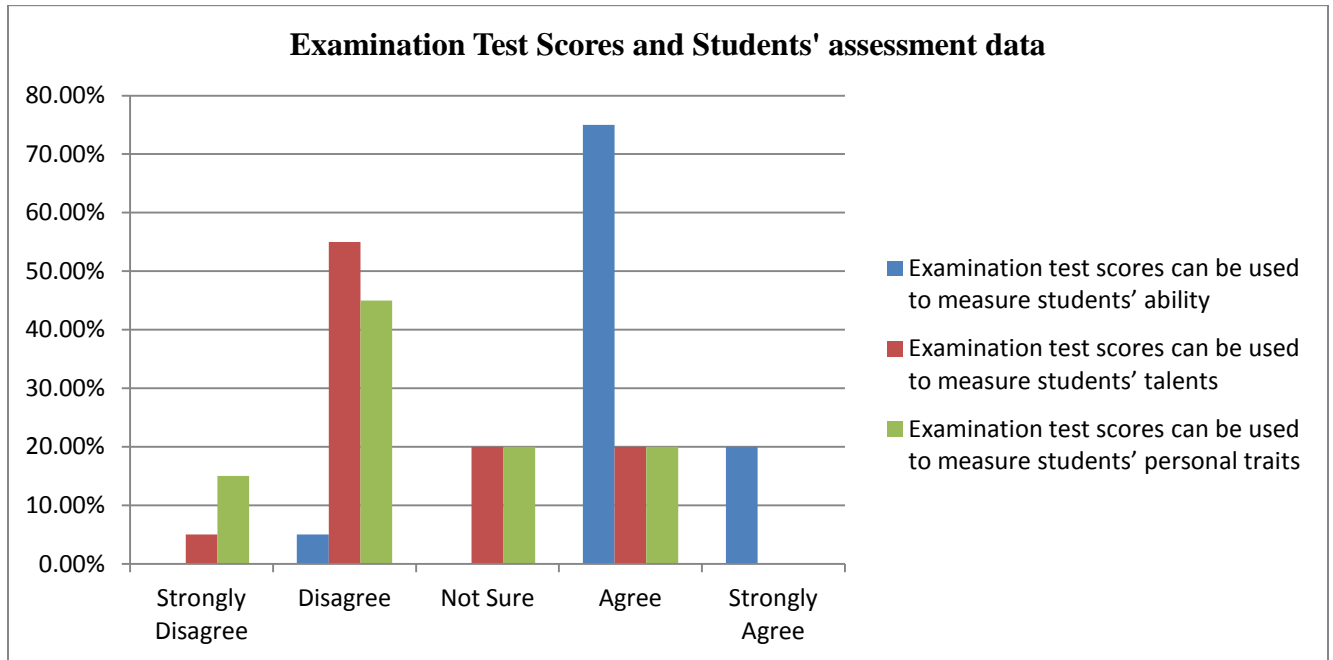


Figure 4.4 Examination Test scores

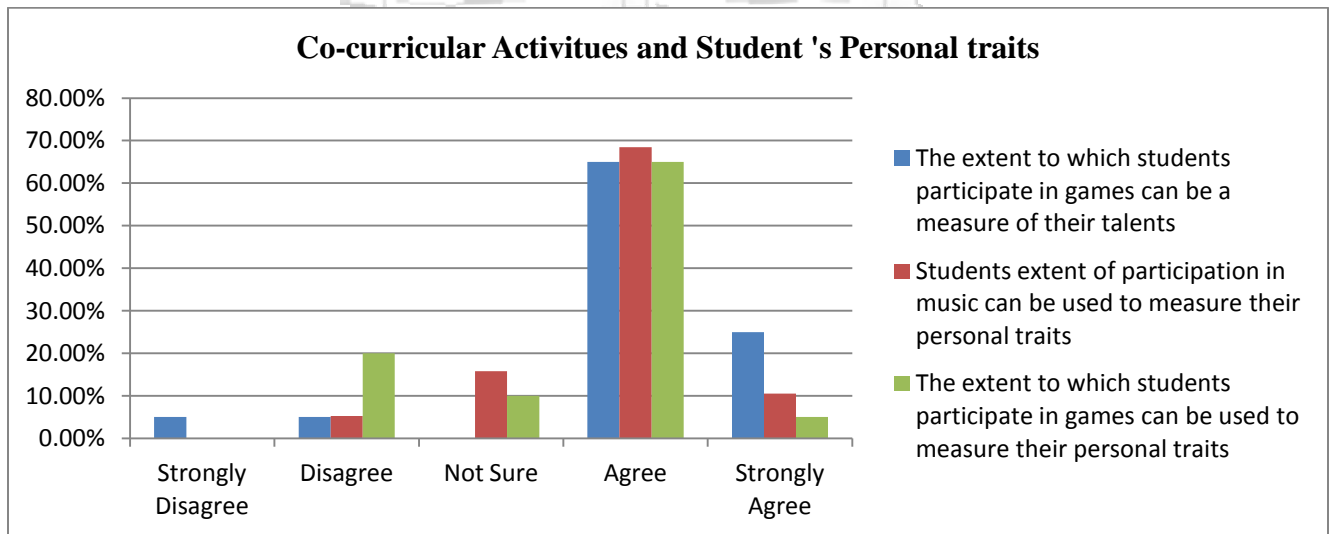


Figure 4.5 Co-curricular Activities and Student's Personal Traits

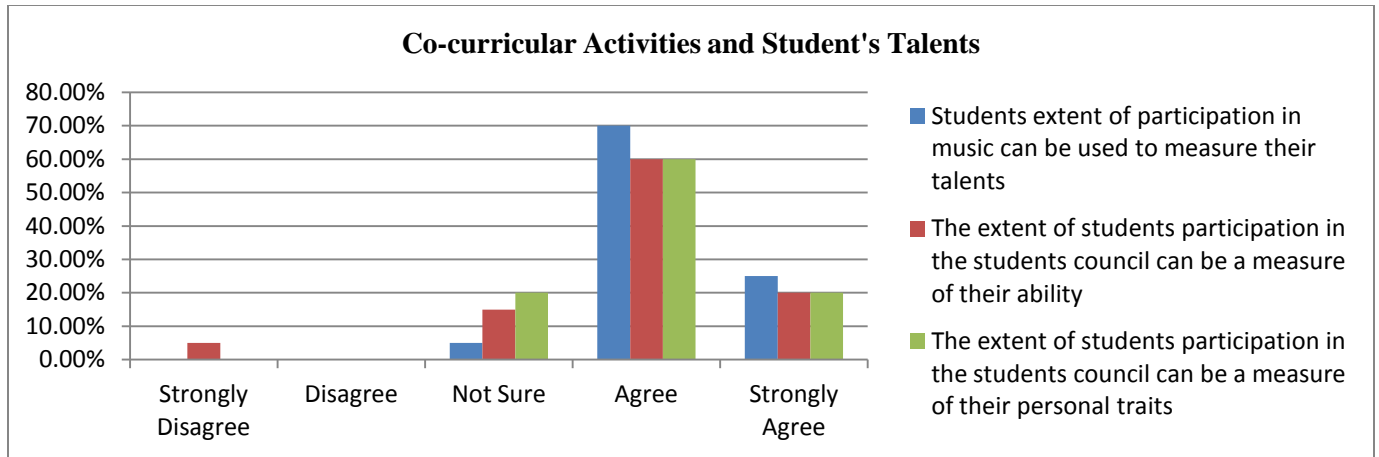


Figure 4.6 Co-curricular Activities and Student's Talents

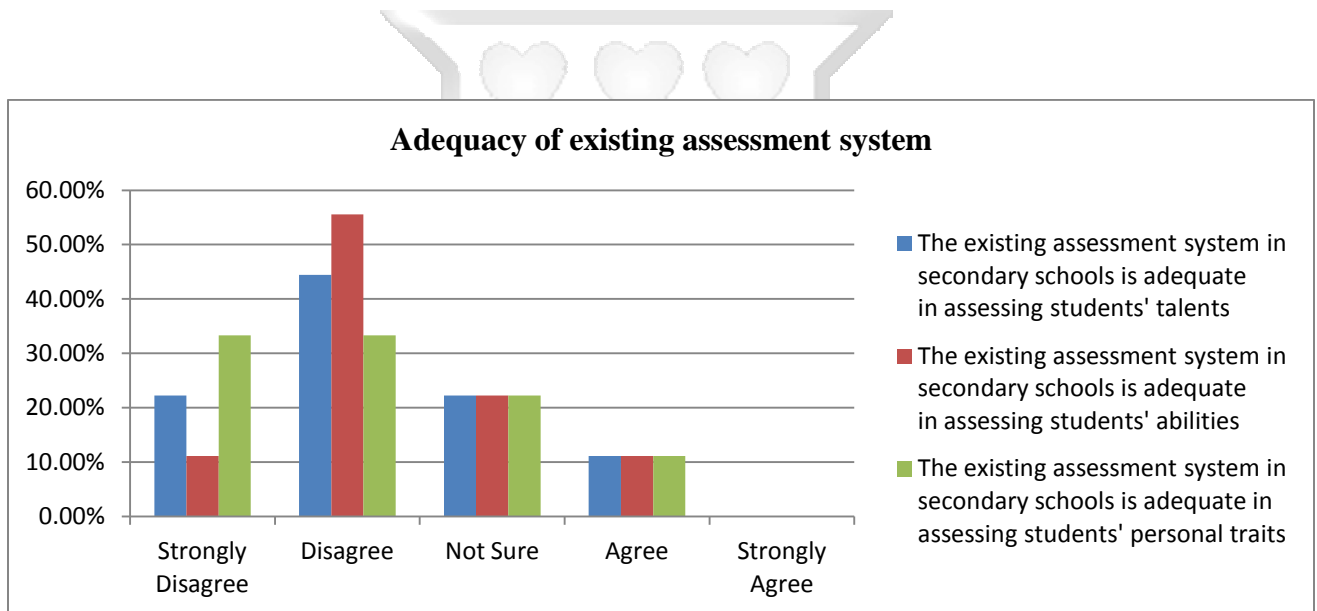


Figure 4.7 Adequacy of Existing Assessment System

4.3 Data Analysis Summary and Interpretation of Results

From the data we find out that majority of the respondents were senior teachers, highly qualified and who are experienced in teaching. This implies that they are well versed with assessment system available in secondary schools in which they teach and hence their opinion in this study was of great significance. Study findings show that there is general perception by the teachers that examination test scores alone cannot be relied upon to assess students' personal traits and talents. The findings go on to show that the existing assessment system is inadequate in assessing students' abilities, personality traits and talents. The respondents are in agreement that student's ability, traits and personal

talents can be assessed by students' extent of participation in music and games or sports and their level of participation in students' council. Aspects regarding extent of student's participation in music or games and their level of participation in students' council according to respondents' opinion are among the contents that should form part of assessment content for students.



Chapter 5 Proposed e-portfolio Model

5.1 Introduction

