



EDUCATORS' CHALLENGES AND BEHAVIOURIAL INTENTION TO ADOPT  
OPEN EDUCATIONAL RESOURCES: THE CASE OF AFRICA UNIVERSITY,  
ZIMBABWE

by

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## **Abstract**

A review of the literature confirms that Open Educational Resources (OER) initiatives have created free, openly licenced and high quality educational resources for anyone to use. However, these free, openly licensed and high quality educational resources appear to remain largely unused by Africa University academics in the educationally resource-impooverished Zimbabwe.

The objectives of this research study are to explore the challenges and enablers experienced by Africa University educators who may potentially adopt OER, and ascertain barriers preventing them from adopting OER in mainstream teaching. The sample consists of 45 full time educators from Africa University. Data was gathered by means of a survey questionnaire administered by the researcher. A modified version of the Unified Theory of Acceptance and Use of Technology (UTAUT) model developed by Venkatesh et al. (2003) was used. The UTAUT model was created from a fusion of eight diffusion of innovation models, and this gave it conceptual superiority over other candidate models. Key findings indicate that the extent to which educators believe that using OER will help them to enhance their teaching performance (Performance Expectancy), the extent of perceived easiness associated with finding, customising, and using OER (Effort Expectancy) and the extent to which educators perceive how important the opinion of their peer educators if they adopt OER or not (Social Influence) have a statistically significant positive influence on the educators' Behavioural Intention to adopt and use OER. The extent to which an individual is satisfied with the institutional framework, policies and technical infrastructure to support the use of the innovation (Facilitating Conditions) did not yield a statistically significant influence on the Behavioural Intention and this was interpreted to mean Africa University educators are satisfied with the current resources and infrastructure in place. However educators felt Institutional Support in the form of institutional OER supportive policies, official OER project enactment, and OER related incentives needed attention. Also, significant differences were found in the barriers which potential users of OER identified as either limiting to potential use of OER, or negatively affecting their intention to use OER. These barriers include open licensing knowledge; institutional support; follow up training sessions; relevance, reliability and adaptability of OER. Addressing these factors could lead to a more widespread adoption of OER, at Africa University and help address the prevalent educational resource challenge.

## **Dedication**

This research study is dedicated to my late father Lyson Nasho Kandiero, my wife Hlupekire, my two daughters Cleopatra (Kudzai), and Octavia (Kudzo) and my son Agrippah Jr. They are my source of motivation and inspiration jointly and severally.

## **Acknowledgments**

My acknowledgements go to my supervisor Prof. Cheryl Hodgkinsons-Williams, co-supervisor Glenda Cox, Econet Wireless Zimbabwe, and my colleague Sabelo Chinzwina. Without their dedication and support this research would have been impossible to complete successfully.

### Compulsory Declaration

I, Agripah Kandiero, hereby declare that the work contained in this dissertation is my own work, and that it has not been submitted for any degree or examination at any other university.

Signed: signature removed  
Signed by candidate

Date: 20 February 2015

### Declaration by candidate for the degree of Master in the Faculty of Humanities

I, Agripah Kandiero of 40 Waldorf Court, Aerodrome, Mutare, Zimbabwe, do hereby declare that I empower the University of Cape Town to produce for the purpose of research either the whole or any portion of the contents of my dissertation entitled **“EDUCATORS’ CHALLENGES AND BEHAVIOURIAL INTENTION TO ADOPT OPEN EDUCATIONAL RESOURCES: THE CASE OF AFRICA UNIVERSITY, ZIMBABWE”**

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Date: 20 February 2015

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## List of Abbreviations and Acronyms

AU	Africa University
AW	Awareness
BI	Behavioural Intention
CBAM	Concerns Based Adoption Model
DE	Demographics
EE	Effort Expectancy
FC	Facilitating Condition
HEI	Higher Education Institution
ICT	Information Communication Technology
OE	Open Education
OEP	Open Educational Practices
OER	Open Educational Resources
OP	Open Pedagogy
OUT	Open University of Tanzania
PE	Performance Expectancy
SI	Social Influence
TW	Training and Workshops
UCT	University of Cape Town
USD	United States Dollar
UTAUT	Unified Model for Acceptance and Use of Technology
VO	Voluntariness
5Rs	Retain, Reuse, Revise, Remix and Redistribute

## **Chapter 1: Introduction to the Study**

### **1.0 Background**

Zimbabwe suffers from lack of educational resources and this has remained unaddressed since the economic recession of 2000-2009 that saw Zimbabwe breaking the inflation record (Shoko, 2010). The gap has been increasing since new private and state universities have been established. Existing universities, and particularly Africa University, have increased their enrolment through parallel programs that run in the evenings and over weekends. Zimbabwe has been affected by brain drain. A related research study (Chifamba, E., Mpala, C., & Nyanga, T., 2012) revealed that on average 14 percent of the total emigrants who left the country during the economic recession, were in the highly skilled category. Precisely these emigrants fall under medical personnel, accountants, architects, nurses, engineers and teachers. The research also noted that on average, 1 780 highly skilled workers emigrated every year since 2000. Furthermore this emigration of highly skilled labour force resulted in significant up surge of service fees to levels above the comfort zone of majority of Zimbabwean citizens (ibid). This turn of events has also increased demand for higher education and requisite educational resources to support the increased enrolment (Shoko, 2010). “Zimbabwe has lost over one million ... of its highly skilled workers, who occupied a wide spectrum of jobs in the health and education sectors to neighboring countries and abroad” (Chifamba et al, 2012). Notable impact can be found in the health sector affected by the migration rate of approximately 400 nurses every year. In the education sector teachers who migrated were in excess of 9 500 per annum. The main reasons for this exodus to the diaspora were: Search for greener pastures (64.4%), failure to get jobs locally (17.8%) and other reasons included, poor working conditions in government ministries, personal development, political and economic instability (ibid).

In response to this increased national demand for higher education Africa University introduced a range of new degrees, namely the BSc. Computer Science, BSc. Nursing Science, BSc. Tourism and Hospitality Management, and Bachelor of Public

Sector Management. All faculties increased their intake by introducing parallel programs running from 17:00hrs to 20:00hrs and over weekends to cater for the increasing number of non-graduate workforce in all sectors. These new programs lack adequate funding at government, institutional and student level. Against this background it is not an overstatement to say that the educational resources requirement and access gap to support educators and learners at Africa University is serious and is likely to increase if no remedial measures are taken.

Although the economy started recovering post 2009, the government still lacks funding to support the book industry and grants to support the new and previously existing educational problems (Shoko, 2010). Since the economic recession most bookstores only cater for primary schools and partly for secondary schools, but they have very limited capacity to cater for the fast growing tertiary education sector. Even if the books were made available in the bookshops very few students would be able to afford them. According to the Zimbabwe central statistics office data, civil servants constitute between 60%-70% of the Zimbabwean working population and the average salary is between US\$100 and US \$500 per month. An average Africa University first year student in the Faculty of Management and Administration takes a minimum of six courses per semester, which translates into a minimum of six textbooks at an average cost of \$65 and this translates into a minimum of \$390 per semester. The minimum cost of textbooks alone exceeds the salary of the majority of working class Zimbabweans. The rising cost of textbooks is not only a challenge in Zimbabwe. A research done by the USA Government Accountability Office in June 2013, revealed that over the past 12 years consumer prices in the USA increased by 28%, textbook prices increased by 82% , while tuition fees increased by 89%. A related study by U.S. Student PIRGS in January 2014 revealed that 65% of students choose NOT to buy college textbook due to cost, 94% report concern that grades are affected due to this choice and 48% take fewer classes or different classes based on cost of textbooks.<sup>1</sup>

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<sup>1</sup>[www.studentpirgs.org](http://www.studentpirgs.org)

Open Educational Resources (OER) have been put forward as a possible response to the lack of access to affordable and relevant educational resources. Open Educational Resources are defined as “technology-enabled, open provision of educational resources for consultation, use and adaptation by a community of users for non-commercial purposes. They are typically made freely available over the Web or the Internet. ... [and] include learning objects such as lecture material, references and readings, simulations, experiments and demonstrations, as well as syllabi, curricula and teachers' guides” (UNESCO, 2002).