The main focus of this research was to develop an e-portfolio model for student assessment in secondary schools. This chapter discusses e-portfolio assessment model developed after data from research findings and reviewing secondary data from literature review. The model involves creation of student's artifacts in a digital format. Such artifacts may include voice, sound, image, video or text. The teacher interacts with the posted data for verification purposes. This data is processed and displayed on demand specifying characteristics of the student such as the students' academic achievement, personal details, personality traits and talents.

5.2 Basics for e-portfolio Model

5.2.1 Parameters Involved

Parameters used in the proposed model include data store or repository which acts as data source, data, actor and algorithm.

These parameters are as explained below;

- a) **Data source**; Students are the main sources of data. Students generate data in form of artifacts and store it in a data store. Teachers may interact with this data for verification purposes. This data may be represented as $Dsc=[Dsc_1, Dsc_2, \dots, Dsc_n]$, where n represents the number of students, e.g. Dsc_1 is all the data for student 1.
- b) **Data**; these are raw facts and figures captured from the data source. Data occurs in various formats, viz image, video, audio, text, multimedia or presentation, etc. This data is presented as
 - ❖ Image data $\Rightarrow Dimg=[Dmg_1, Dmg_2, Dmg_3 \dots Dimg_n]$
 - ❖ Video data $\Rightarrow Dvid=[Dvid_1, Dvid_2, Dvid_3 \dots Dvid_n]$
 - ❖ Audio data $\Rightarrow Daud=[Daud_1, Daud_2, Daud_3 \dots Daud_n]$
 - ❖ Text data $\Rightarrow Dtxt=[Dtxt_1, Dtxt_2, Dtxt_3 \dots Dtxt_n]$
 - ❖ Multimedia data $\Rightarrow Dppt=[Dppt_1, Dppt_2, Dppt_3 \dots Dppt_n]$
- c) **Actor**; Any person or agent acting on the data is referred to as an actor.

- d) **Algorithm**; these are set rules, that determine a decision. To arrive at a decision based on the data posted, there is need for predetermined set of rules that must be followed. This set of rules is called algorithm. This algorithm is constant, may be represented by (β).
- e) **Processes**; refers to execution of the data that has been stored or captured. Process can be presented by λ , hence a set of processes carried out on data is represented as $\lambda[\lambda_1, \lambda_2, \lambda_3 \dots \lambda_n]$

5.2.2 Model architecture

Figure 5.1 shows diagrammatic representation of the architecture of the proposed model.

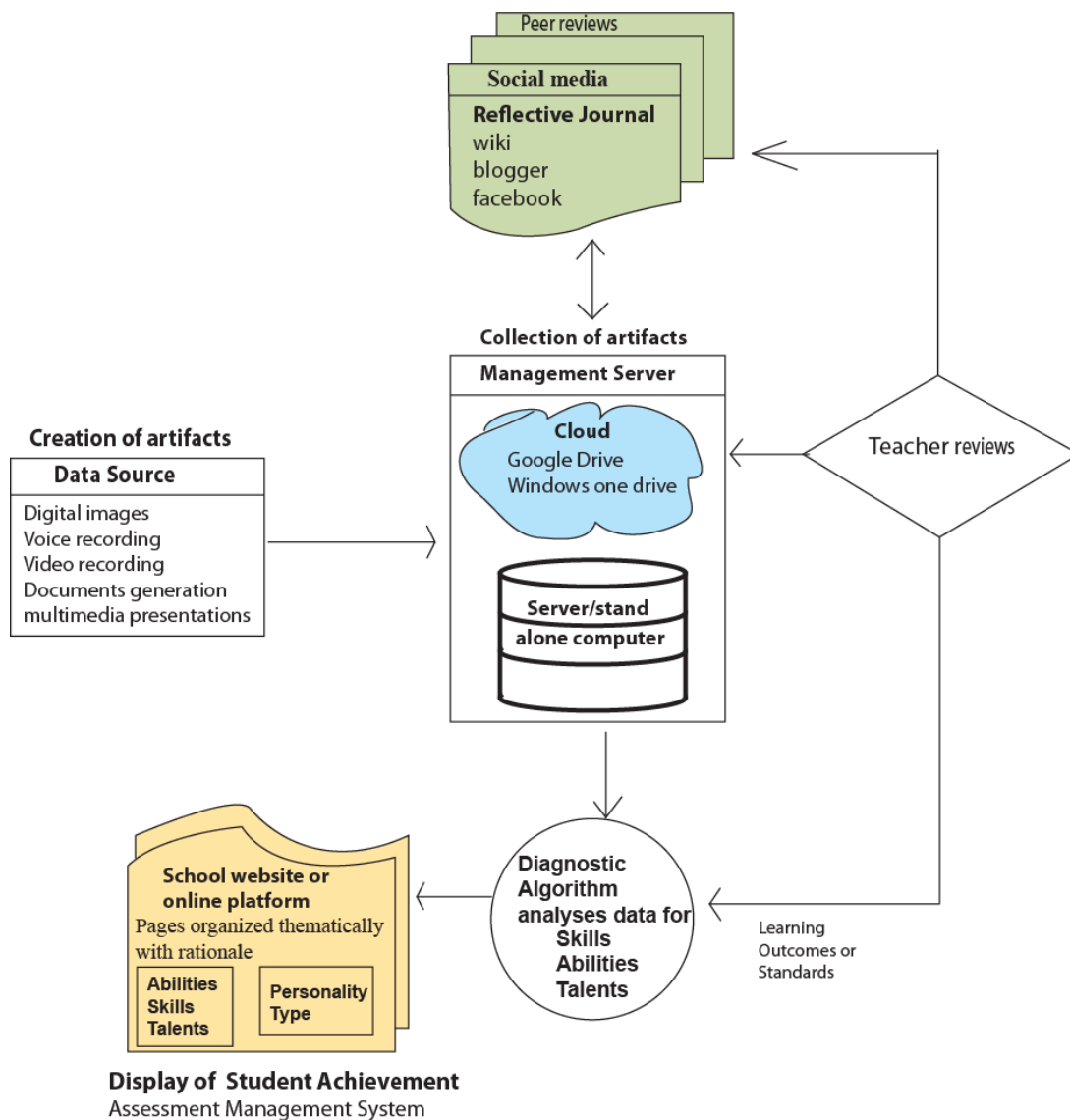


Figure 5.1 Proposed e-portfolio Model

The architecture for an e-portfolio can be viewed as containing three parts or levels (Barrett, 2010). The first part involves collection and storage of artifacts (data) or contents of the e-portfolio. This part collects data in their various formats, text, video, audio, image or presentation. The second part is the workspace, which involves the process of reviewing the data by peers and the teachers. It is in this part that the data is verified by the teachers, of course putting peer review comments in and the students' personal reflection on their data into use. The final part is the product or the contents of the e-portfolio. Once data has been peer reviewed and verified by the teachers it is then processed using information filtering algorithm (which could be personality diagnostic algorithm) and presented thematically on the school's website or an online platform.

5.2.3 Model Components

E-portfolio model for student assessment consists of various components that work together as a system. Various components perform certain tasks to contribute to complete operability of the e-portfolio. The components are explained below;

- i. **Data source or artifacts collection point** – This part provides collection point of data in form of text, images, video, audio or multimedia. It has input devices which enables data in the mentioned formats to be input in the system. It is designed to allow users to upload data in a very user friendly way and in a prescribed format to enable easy processing of the data. Students will select an appropriate category of artifact to enter data. For instance data could be captured as shown in figure 5.2.

Figure 5.2 Data Source

Data source has categories for students to select from; Sports, Leadership, Innovations, Entertainment and Academic categories. Academic category shows student's academic record which includes grades for various subjects done for each school term and year. For Sports category there are levels of student's participation, i.e. school level, county level and national level. Merits have three categories, gold, silver and bronze. Leadership levels range from head of student's council, member of the council. Ratings for different levels are based on seniority of the level as per agreed criteria by the school. Similarly innovations and entertainment also have student's participation levels. Academic category has various subjects according to the syllabus and scores for various tests given by teachers. Students can upload different data types like text files, images, video and multimedia presentations. They can provide links to online pages.