According to the William and Flora Hewlett Foundation<sup>2</sup> Open Educational Resources, “...are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge”<sup>3</sup>. OER are offered for free through a public domain or under a license that permits their free use and customization by others.

The definition of *OER adoption* in this research study means **Retain** (make and own copies) **Reuse** (using the material in its original form), **Revise** (modify the material to meet local requirements), **Remix** (combine original and altered material to better address the local need), and **Redistribute** (share original, modified, or remixed material with others) (Wiley D, March, 2014)<sup>4</sup>. Adoption also implies acceptability of OER as primary sources of content in mainstream education system. In this research study OER adoption is synonymous to *OER Mainstream Adoption*. According to Hewlett-Foundation Mainstream Adoption “...is for OER to become integrated into the education

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<sup>2</sup><http://www.hewlett.org>

<sup>3</sup><http://www.hewlett.org/programs/education/open-educational-resources>

<sup>4</sup><http://opencontent.org/blog/archives/3221>

mainstream, delivering access to knowledge and improved teaching and learning and supported by a robust market” (2013:12).

A number of other research studies which focus on 21<sup>st</sup> century educational challenges and pedagogy, i.e. Association of Learning Technologies (ALT) and NMC Horizon Reports, present research based evidence that Emerging Technologies hold the key to 21<sup>st</sup> century access to education and pedagogy challenges. It is not always clear how to introduce these emerging technologies in different contexts. According to Valetsianos “... emerging technologies are tools, concepts, innovations, and advancements utilized in diverse educational context to serve varied education-related purposes... emerging technologies are evolving organisms that experience hype cycles, while at the same time being potentially disruptive, not yet fully understood, and not yet fully researched”(2010:3-4).

In the context of Africa University and Zimbabwe, Open Educational Resources, constitute emerging technologies because they manifest the following six characteristics spelled out by Valetsianos (2010).

1. OER may or may not be new technologies at Africa University
2. OER will go through hype cycles within the institutional and national context
3. OER are not yet fully understood at Africa University
4. OER are not yet fully researched at Africa University
5. OERs are potentially disruptive at Africa University, and that potential is mostly unfulfilled
6. OER are already in existence and are evolving.

At institutional level, Africa University hired a Director of Distance Education in November 2013. The mandate of this director is to expand access to education at reasonable costs. OER offer a window of opportunity to deliver on this mandate. The Africa University administration has instituted some measures that directly or indirectly promote the adoption and use of OER and these include, but are not limited to:

1. A Distance Education Policy which promotes the use of ICTs in education, and increased access to education at reduced costs (OER possible solution).

2. Computer Laboratory facilities in the library which allows students to supplement the physical books with freely available electronic materials, with OER being the main source expected.
3. Wireless access facilities throughout the campus including student hostels.
4. An education quality assurance policy that recognizes ICTs in education as pivotal.
5. A lecturers' appraisal framework that includes the use of ICTs as an assessment criteria.
6. Some internal workshops for educators which promote the use of ICTs in teaching and learning.

In Zimbabwe there are national government initiatives and projects that have direct or indirect influence on OER and these include but not limited to the following: (a) In 2004 the government commissioned a national e-Readiness survey, a research study project to evaluate the extent to which citizens, organizations and government institutions were ready to adopt ICTs in development, education and all aspects business and daily activities; (b) In 2005 the government launched the National ICT Policy Framework, and the policy was revised and updated in 2014. Among other things, the bill recognizes and spell out terms of reference for use of ICTs in education. The bill also recommended a central regulator of telecommunications to better address issues of equity and access. Telecommunications are a critical success for ICTs in education, more specifically OER depends heavily on the access of internet.

### **1.1 Research Context**

This OER research is motivated by the fact that, the researcher is a member of Africa University faculty and actively involved in OER advocacy, training and stewardship. The research kick started with an OER intervention workshop for all Africa University educators conducted by the OER advocacy team and sponsored by the office of the

deputy vice chancellor. The expectation is the outcome of the research will help reveal motivators and deterrents for OER adoption by Africa University educators.

The unavailability and high cost of textbooks is the trigger problem that underpins this research study. In Zimbabwe at some point during 2005-2008 the state of the economy came to a near total collapse and this translated into a temporary collapse of the education sector (Shizha & Kariwo, 2011). Many schools and bookshops temporarily closed and many professionals in the Higher Education sector left the country (Shoko, 2010). In 2009 the Zimbabwean government adopted the USD as the official currency and the economy stabilized. Subsequently bookshops have tried to open but have not been able to hold adequate stocks of books for primary and secondary schools (Shizha & Kariwo, 2011). The reality is that the bookshop industry in Zimbabwe is not able to cater for higher education requirements and is unlikely to reach the capacity in the short and mid-term future (Shoko, 2010). During the period 2003-2008 Zimbabwe's inflation plunged to unprecedented global levels reaching 164,900% in February 2008. The downsurge continued and Zimbabwe's hyperinflation scaled to an unprecedented rate of 79,600,000,000% per month. By the beginning of 2009 the Zimbabwean national currency effectively lost value, as testified by reports from economic analysts indicating that colossus Z\$ 100,000,000,000 was worth a meagre US\$ 2.5 (Shizha & Kariwo, 2011). The Zimbabwean economy is still experiencing the impact of this recession and this is aggravated by targeted economic sanctions. According to figures published in a press release by Zimbabwe's Registrar General Office in June 2014, an excess of 3 million Zimbabweans reside in foreign countries as economic refugees (Zimbabwe Economic Review, 2014). Zimbabwe Economic Review (2013) reported an actual growth of 0.5 for the education sector, and a projection of 1.0 for 2014 and 1.3 for 2015. This growth needs to be supported with access to educational resources and, in the absence of corresponding economic growth, OER are a possible solution.

This economic meltdown makes it difficult for the government to provide all the funding required in education and other sectors. This dilemma coincides with increased demand for education, particularly higher education. The demand for higher education in

Zimbabwe has increased significantly in the last 10 years (Shizha & Kariwo, 2011). Zimbabwe's expenditure per university student is in excess of 300% of Gross National Product (GNP) per capita, compared to only 19% of GNP per capita for primary education (ibid). The expansion of the higher education sector in Zimbabwe is demand driven and the enrolment rates at higher education of a mere 4% are relatively low compared to developed countries, with averages in excess of 60% (Shizha & Kariwo, 2011).

According to Shoko (2010) development agencies have tried to come to the rescue of the Zimbabwean education sector, but so far the greatest effort has been in primary and secondary school education. A fifty million USD, multi-donor programme, by the Education Transition Fund (ETF), is one of the major initiatives in place to help the education sector (ibid). This consists of resources pooled together for a common objective of improving the quality of Zimbabwe's education through provision of teaching and learning materials and technical assistance to the Ministry of Education Sport Arts and Culture. Since the inception of ETF at least 13,252,000 textbooks were distributed to all 10 provinces and 5 667 primary schools in Zimbabwe by 2011(Shoko, 2010). This reflects that the emphasis of ETF was largely directed towards primary education and this leaves a gap in higher and tertiary education.

## **1.2 Research Problem**

From literature review OER have been put forward as a viable potential solution to the shortage of educational resources. The dilemma is why it has not been possible for Africa University educators to leverage this pool of freely available educational resources to address the challenge of access to educational resources.

Through the Massachusetts Institute of Technology (MIT) OpenCourseWare (OCW) project of 2001, OERs became the starting model for open sharing of educational content. According MIT site statistics, both Publication Metric and Site Traffic Measures

have surged to high levels since 2002. The Site Traffic Metric measures, as of March 2014 indicate: 199 298 131 total visits including affiliates; 152 347 350 unique visits; 2 175 425 visits to the MIT education site; 3 685 784 visits from learning institutions; 9 538 154 visits by OCW scholars; 9 538 154 page views; 220 885 OCW e-newsletter subscribers. Furthermore the publication metric measures indicate: 2 206 courses published; 71 full video courses; 1018 translated sites; 762 updated courses published; 345 mirror sites (MIT, Mar, 2014).