- ii. **Management Server** - This component acts as store of data that has been input in the system by the user. Such data includes the artifacts from the students and the reviewed data by peers and the teacher. It provides hyperlinks of the artifacts to social media platforms, to enable reviews by peers. It also contains the database with data that shows the relationship or association between personality types, personality traits, and student's activities or artifacts. Other than academic grading system, the database also contains a collection of statements clustered into six clusters, each depicting Holland's personality type, (Johns Hopkins School of Medicine, 2016), see Figure 5.3. To determine students' personality types, personality diagnosis algorithm is used. A student's (user's) reported preferences are interpreted as a demonstration of their underlying personality type (Pennock, Horvitz, Lawrence, & Giles, 2000). In our case here, personality type is encoded simply as a vector of the student's "true" selection for statements in a cluster within the database. For each student in the dataset logged in, probability is calculated for them as the active user and given their respective selection vectors. This probability is multiplied by the probability that the active user will make selection of the statements in a cluster as one of the available selections, given what the comparison student (user) made selections of the statements. This is summed together for all users and the selections with the highest probability taken as the predicted selection for the active user on the cluster statements. This is illustrated by the equation below

$$\text{Max}_{k=1,\dots,5} \sum_{i=1}^n P_r(r_q(j) = y) \cdot P_r(q^{true} = i | R_q, R_i)$$

Where k is a possible selection, n is the number of users (students), $r_q(j)$ is the selection of the active user on statements on a cluster j , and R_q is the selection vector for the active user (student) (Kayima, Kivisi, & Shibwabo, 2015).

The computation of the student's personality is based on the percentage of the preference within a cluster. The higher the percentage in a cluster the more preferred the personality type. Academic data is input, reviewed by the assessors (teachers) and converted into text and numbers and its processing is done by a grading program so that the output is a suitable grade awarded to the student.



REALISTIC (R)

Are you:

- practical
- athletic
- straightforward
- mechanically inclined
- a nature lover
- curious about the physical world?

Can you:

- fix electrical things
- solve mechanical problems
- pitch a tent
- play a sport
- read a blueprint
- operate tools and machinery?

Do you like to:

- tinker with machines
- work outdoors
- be physically active
- work with your hands
- build things
- work on cars?

TOTAL _____

INVESTIGATIVE (I)

Are you:

- inquisitive
- analytical
- scientific
- observant
- logical
- precise?

Can you:

- think abstractly
- solve math problems
- understand physics theories
- do complex calculations
- use a microscope
- interpret formulas?

Do you like to:

- explore ideas
- use computers
- work independently
- perform lab experiments
- read scientific or technical magazines
- analyze data?

TOTAL _____

ARTISTIC (A)

Are you:

- creative
- intuitive
- imaginative
- innovative
- sensitive
- an individualist?

Can you:

- sketch, draw, paint
- use intuition
- play a musical instrument
- write stories, poetry, music
- develop new ideas, approaches
- design fashions or interiors?

Do you like to:

- solve problems in original ways
- read fiction, plays, poetry
- use verbal abilities to speak, act, entertain
- take photographs
- use visualization abilities
- express yourself creatively?

TOTAL _____

SOCIAL (S)

Are you:

- friendly
- helpful
- idealistic
- insightful about people
- outgoing with others
- understanding?

Can you:

- teach or train others
- express your feelings clearly
- lead a group discussion
- mediate disputes
- cooperate well with others
- work well in groups or teams?

Do you like to:

- solve problems in original ways
- read fiction, plays, poetry
- use verbal abilities to speak, act, entertain
- take photographs
- use visualization abilities
- express yourself creatively?

TOTAL _____

ENTERPRISING (E)

Are you:

- self-confident
- assertive
- sociable
- persuasive
- enthusiastic
- energetic?

Can you:

- initiate projects
- convince people to do things your way
- sell things or promote ideas
- give talks or speeches
- organize activities and events
- lead a group?

Do You Like To:

- make decisions affecting others
- use energy or drive
- give speeches or talks
- use skills in argument or debate
- take risks
- organize and lead others?

TOTAL _____

CONVENTIONAL (C)

Are you:

- well-organized
- accurate with details and numbers
- interested in number crunching
- methodical
- conscientious about facts
- efficient?

Can you:

- work well within an authority system or organization
- write reports
- keep accurate records
- use a computer terminal
- perform calculations
- gather, organize and report data?

Do You Like To:

- follow defined procedures
- make charts, tables and graphs
- work with numbers
- type or do word processing
- classify and organize information
- be responsible for details?

TOTAL _____

Figure 5.3 Cluster Statements for Personality Type Codes

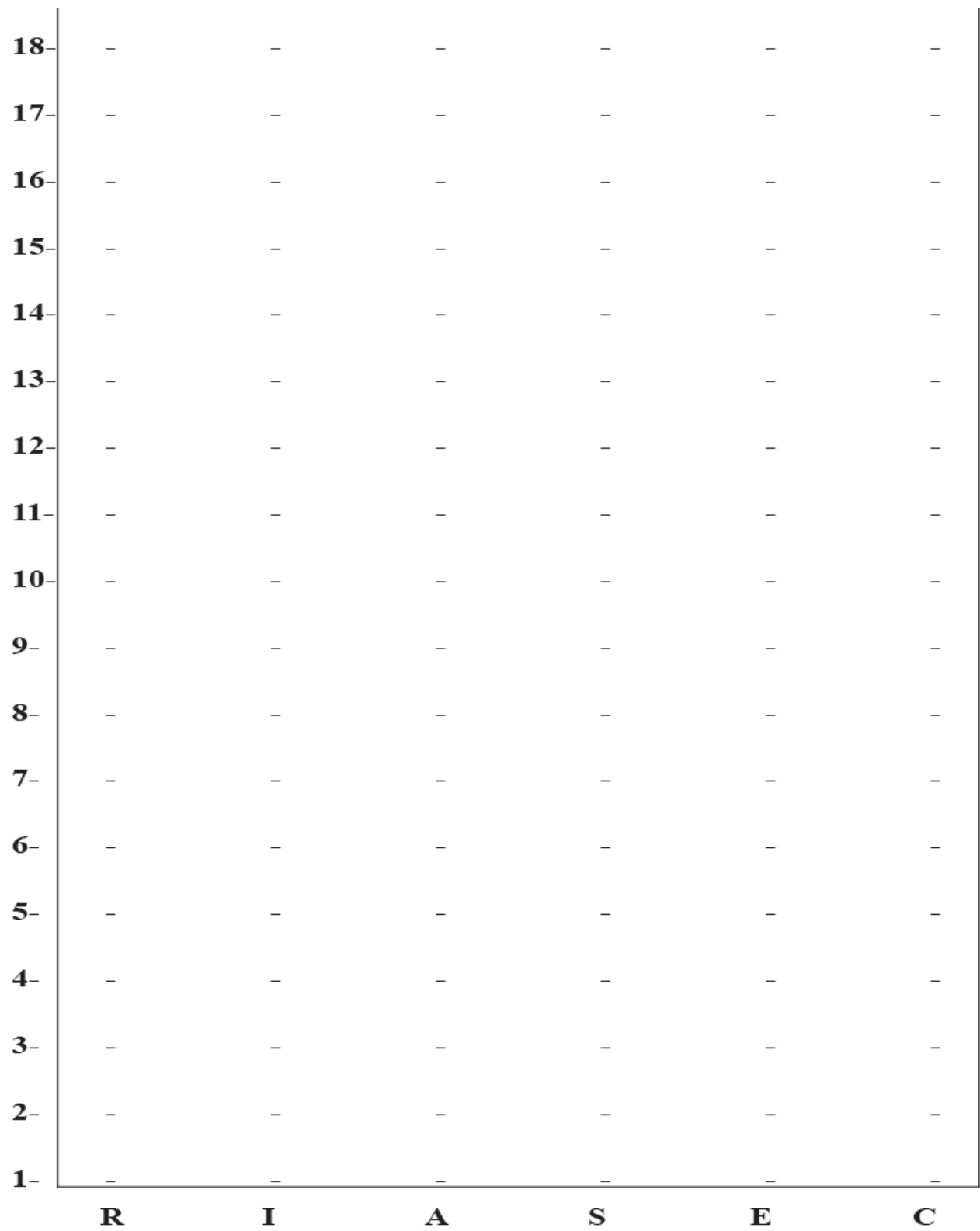


Figure 5.4 Graphical representation for cluster statements scores

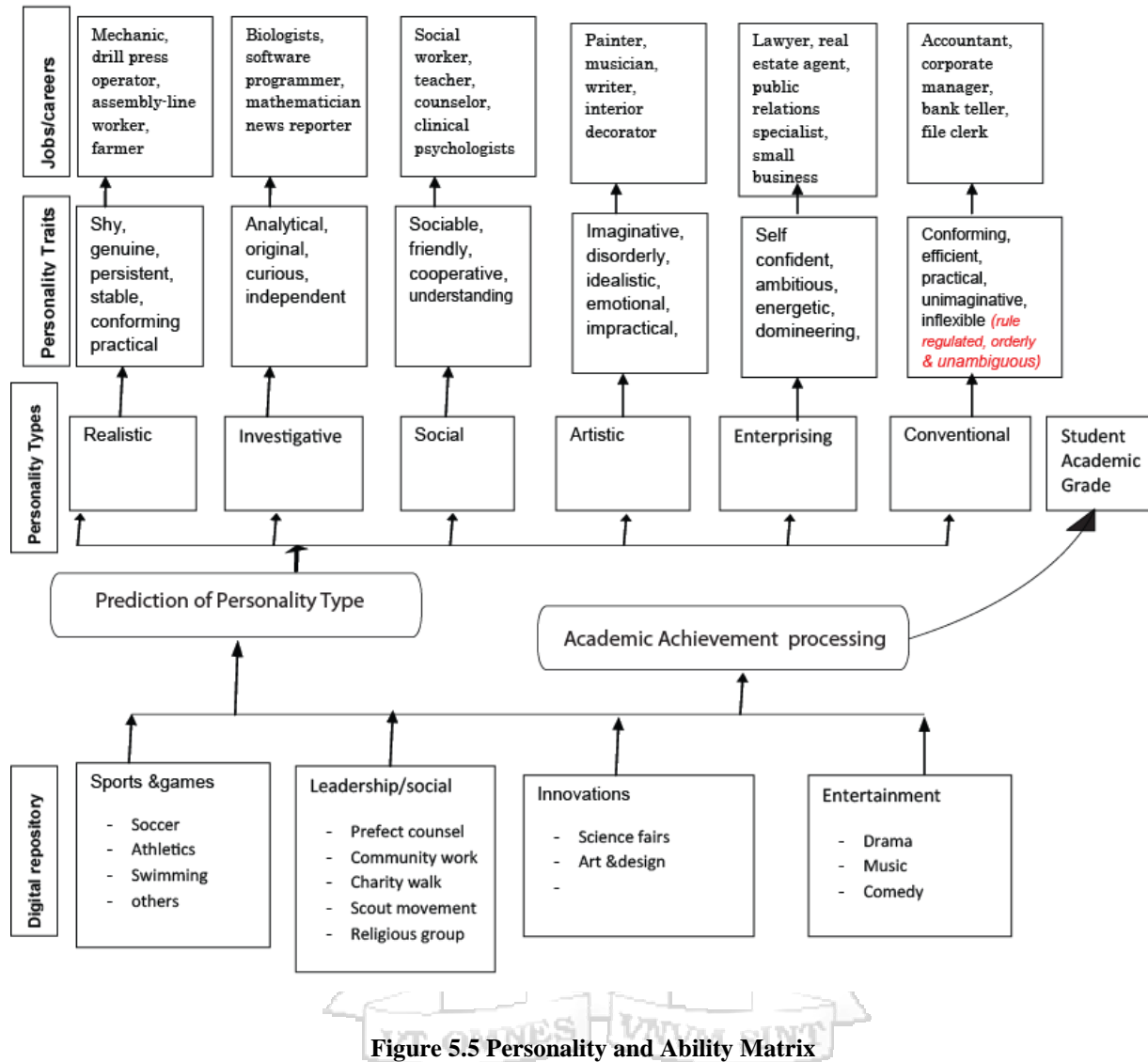


Figure 5.5 Personality and Ability Matrix

iii. **Website or online platform** – This is where the output of the processed data is displayed. The student’s information showing abilities, talents and personality types are available at this point. At this point processed data is organized into pages based on themes and rationale. Each student will have their own profiles displayed.

5.2.4 Possible scenario

A student enters data at the input device, the data is identified as per the student’s ID captured by the input device upon successful login, and all data for that ID classified as belonging to the ID and put together. Reviews that are authenticated and accepted are treated as updates to the data. Thus text or image data for a student 1 by the input device I is

I=[Dsc1.img+Dsc1.txt]. This data is analyzed by matching it with stored data in the database and following set rules, and eventually intended output obtained.