The concern is why it has not yet been possible to adopt OER to address the challenge of access to affordable and relevant education resources in Higher Education Institutions in Zimbabwe. In this research I will make effort to explore the challenges, intentions, and attitudes towards adoption of OER at Africa University in order to inform a possible future national study

According to several researchers (Mtebe & Raisamo, 2014; Percy & Van Belle, 2012; Dulle & Minishi-Majanja, 2011) despite abundant availability of these free Open Educational Resources, their adoption in African countries with similar context background e.g. Malawi, Zambia, Zimbabwe and Tanzania is sub-optimal or below expectations. In related independent OER research studies Freitas (2012), Hoosen (2012), Unwin et al. (2010) corroborate low OER adoption rate in different contexts. MIT access statistics reports show that since 2004 a meagre 2% of OCW traffic was coming from countries in Africa South of Sahara (MIT, 2013). Samzugi & Mwinyimbegu (2013) report on an initiative by the Open University of Tanzania to use OCW from MIT however a follow up survey revealed that only 21.8% of the respondents had knowledge of the existence of the resources. The University of Dar es Salaam authorities took the initiative to sign an OER agreement with MIT to use MIT OCW, but even though some years have passed since the signing of the agreement no significant adoption of the resources has been reported (Mtebe & Raisamo, 2014).

According to Hodgkinson-Williams (2010) OER offer benefits and challenges for educators, learners, institutions, and government institutions. OER opportunities and

challenges need to be well understood in specific contexts in order to inform policies and incentives for use and/or adoption.

## **1.2 Purpose of the study**

To elicit, measure and evaluate educators' challenges and behavioural intention to adopt OER, as a response to the lack of affordable, quality and relevant educational resources at Africa University.

## **1.3 Conceptual/Theoretical Framework**

The main purpose of the conceptual and/or theoretical framework is to relate and explain the key concepts of the research in relation to each other and identify and use an established theoretical position to help explain the research findings.

The research study adopted the UTAUT model (Figure 1) developed by Venkatesh et al. (2003) who borrowed concepts from eight different diffusion and adoption of innovation models and this gave the UTAUT model some conceptual superiority over many other candidate innovation models. Another more compelling reason is that the UTAUT model has been used before in prior OER research (Mtebe & Raisamo, 2014; Percy & Van Belle, 2012; Dulle & Minishi-Majanja, 2011). All research studies were undertaken in Africa and this gives assurance of the contextual relevance. UTAUT has been used in many similar researches and proved consistency and high validity and reliability ratings (Percy & Van Belle, 2012), and this was an important determinant in the selection of the model. Furthermore using UTAUT enables us to account for 70% of the variation in behavioural intention in ICT and approximately 50% of effective use behaviour, so this was a significant improvement from the results achieved by the other eight innovation models (Venkatesh et al., 2003). The UTAUT is premised on four key constructs: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions (ibid.). These four constructs directly determine the Behavioural Intention to adopt a particular technology. The model also incorporates the

variables **gender, age, experience, and voluntariness of use**. These variables influence and moderate the relationship of the four key constructs in the UTAUT model (ibid).

In this research study the UTAUT model was used to elicit and measure educators' *challenges* and *intention* to adopt OER in teaching. The research questions are based on the four constructs, and below is a detailed explanation of these constructs to help clarify the research questions.

**Performance Expectancy:** Refers to the extent to which educators believe that using OER will help them to enhance their teaching performance. Performance expectancy is rated the strongest predictor of the intention to adopt and use all technologies in both voluntary and involuntary settings (Venkatesh et al., 2003). The research study seeks to establish the impact of Performance Expectancy on educators who may have an interest in adopting OER.

**Effort Expectancy:** Refers to the extent of perceived easiness (Venkatesh et al., 2003) associated with finding, customising, and using OER. Therefore, the research study seeks to ascertain the impact of Effort Expectancy on educators who may be potential users of OER.

**Social Influence:** Refers to the extent to which educators perceive how important the opinion of their peer educators if they adopt OER (Venkatesh et al., 2003). The research study seeks to establish the possible impact of Social Influence on educators' motivation to adopt OER.

**Facilitating Conditions** Refers to the extent to which an individual is satisfied with the institutional framework, policies and technical infrastructure to support the use of the innovation (Venkatesh et al., 2003). The research study seeks to establish the possible impact of Facilitating Conditions on educators who may be aware, willing and able to adopt OER.

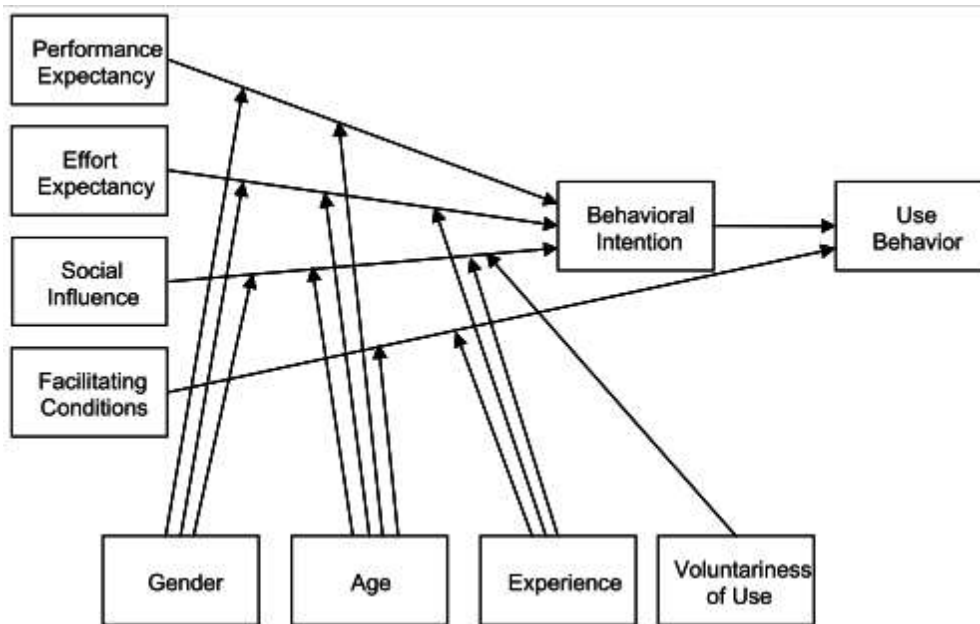


Figure 1: The UTAUT Model (Venkatesh et al., 2003:447)

#### 1.4 Research Questions

RQ1. In what ways does **Performance Expectancy** influence the Behavioural Intention of Africa University educators to adopt OER?

RQ2. In what ways does **Effort Expectancy** influence the Behavioural Intention of Africa University educators to adopt OER?

RQ3. In what ways does **Social Influence** influences the Behavioural Intention of Africa University educators to adopt OER?

RQ4. In what ways do **Facilitating Conditions** influence the Behavioural Intention of Africa University educators to adopt OER?

**Hypothesis 1:** Performance Expectancy has a positive effect on Behavioural Intention of Africa University educators to adopt OER.

**Hypothesis 2:** Effort Expectancy has a positive effect on Behavioural Intention of Africa University educators to adopt OER.

**Hypothesis 3:** Social Influence has a positive effect on Behavioural Intention of Africa University educators to adopt OER.

**Hypothesis 4:** Facilitating Conditions have a positive effect on Behavioural Intention of Africa University educators to adopt OER.

### **1.5 Significance of the study**

This research study begins with an OER intervention through an internal OER workshop, followed by a survey to elicit and establish challenges and Behavioural Intention to adopt OER by educators at Africa University, an institution of higher learning situated in the city of Mutare in Zimbabwe. This exploratory research will help to reveal knowledge regarding the adoption process of OER, ways to enhance OER adoption in the specific context of AU in Zimbabwe, and to some extent reveal knowledge to enable us to judge the merit of OER as a potentially viable, credible and acceptable intervention for the shortage of educational resources challenge facing Africa University.