5.2.5 Data Processing Diagrammatically

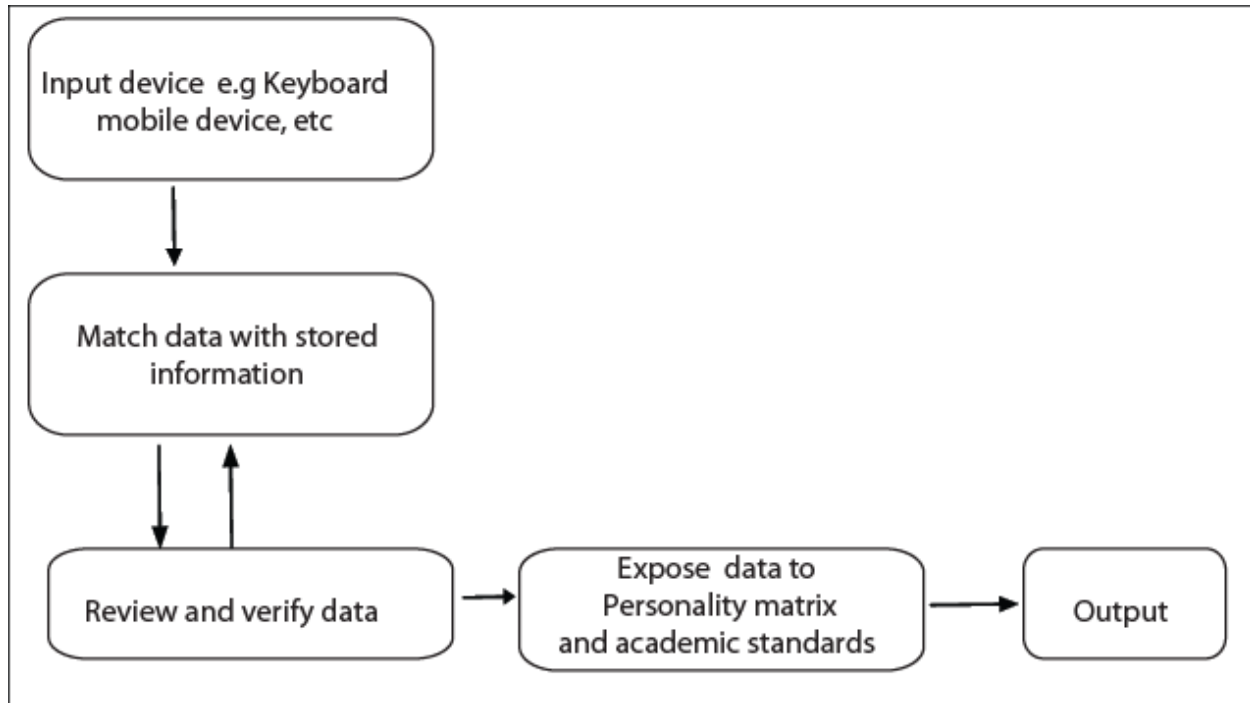


Figure 5.6 Operation of the model

Figure 5.6 shows diagrammatically the operation of the model. Data is input into the system through appropriate input devices, it is assigned a process that checks the authenticity of the data. The data is then subjected to another process where it is reviewed and authenticated, after which it is analyzed using set rules and matched accordingly. The input data is matched to stored data within the system based on set relationships or rules so as to provide an appropriate output. Finally the intended output is displayed, see Figure 5.7. This intended output is the student's personality type and academic grade.

Sports	Sports Award	Sports Level
Soccer	Merit	National
Entertainment	Entertainment Award	
Drama	Merit	
Leadership		
Leader		
File		
Choose File No file chosen		
Url		
http://		
Personality Type		
Artistic / Realistic		
SUBMIT		

Figure 5.7 output of students processed data

5.3 Implementation and validation

The value of the model can be measured from the solution it offers according to its intended objectives and its ability to transform inputs and outputs into quantifiable form as far as solutions are concerned. The researcher in the process of validating the model isolated the components of the model and details of activities as well as outcomes and measurement quantities that a school can use to determine the model's performance.

A validation questionnaire was used by the researcher to assess the model's validity as far as achievement was concerned, considering the model's performance and architecture. This questionnaire was answered by 30 teachers randomly selected, who had information technology background and were well versed with existing secondary school assessment system. The score interpretation of the questionnaire is as shown in table 5-1, while the questionnaire is as shown in Table 5-2.

Table 5-1 Score Interpretation

Score	Interpretation
5	Excellent
4	Very good
3	Good
2	Fair
1	Poor

Table 5-2 E-portfolio Model Validation

Model Performance		
Activities/outputs	Metrics	Score (1-5)
Integration in the system	Do you consider integrating the model into the assessment system necessary?	
Operability	Can the components work together?	
Sub-total Ranking		
Model Architecture		
Activities/outputs	Metrics	Score (1-5)
Integration of the model	Do you think this model can be easily integrated with secondary school assessment system	
Talents and abilities	Do you agree the model can show student talents and personal traits?	
Sub-total Ranking		

5.4 Validation Results

From the questionnaire the lowest possible score with all questions answered is 4, i.e. a score of 1 in each question, while the highest score is 25. The ranking were categorized as per table 5-3.

Table 5-3 Ranking Categorization

Between 4 and 7	Between 8 and 11	Between 12 and 15	Between 16 and 19	Between 20 and 25
Poor	Fair	Good	Very Good	Excellent

A score between 4 and 11 implies that the model requires improvement prior to implementation. A score between 12 and 19 means that the models is good to go and can be implemented successfully but rectify the weak areas. A score of 20 and above implies that the model can be implemented successfully.

The model ranked between 16 and 19, meaning that it can be implemented successfully. However some weak areas, that scored lowly need to be improved to ensure success of the model.



Chapter 6 Discussions

6.1 Introduction

This chapter contains discussion and summary of findings on content required for e-portfolio model for secondary schools. These discussions are in line with the research objectives and based on existing literature.

6.2 Content Requirement of an E-portfolio

This study sought to answer the question, what is the content requirement of an e-portfolio? This question was in context to the Kenyan situation in public secondary schools. From the findings it was found out that sports and games; student leadership as manifested by ones level of participation in students' council; and the level of students' participation in music and entertainment are vital requirements for e-portfolio content for student assessment. It came out strongly from the findings that these elements if included in the content can bring out students personal traits and talents according to the perception of the respondents.

6.3 Status of Current Assessment System in Secondary Schools

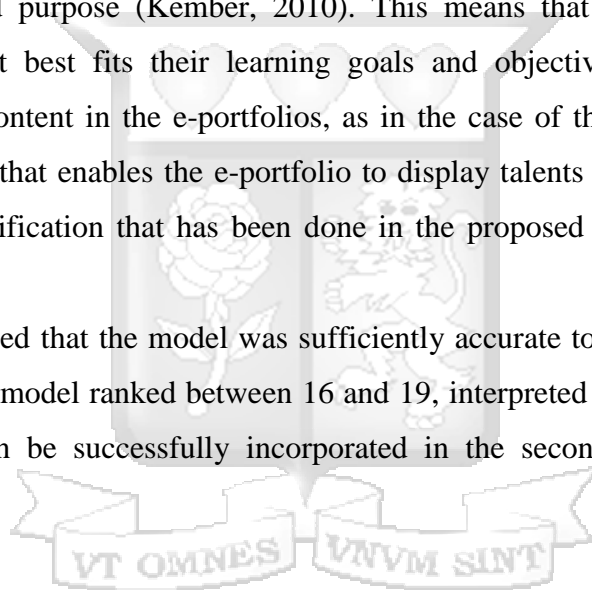
Findings of this study show evidence based on the respondents' opinion that the current assessment system is inadequate in assessing students' talents. From the demographic information of the respondents we found out that over 90% were teachers with a teaching experience of over ten years, over 67% had either a bachelors degree or masters in education and over 46% were either heads of department, deputy principals or principals and therefore implying that the respondents held senior responsibilities in school. Based on this information we can conclude that the respondents were well versed with assessment system available in secondary schools in which they teach and hence their opinion in this study was of great significance. Findings from this study show a general perception by the teachers that the current assessment system in secondary schools cannot be relied upon to assess students' personal traits and talents. The findings go on to show that the existing assessment system is inadequate in assessing students' abilities, personality traits and talents. Based on the research question on the available e-portfolios, within the Kenyan secondary schools context it is evident that the models available are inadequate in assessing students. In this regard that there is need for a better e-

portfolio model, such as the proposed that can improve the assessment system to be able to capture students' personal traits as well as talents.

6.4 Existing Models and the Proposed Model

The models available have content open to a variety of categories including sports and games, leadership and others as included in the proposed model. Most models describe processes involved in building an e-portfolio and do not dictate the content that can be contained in the e-portfolio. It is therefore open to the creators to come up with an appropriate content according to prescribed learning outcomes of their education system or objectives for which these e-portfolios are created. E-portfolios are created by students and teachers to best reflect the creator's development, vision and purpose (Kember, 2010). This means that the creators are free to include any content that best fits their learning goals and objectives. However other than including the requisite content in the e-portfolios, as in the case of the models discussed, it is prudent to add a feature that enables the e-portfolio to display talents and personal traits of the student. This is the modification that has been done in the proposed e-portfolio model in this study.

Validation results indicated that the model was sufficiently accurate to perform according to its intended objectives. The model ranked between 16 and 19, interpreted as very good as per table 5-3, meaning that it can be successfully incorporated in the secondary schools assessment system.



Chapter 7 Conclusions and Recommendations

7.1 Conclusions

Results of this research show that the assessment content of the current assessment system is inadequate in assessing students' personal traits and talents as per the perception of the respondents. The current assessment system is majorly on test scores. The respondents are of the opinion that test scores only cannot adequately assess students' talents and traits. This indicates need for additional content that can assess student's talents and traits. Findings further show that e-portfolio content should include a measure about the extent of students' participation in sports and games; their level of participation in students' council and their extent of participation in entertainment activities like music, in addition to what the assessment system currently is able to assess.

Literature reviewed in this study show that an e-portfolio should allow students, to accumulate artifacts that can show their learning over time. Such an e-portfolio should provide workspace for students to post their artifacts as well as offer an opportunity for peer review and for the teachers to review the artifacts. The artifacts can then be used for purposes of evaluation. The type of artifacts which basically constitute the content of e-portfolio, are usually determined depending on the goals, objectives and expected outcomes of the education system. One of the goals for secondary education in Kenya is to foster nationalism, patriotism and national unity (Ministry of Education (MOE), 2012). Patriotism is an example of a value. Research has shown that our values help determine our personality (Denham, 2010), therefore assessing personality informs on the extent of entrenching stipulated values in the education system. The model proposed is intended to display personality types or traits of the students. The results of this research show that the proposed e-portfolio model can add quality to the assessment system in secondary schools.

This study has been able to establish the content requirements for an e-portfolio in the Kenyan public secondary school's context. Findings have been able to clearly indicate what should be the content of an assessment e-portfolio in the secondary school. The study further was able to validate the developed model and its findings indicate that it can be successfully implemented,

however it was not within the scope of this study to find out whether the proposed model can be accepted within the secondary school education system.

7.2 Recommendations

In order to assess the stipulated goals in education, such as patriotism, it is prudent that the assessment system should be able to assess personality of the students, since values help determine personality. The Ministry of Education science and Technology should encourage secondary schools to adapt an assessment system that can assess talents and personality traits.

7.3 Suggestions for future research

This study would like to make the following recommendations;

The study suggests that future research can be directed towards determination of career paths by the students through use of personality diagnostic algorithms or machine learning to enable predictive learning techniques. This would help students at an early age of learning to pursue courses relevant to their careers and have a longer period of time developing themselves and building confidence around the areas where they truly fit. The system as it is now, makes students move in a broad area in their academics and even upon graduation, many end up earning a living from areas they never specialized in back at school.

Further research can be done on an online student assessment system for secondary schools in Kenya that uses information filtering algorithm to offer students assessment that can be done at different times but offer similar results for the students. This would minimize cases of cheating in our secondary schools.

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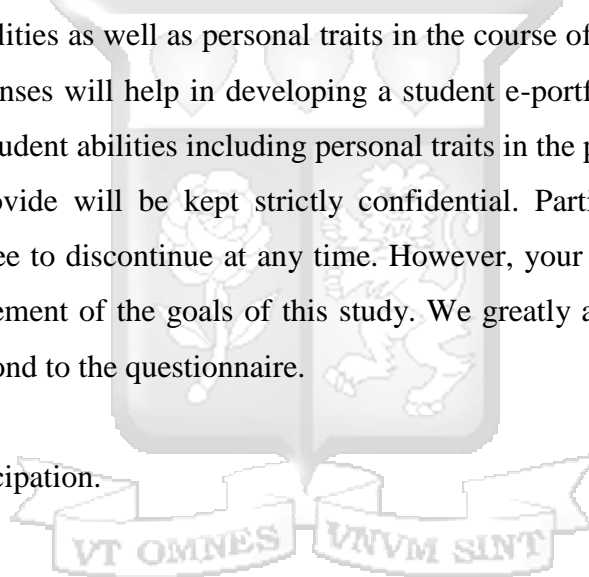
Appendix A: Questionnaire

INTRODUCTION

This questionnaire is part of a study being conducted by Philip Malinga Maate as part of the requirements for the award of the degree of Master of Science in Computer-Based Information Systems, Strathmore University. The main objective of this study is to come up with a student assessment e-portfolio model for secondary schools. We have developed a questionnaire to learn more about what teachers perceive as important requirements of a student e-portfolio that would enable reflect student abilities as well as personal traits in the course of learning. The knowledge we gain from your responses will help in developing a student e-portfolio model for secondary schools that can reflect student abilities including personal traits in the process of learning.