The research study will also presumably be of interest and value to the following stakeholders:

1. Education authorities in Zimbabwe (the research may inform probable OER initiatives and projects)
2. Africa University administration (The university is on a drive to introduce instructional technology to improve the quality of teaching and learning, they have held staff workshops and have now developed an appraisal policy that includes adoption of instructional technologies. OER is a prime candidate)
3. Lecturers (quality of teaching, learning, appraisal rating may improve through use of OER, an opportunity to start publishing by sharing OER teaching content)
4. Students (quality of learning, budget, gateway to sharing and involvement in publishing when students are given a chance to review and comment on OER content as part of the OER life cycle)

5. Parents of students (OER may address quality of teaching and learning and budget constraints)
6. Development Agencies (OER intervention guidelines and OER intervention models)
7. Policy makers and strategists for OER adoption
8. Pedagogy experts evaluating the impact of OER in teaching and learning.

### **1.6 Scope of the study**

The process of awareness, evaluation, motivation and intention to adopt OER, like any diffusion of innovation process, entails many variables that include but are not limited to: motivators, deterrents, social factors, personal factors, organizational factors, policy, etc. This research study is confined to effort expectancy, performance expectancy, facilitating conditions, and social influence. The subjects used in this research study are a sample of educators from Africa University an institution of higher learning in Mutare, Zimbabwe.

### **1.7 Limitations of the study**

This research study is a dissertation of limited scope with a limited time frame and a maximum limit of 25000 words. As such brevity was adopted as strategy to incorporate the most essential information in all the chapters.

Validity and reliability relied heavily on precedence metrics on the use the UTAUT model and the adopted research instrument in past related studies despite the fact that these studies were OER research studies done in Sub-Saharan Africa (contextual relevance), fairly recent and some as recent as 2015 (time relevance).

The research was only conducted at Africa University a church related private institution. Zimbabwe has 10 state owned institutions of higher learning, and only 4 church related private universities. These institutions may be fundamentally different in terms of resourcing, technology and strategic focus. Any attempt to apply the findings across the institutions or at national level may be a potential logical fallacy.

## **1.8 Organization of the Chapters**

Five chapters make up this research study. The first chapter introduces the research study and includes the background of the research study, the statement of the problem, and aim of the research study. Limitations and delimitations (scope) of the research study are also explored. The second chapter explores existing literature related research objectives and research questions of the research study. The third chapter covers the research method adopted to guide and give credibility to the search study and validity of the outcomes. Research paradigm/philosophy, design, and approach are discussed in detail. The way research participants were selected (sampling), the research tools and techniques used, techniques to collect data, the way data was analysed, and research ethics and validity issues are also discussed in detail in this chapter. The fourth chapter is a presentation and detailed analysis of the actual findings from the research study using tables, graphs, descriptive narrative and analytical comments. The last chapter is an analytical resume of the findings of the research study to answer the research questions, draw conclusions and make recommendations for actions and possible areas of future research.

## **Chapter 2: Literature Review**

### **2.0 Introduction**

This section outlines some important operational OER concepts and practices adopted in this research study; explores understandings of open educational resources and practices emerging from the literature; explores theoretical perspectives on why academics may decide to (or not) to retain, reuse, revise, remix, and redistribute OER; explores the potential benefits of OER in terms of publically available research literature; explores the anticipated challenges appearing in the literature; and explores suggested ways forward to support and encourage academics to continue to adopt OER.

### **2.1 Key OER Concepts and Practices**

There are a number of key operational concepts and practices that arise when OER are used and discussed. This section defines and discusses the key terms and concepts that are used in this research study.

The term ‘open educational resources’ is used synonymously with ‘open courseware’, ‘open eLearning content’ (Geser, 2012; Geser et al, 2012); ‘open digital educational content’ (Córcoles et al. 2007); “digital learning resources” (Margaryan & Littlejohn 2008); “reusable digital learning resources” (Leacock & Nesbit 2007). ‘Open educational content’ or even ‘open content’ (Harley 2008; D’Antoni 2007).

Further to the UNESCO (2002) definition advanced in chapter 1 of this research study “Open Educational Resources (OER) are teaching and learning materials made freely available for use and repurposing by teachers and learners. The term is potentially synergistic with learning objects; the emphasis is on the open license allowing the use and reuse of the resources” (Camilleri et al. 2014:8).

Wiley (2009) in defining OER pre-supposes that most people have the same interpretation of Education Resources (ER) since they have always existed. However the term open (O) is a new concept that needs to be defined in terms of cost involved in accessing the resources and legal access permissions (copyrights) attributed to the

resources. According to Wiley (2009), **Open** tells us that the resources are available at no cost (free) and the users have five permissions universally known as “5Rs”. These five OER copyrights are: **Retain**: make and own copies; **Reuse**: permission to use the resources in their original form; **Revise**: permission to customize or improve the resources; **Remix**: permission to aggregate content and create new product; **Redistribute**: permissions to deploy and share all forms of OER.

There is a trend to incorporate “practice” in OER definitions. This is because of the realization that it is not possible to talk about use without understanding of the actual pedagogical issues and practices (Camilleri et al, 2014). Camilleri et al (2014) and Ehlers, (2011) put forward some defining constructs or terms associated with OER practice such as “Open Pedagogy” and “Open Educational Practices (OEP)”. Camilleri et al. (2014) define, OEP as activities or practices that help promote or sustain use, reuse and development/production of OER. Open Educational Practices include policies enacted by institutions, to motivate creative models of teaching and learning and acknowledge and include learners in the OER lifecycle. This research study uses the Wiley (2009) definition of OER.

## **2.2 OER Opportunities**

It is possible to make an important contribution to the current educational challenges in both developing and developed world by using OER to deliver better education with fewer resources (Hewlett Foundation, Nov, 2013). Research is showing that resource challenges faced by Higher Education systems, and the emerging affinity for solutions based on technology (technology centric solutions) create an opening for OER to be adopted in mainstream teaching and learning in efforts to improve outcomes of education performance metrics (ibid).

Among other things this research study is concerned with access and quality of educational resources. There is research evidence suggesting that, using OER increased access since only internet access is required. With the free nature of OER have seen the

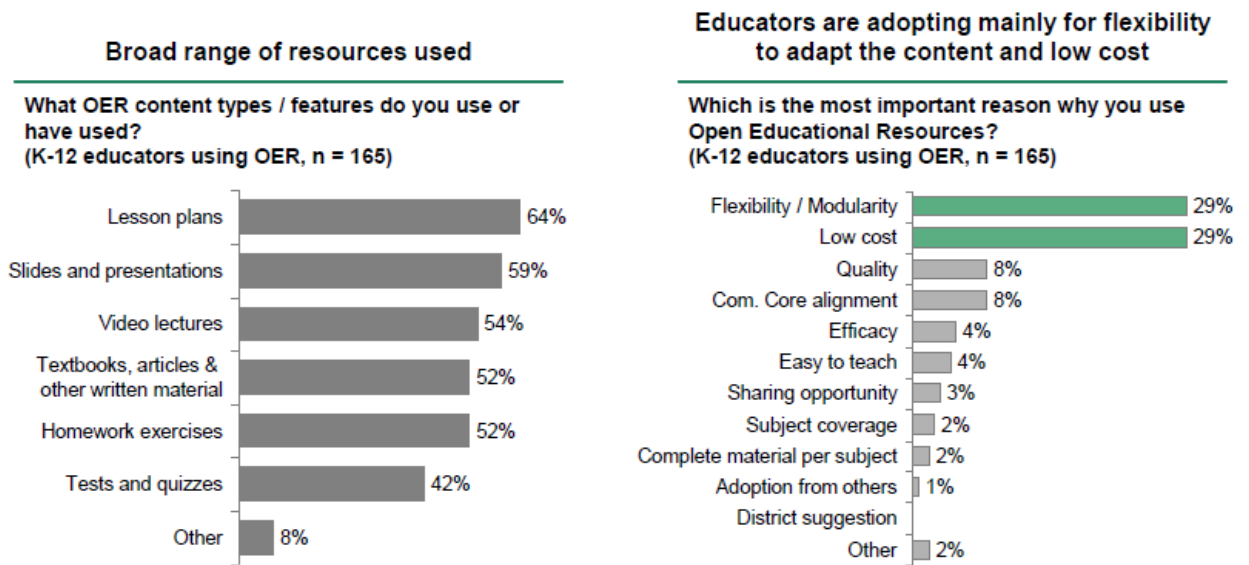
advent of free online courses and even free online universities and this helps address the access and equity gap. (Wiley & Gurrell, 2009). This is corroborated by findings from Downes (2007) that confirm reduction in costs of developing courses as a result of using OER. In support of both equity and access a research study by Keller & Mossink (2008) confirm that the nature of OER life cycle makes it easy for all educational resources to be easily translated and availed in a wide range of different languages. Another research study by Armellini & Nie (2013) revealed that learning institution have managed to raise educational resource using OER.