All information you provide will be kept strictly confidential. Participation in this study is voluntary and you are free to discontinue at any time. However, your experiences and opinions are crucial to the achievement of the goals of this study. We greatly appreciate your effort and the time you take to respond to the questionnaire.

Thank you for your participation.



QUESTIONNAIRE

INSTRUCTIONS

This questionnaire has two sections and consists of five printed pages. Select the most appropriate response when answering the questions.

SECTION ONE: DEMOGRAPHIC INFORMATION

A. RESPONDENTS

1. Please indicate your teaching subject.....
2. What is your teaching experience?

A) Less than 5 years B) 5-10 years C) Above 10 years

3. What is your academic qualification?

- A) Diploma in education B) BEd. C) MEd. Other

B. Responsibility

4. What is your responsibility in the school?

- A) Classroom teacher B) Class teacher C) Head of Department Deputy Head teacher D) Principal E) Other

SECTION TWO: E - PORTFOLIO CONTENT

1) Student data and abilities

Rate the following on the indicated scale to the best of your knowledge

		Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
1.	Examination test scores can be used to measure students' ability					
2.	Examination test scores can be used to measure students' talents					
3.	Examination test scores can be used to measure students' personal traits					
4.	The extent to which students participate in games can be a measure of their talents					
5.	Students extent of participation in music can be used to measure their personal traits					
6.	The extent to which students participate in games can be					

		Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
	used to measure their personal traits					
7.	Students extent of participation in music can be used to measure their talents					
8.	The extent of students participation in the students council can be a measure of their ability					
9.	The extent of students participation in the students council can be a measure of their personal traits					
10.	The extent of students participation in the students council can be a measure of their talents					
11.	The existing assessment system in secondary schools is adequate in assessing students' talents					
12.	The existing assessment system in secondary schools is adequate in assessing students' abilities					
13.	The existing assessment system in secondary schools					

		Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
	is adequate in assessing students' personal traits					

11. What other student data do you consider useful for assessing students' abilities?

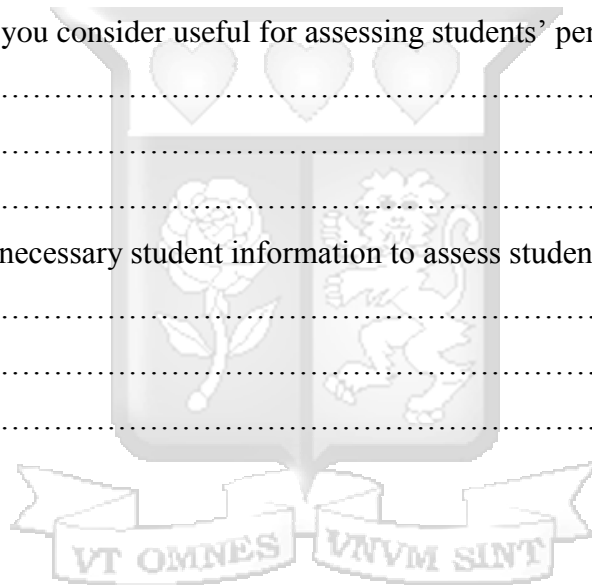
.....

12. What student data do you consider useful for assessing students' personal traits?

.....

13. What do you think is necessary student information to assess students' talents?

.....



Appendix B: Sample Code for E-portfolio

```
add_action( 'show_user_profile', 'my_show_extra_profile_fields' );
add_action( 'edit_user_profile', 'my_show_extra_profile_fields' );

function my_show_extra_profile_fields( $user ) { ?>

<h3>Extra profile information</h3>

<table class="form-table">

<tr>

<th><label for="sports">Sports</label></th>

<td>

<input type="text" name="sports" id="sports" value="<?php echo esc_attr( get_the_author_meta( 'sports', $user->ID ) ); ?>" class="

<span class="description">Please enter the sport you play.</span>

</td>

</tr>

<tr>

<th><label for="sports_award">Sports Award</label></th>

<td>

<input type="text" name="sports_award" id="sports_award" value="<?php echo esc_attr( get_the_author_meta( 'sports_award', $user->

<span class="description">Please enter the award you got for the sport</span>

</td>

</tr>

<tr>

<th><label for="sports_level">Sports Level</label></th>

<td>

<input type="text" name="sports_level" id="sports_level" value="<?php echo esc_attr( get_the_author_meta( 'sports_level', $user->

<span class="description">Please enter the level you reached for the sport</span>

</td>

</tr>

<tr>

<th><label for="entertainment">Entertainment</label></th>

<td>

<input type="text" name="entertainment" id="entertainment" value="<?php echo esc_attr( get_the_author_meta( 'entertainment', $user->

<span class="description">Please enter your favorite entertainment</span>

</td>

</tr>

</table>

}


```

Sample code 1

```
add_action( 'personal_options_update', 'my_save_extra_profile_fields' );
add_action( 'edit_user_profile_update', 'my_save_extra_profile_fields' );

function my_save_extra_profile_fields( $user_id ) {

if ( !current_user_can( 'edit_user', $user_id ) )
return false;

/* Copy and paste this line for additional fields. Make sure to change 'twitter' to the field ID. */
update_usermeta( $user_id, 'sports', $_POST['sports'] );
update_usermeta( $user_id, 'sports_award', $_POST['sports_award'] );
update_usermeta( $user_id, 'sports_level', $_POST['sports_level'] );
update_usermeta( $user_id, 'entertainment', $_POST['entertainment'] );
update_usermeta( $user_id, 'entertainment_award', $_POST['entertainment_award'] );
update_usermeta( $user_id, 'leadership', $_POST['leadership'] );
update_usermeta( $user_id, 'personailty_type', $_POST['personailty_type'] );

}


```

Sample code 2