### **2.2.1 Significant Cost Reduction**

In 2010 the California state education was hit by a budget deficit of \$19 billion. To address the challenge the authorities started the Free Digital Textbook Initiative to cut costs by aligning open textbooks with the state's curriculum standards (Hewlett-Foundation, Nov, 2013).

Out of the realization of high potential for radical cost reduction offered by OER, the University of Maryland University College (UMUC), the largest non-profit public online university in the U.S.A., embarked on an initiative to match its learning outcomes for both undergraduate and graduate courses with available OER. The target dates are 2015 for undergraduate programs and 2016 for all graduate courses (Vignare & Brosch, 2014).

An OER research study conducted by the Boston Consulting Group (BCG) on behalf of the Hewlett Foundation indicates that low cost and flexibility are among the major motivators for OER adoption as depicted in the Figure 2.



Source: BCG OER survey and Analysis  
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**Figure 2: Cost and efficiency as motivators for OER adoption (BCG, June, 2013:20)**

Close to 30% of motivation to adopt OER is attributed to low cost while another 29% is attributed to OER flexibility. The BCG research study used both empirical and desk research and interviewed stakeholders involved in OER initiatives and surveyed approximately 375 educators.

The Vietnam foundation has distributed an excess of 20, 000 OER research manuals and modules at zero cost in an effort to cut costs (Hewlett-Foundation, Nov, 2013).

In South Africa the Siyavula OER initiative made available Maths and Science textbooks to high school teachers and students through the Maths Everywhere and Science Everywhere initiative. Although the cost savings have not been fully quantified feedback and status reports from Siyavula suggest significant cost reduction (Cartmill, 2013).

From the above findings it can be deduced that the potential of OER in cost reduction is too attractive to be ignored by a cash-strapped country such as Zimbabwe.

### **2.2.2 Greater learning efficiency**

The jury is still out on whether OER can deliver greater learning efficiency and survey and evaluation reports keep flowing in from stakeholders and various interest groups (Hewlett-Foundation, 2013).

The Hewlett-Foundation (Nov, 2013) report on a “Cognitive Tutor” project for Carnegie Mellon University. This program assisted learners to enrol online in courses on Open Learning Initiative. The learners enrolled in the project completed their courses in half the normal time and with higher learning outcomes in comparison to learners enrolled in normal courses. Also reported in Hewlett-Foundation (Nov, 2013) is improvement in test results for thousands of learners from Salt Lake City (USA). The students were using cheaper OER textbooks (\$5 per copy) that had replaced normal traditional textbooks (\$80 per copy) as part of both learning and cost reduction initiatives. This is corroborated by Robinson et al. (2014), a one year research study that investigated the OER use of three learning institutions using a control group and propensity score. The research revealed that learners that utilized OER produced higher score in comparison to learners in the control group. The research study was rigorous involving 1274 learners in each experiment category; possible effect of teachers, socioeconomic status and 8 other variables with the possibility of causing research bias were catered for in the research study.

Another related research study (Allen et al., 2015) involved an experiment class of 478 students that adopted the OER ChemWiki<sup>5</sup> as the principal learning resource. The control class consisted of the same number of students and adopted the normal proprietary textbook as the principal learning resource. The scheduled teaching and learning sessions for the semester were conducted concurrently and the same final

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<sup>5</sup>[www.oercommons.org/courses/the-chemwiki](http://www.oercommons.org/courses/the-chemwiki)

examination was administered to both groups at the end of the semester. The research outcomes revealed no statistically significant difference in test scores and the time spent preparing for evaluations between the two groups.

From the research findings presented in this section we can deduce that while evidence on OER capacity to derive significant positive learning efficiencies is not conclusive, there are positive indicators particularly in subject specific areas and context specific scenarios. This goes to justify the need for further research to understand the application and outcomes of OER initiatives in different contexts.

### **2.2.3 Improving Pedagogical Practice**

A research study conducted by Gurell et al. (2010) investigated on OER and Problem Based Learning (PBL). This research contends that Problem-based learning is candidate teaching and learning method (Pedagogy) that can be integrated well with open education and identifies beneficial relationships and opportunities that can be leveraged between Open Educational Resources and Problem Based Learning. In other words this research identifies OER as good resources for Problem Based Learning. In brief the research concluded that some benefits can be derived from using OER in PBL.

A related research study (Petrides et al., 2010) on the influence of OER in changing the way of teaching and learning reported that educators using Open Educational Resources enhanced cooperation, collaboration and communication amongst them compared to those who did not.

Outcomes from the research studies presented in this section illustrate and confirm the potential of OER in transforming the way teaching and learning can occur. However it is important to note that the outcome can differ significantly from one context to another.

#### **2.2.4 Continuous Improvement of Instruction and Personalized Learning**

Testimony of how continuous improvement and customized learning can be achieved using OER is evidenced in the San Francisco Bay Area, where Leadership Public Schools have partnered with CK-12 to “adapt their original, open-source textbooks into a series, each version targeting students at different reading levels” (Hewlett-Foundation, Nov, 2013). At Utah’s Open High School, where open resources are used throughout the curriculum, “teachers continually customize coursework to match state standards and meet students’ individual needs” (Hewlett-Foundation, Nov, 2013).

Furthermore, the OER lifecycle is continuous and iterative by its very nature, as depicted in Figure 3 below. The arrows go in circles between stakeholders reflecting a cyclical and continuous process. Although this decentralized nature of OER lifecycle is mentioned as a weakness by some OER critics, with good Open Education Practices this may be capitalized to achieve continuous improvement of instruction and personalized teaching (Camilleri et al., 2014).

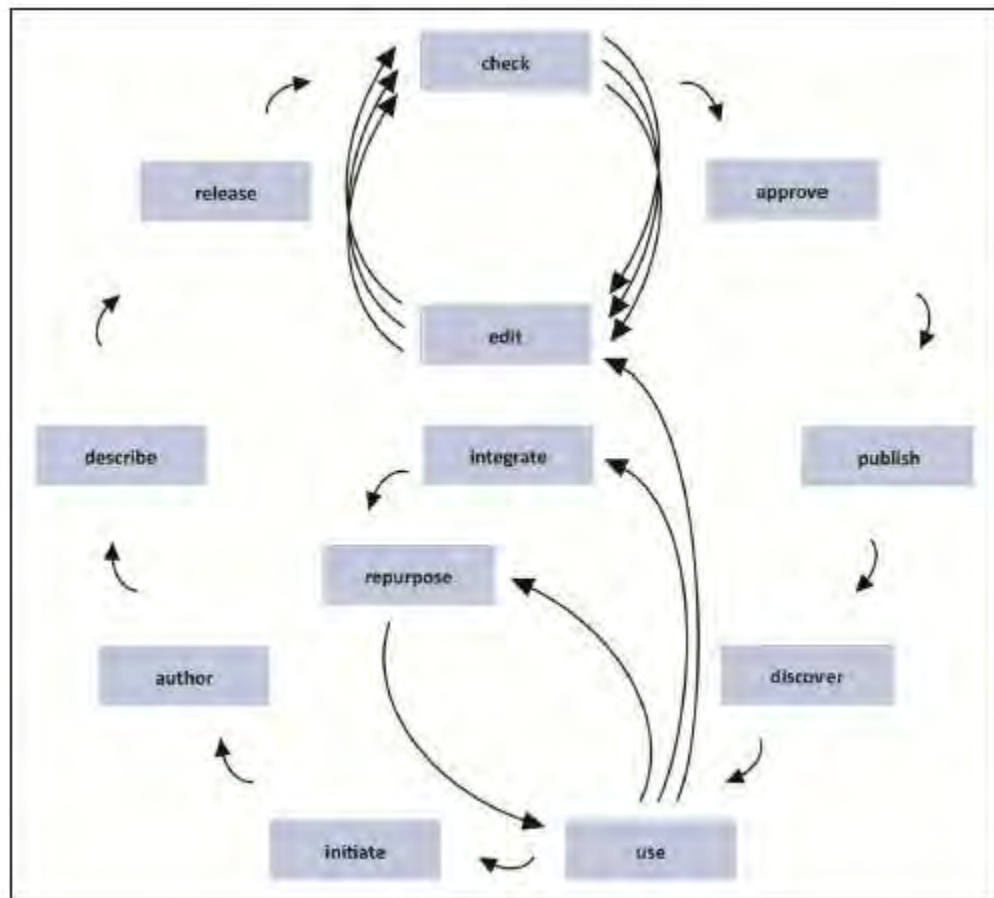


Figure 3: A typical usage scenario for Open Educational Resources (Camilleri et al., 2014:17)

### 2.2.5 Equal access to knowledge

OER are largely availed through open online repositories and portals such as MIT Open Courseware, OER Commons, OCWC Search, MERLOT, Open Learn, etc. This has made it possible for any world citizen with access to the Internet to access OER from anywhere, at all times without restrictions or requirement to be registered in any formal institution of learning (a requirement of many commercial learning resources). The extent and magnitude of access and impact differ across, regions, countries, institutions, cultures and individuals. Notable examples are WikiEducator<sup>6</sup>, the Khan Academy<sup>7</sup>, MIT's

<sup>6</sup>[http://wikieducator.org/Main\\_Page](http://wikieducator.org/Main_Page)

<sup>7</sup><https://www.khanacademy.org/>

OpenCourseWare availed in more than 10 different languages and the simulations for physics education that are interactive offered in 74 different languages produced by Physics Education in Technology (Hewlett-Foundation, Nov, 2013).

According to Wolfenden et al. (2012), in the African context continuous improvement and context relevant (customized) learning can be identified in TESSA's OER content distributed in four languages and adapted culturally for use in twelve countries. These resources are continuously reviewed and updated by relevant players in the OER life cycle.

Based on research evidence, and maybe logical scientific inferences and deductions, a number of institutions and programs endeavour to promote equal access to education through OER. The quotation below from Panke and Seufert (2012) is a summary that runs through some of the important initiatives to promote equal access. It is important to note that these initiatives have varying degrees of outreach and outcomes.

*“Make the world your study group (openStudy), learn almost anything for free (Khan Academy), join the world's first tuition free online university (University of the People), learn anything with your peers (P2PU), learn anything, anytime, anywhere (iTunesU), your opportunity is here – take it (University of the People), free online education, open to anyone, anywhere in the world (OpenLearn), free and openly licensed, accessible to anyone, anytime via the internet (OpenCoursewareConsortium), a community devoted to collaborative learning (Wikiversity), turning the digital divide into digital dividends using free content and open networks (WikiEducator), towards free learning for all students worldwide (OER university), ask, answer, understand (OpenStudy).”*(Panke & Seufert, 2012:3).

### **2.3 Barriers and concerns to mainstream adoption of OER**

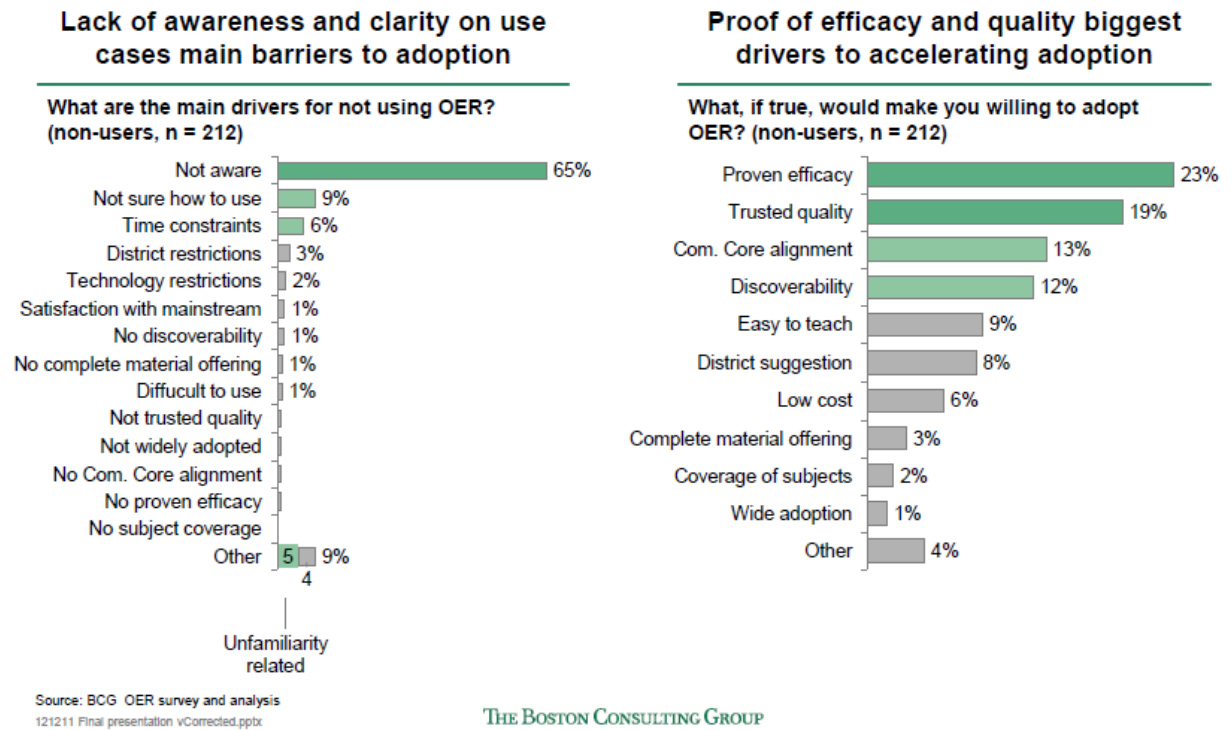
Review of literature identifies several challenges/barriers that must be well understood before OER can be adopted as principal teaching and learning resources by main learning institutions. This section discusses some barriers and challenges reported by several related research studies in the literature reviewed.

### **2.3.1 Limited proof of quality and effectiveness**

Although, isolated research has made compelling inroads in demonstrating improved quality and effectiveness that can be derived from OER mainstream adoption, this body of evidence is still deemed inadequate and inconclusive and there are many criticisms and challenges. Some critiques (Glennie, Harley, Butcher, & van Wyk, 2012) lament the lack of “critical perspective” that has made OER a self-evident social ‘good’” (p. 7). Adding to this problem is that OER products do not have equal publicity and access and the rating criteria are not consistent or universal (Hewlett-Foundation, Nov, 2013).

A recent study conducted by BCG on behalf of the Hewlett Foundation (Figure 4), reveals that a proven efficacy (23%) and trusted quality (19%) are the major drivers of accelerated adoption of OER. OER quality and efficacy both have a rating below 0.5% in the rating of main adoption barriers, while the lack of OER awareness featured as the main barrier.

In the context of Africa proof of OER quality and efficiency is corroborated by a related research survey by Hoosen (2012). In this survey 58% of representatives from Africa indicated increased OER quality and efficiency as their motivation to participate in the OER movement.



**Figure 4: Time constraints and lack of awareness impede adoption, while efficacy and quality could be major accelerators (BCG, Jun, 2013:12)**

According to Camilleri et al. (2014) the major concerns on quality stem from the decentralized nature of OER lifecycle. In the traditional production of educational content quality issues are managed centrally and this is the source of comfort and confidence regarding the quality. The federated responsibility to manage quality issues is the major concern in OER (Camilleri et al. 2014). Table 1 below depicts a matrix framework for OER lifecycle that includes all stakeholders. In this framework Camilleri et al. (2014) make provision for quality assurers to assign points and degree of involvement to assure quality management during the OER lifecycle. This framework is testimony of how good Open Education Practices could be incorporated to address OER quality issues.

**Table 1: Stakeholders' role in the lifecycle of OER:**

	Initiate	Author	Describe	Release	Check/ Edit	Approve & Use Publish	Re- purpose
Teachers	XX	XX	X		XXX	XX	XXX
Formal Learners	X	X			XX		XXX
Informal Learners	X	X			XX		XXX
Non-Formal Learners	X	X			XX		XXX
Managers	X			X	X	XX	
Technical Editors		XX	XXX	XXX	XXX	XX	
Instructional Designers	XXX	XXX	XXX	XXX	XXX	XX	XXX
Educational developers	XX	XX		X	XXX	XX	XX
Quality assurers			X		XX	XXX	
Translators		XX	X		XX	X	
International relations staff					X		X
OER mentors					X		XX
Wider community	X	X	X		X		X

x = occasional / marginal involvement, xx = strong involvement, xxx = extensive involvement

Source (Camilleri et al., 2014:30)

The above findings reveal that quality issues do not seem to be the major obstacle militating against mainstream OER adoption. With good Open Education Practices quality issues can be addressed or even better quality can be achieved.

### 2.3.2 Uneven, disorganized supply

OER do not provide a full range of high quality materials to cater for the needs of educators across the board. The quantity of supply has been increasing since inception; however there still are inadequate complete off-the-shelf products that educators can adapt with minimum effort. Science and Math materials are much more readily available than language, arts and social sciences (Hewlett-Foundation, Nov, 2013). This is also evident in South Africa's Siyavula OER initiative where Math and Science textbooks are more readily available than other disciplines (Cartmill, 2013).

According to the Hewlett-Foundation (2013), "... more emphasis on creating complete products from the existing supply of materials would encourage more widespread adoption of OER in regular classrooms" (p.9). Some countries notably India have tried to bridge this gap by having a national OER policy that works towards bridging the requirements gap, through a National Repository of Open Educational Resources (NROER).

### **2.3.3 Incompatible policies and lack of incentives**

If educators are to publish their work on open license there should be policies, measures, and metrics to measure the impact that feeds into human resources for their promotion and advancement purposes (Camilleri et al, 2014). In the USA, some states insist that OER developers hire and pay for review services by qualified education officers. This is a barrier for non-governmental organizations to produce OER. In other contexts some ministries of educations have expressed unwillingness to adopt OER that are not accompanied with evaluation material or not translated to local languages and this is not the norm for most OER (Hewlett-Foundation, Nov, 2013). According to Hoosen (2012), the OER policies adopted differ across countries and regions. OER Policies were found to be more prevalent in countries in USA, Asia-Pacific and Europe while some countries in Africa reported complete absence of such policies. Hoosen's research study revealed that: 71% of respondents from Africa confirmed that they had no policies and only 25% confirmed the existence of such policies.

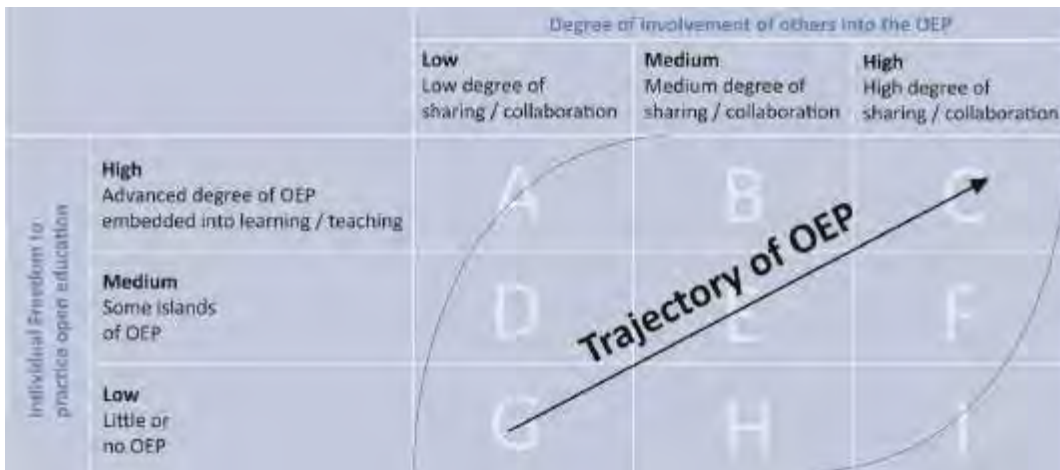
From the literature reviewed the lack of OER policies and incentives are still a cause for concern in the African context, compared to other regions.

### **2.3.4 Lack of OER Accreditation and Cataloguing Standards**

OER accreditation standards, have been identified as a concern. According to the Hewlett-Foundation (Nov, 2013), some educators bemoan the lack of accreditation bodies for clearing OER as one major stumbling block for widespread OER adoption in their contexts.

OER cataloguing standards i.e. a common system for identification and tagging OER content when searching is another challenge for educators (ibid). In other words there is need for technical standards for producing and making OER discoverable. The researcher concurs with this concern just like we have a common cataloguing system to search books in a library or words in a dictionary a common tagging standard of OER resources at national, regional, or global level could promote adoption.

In my view lack of standards can progressively be addressed by movement from OER adoption to Open Education Practices. Figure 5 below depicts diffusion or progression of Open Education Practices as suggested by Ehlers (2011). In quadrant C a high degree of sharing and collaboration and high freedom to practice open education is evident. At this stage there are common educational practices and all stakeholders are working towards the common goal of open collaboration and sharing. The fact that OER will be using common educational practices and openly collaborating and sharing in my view this invariably fosters common standards.



**Figure 5: Diffusion of Open Educational Practices (Ehlers, 2011:65)**

Based on the review of current literature it may be deduced that the lack of standards may be an issue in the early stages of OER adoption that can be progressively and systematically addressed with increasing adoption of OEP. However, a research outcome on Open Educational Practices (Conole, 2013) revealed that even after 10 of their inception, OEP are still not yet widely known or being universally practiced. We should

not be discouraged by these disconcerting research findings. There are some countries (e.g. India) adopting national OER policies and working towards national OER repositories, this may close the standards gap at national level and lead to increased OEP adoption.

Although it is difficult to state with certainty, the open online nature of OER may encourage fusion of international OEP and OER standards.

## **2.4 Potential risks to OER adoption**

According to the Hewlett Foundation, despite significant progress made so far, there are still a number of factors that negatively affect this progress. Some of the factors include but are not necessarily limited to the following: lack of funding to sustain OER; lack of public interest, awareness, and understanding; and inadequate succession planning.

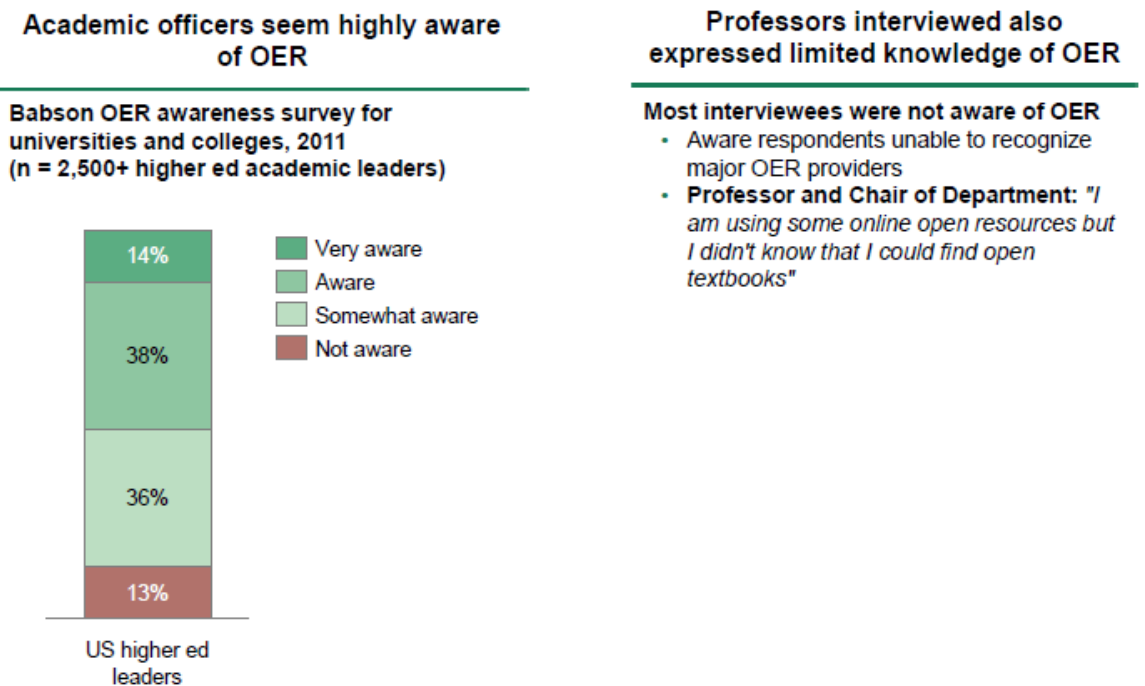
### **2.4.1 Lack of funding to sustain OER**

Current sources of OER funding include development agencies, private capital and philanthropic funding. The risk is there is no guarantee for continued and increased funding from these sources (Hewlett-Foundation, November, 2013). To decrease the risk it is suggested a move toward a self-sustaining “marketplace model, as more governments adopt open policies that require publicly funded educational licenses to be openly licensed” (Hewlett-Foundation, November, 2013:p15). Downes (2007) proposes the following OER funding models that can suit different stages and contexts of OER adoption: Endowment model, Donations model, Membership model, Conversion model, Contributor pay model, Sponsorship model, Institutional model, and Government model. These models suggest alternatives to address or mitigate the risk of lack of sustainable OER funding.

## 2.4.2 Lack of public interest, awareness, and understanding

The lack of widespread adoption of OER by educators, learners and institutions has sparked widespread research on OER adoption. Some countries, regions, and institutions have reported positive gains, but this risk cannot be down played.

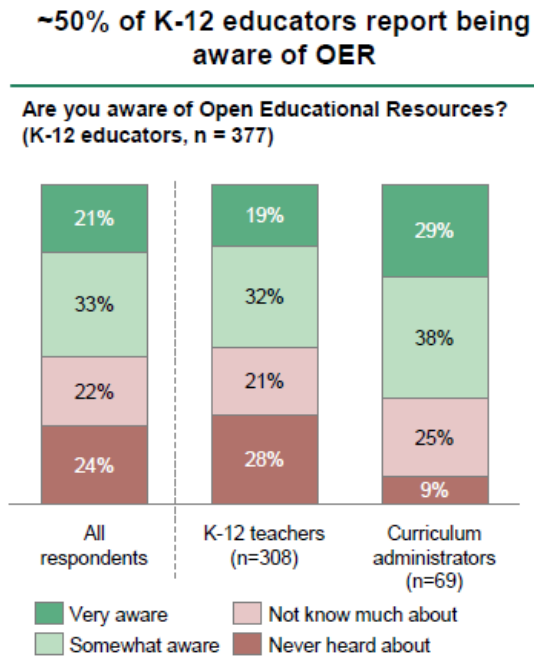
A BCG (2013) survey (Figure 6), revealed that in higher education, while awareness among academic officers (administrators) is high, many professors remain unaware of OER.



Source: Babson Survey Research Group, *Going the Distance – Online Education in the United States, 2011*; 121211 Final presentation vCorrected.pptx THE BOSTON CONSULTING GROUP

**Figure 6: OER Awareness Amongst Education Officers and Professors (BCG, Jun, 2011:11)**

Another related research study undertaken by BCG exhibited in Figure 7 below revealed that while general awareness of OER is about 50%, K – 12 educators are not sure how to fully use OER in the classroom.



**However, survey indicates that OER is likely not used to its full potential**

**50%+ of users reported themselves as only "somewhat aware" of OER**

- **Survey respondent:** *"More information about how OER could be integrated into the class is needed. I am not totally aware of all that is available and would perhaps use OER more if I was more informed"*

**74% of non-users report either lack of awareness or knowledge on how to use OER as primary adoption barriers**

- ~37% of aware non-users mention lack of clarity on how to use OER as their main adoption barrier

**Figure 7: OER Awareness and Usage Understanding for K-12 Educators (BCG, Jun, 2013:10)**

### 2.4.3 Inadequate succession planning

OER owes its current popularity and success to out of the ordinary support from many early initiators, and adopters who were great visionaries. Continued success will depend on the effort and dedication of those who will take the task forward. It is therefore important to encourage succession planning for the next generation of OER trailblazers to guarantee continued sustainability (Hewlett-Foundation, Nov, 2013).

### 2.5 Technology Integration Theories and Models

According Dulle & Minishi-Majanja, (2011) "A theory emanates from a systematic and formalized expression of previous empirical generalizations and experimental testing. This is contrary to a model, which need not necessarily be derived from empirical generalizations and testing" ( p.1). Burch (2013) makes a distinction between a theory and model and defines a model as an intermediate product between theory and outcomes of empirical research.

After some research inquiry, I came to a position that the use of OER may be viewed as some form of technology integration model involving government, educational institutions, students and educators. For this reason, I chose to review literature surrounding technology integration. Neuman (2006) posits that those who initiate and conduct research, not based on a proven theoretical framework or existing model, seldom produce research results of high quality; they also face challenges in interpreting their research findings. This may be the explanation/justification for so much investment in time and resources by researchers in the elaboration, testing and validation of various theoretical concepts and models for application in different fields. Theories and models of acceptance and use of technological innovations have been widely used in studies to illicit motivators and inhibitors during the early process of acceptance and usage of technologies (Kripanont, 2007).

There is a rich body of literature on educators and technology adoption. It is my conviction that these previous research models on technology integration can serve as useful theoretical and conceptual frameworks in this research study. Some of the conceptual and theoretical frameworks discussed here have been used previously in OER adoption research.

### **2.5.1 Rogers' Diffusion of Innovations Theory**

One of the classical works in the field of technology integration is Rogers' *Diffusion of Innovations* which postulates four distinct stages to the process of diffusion of new ideas, "... the main elements in the diffusion of new ideas are: (a) an innovation (b) that is communicated through certain channels (c) over time (d) among the members of a social system" (Rogers, 2003:36).

Hodgkinson-Williams conducted some research studies on OER use and adoption in higher education. In one research study Hodgkinson-Williams and Paskevicius (2011) used Rogers' (1983; 1995) diffusion of innovation theory and specifically his theory of perceived attributes and its extension by Moore and Benbasat (1991) as a way of

understanding students' willingness engage with OER. Most recent OER research studies in Sub-Saharan Africa identified during literature review have preferred UTAUT model. Hence the most recent context relevance and conceptual superiority of the UTAUT model were key determinants in the selection of the model in this research study.

### **2.5.2 The Concerns Based Adoption Model**

A classical foundational work in the field of innovation adoption by educators is the Concerns Based Adoption Model (CBAM). The CBAM is a conceptual framework designed to guide leadership and administration in the education sector to describe, explain, and predict behaviours of educators in an innovative change process (George, Hall & Stiegelbauer, 2006).

The CBAM has its origin in the early 1970s. During this time in the education sector best practices were packaged in innovation kits that were packaged and parcelled for implementation. These innovation kits never yielded the desired outcome and this generated research interest to establish the behaviour of educators in an innovation process. One of the research studies was done by the Research and Development Centre for Teacher Education at the University of Texas in Austin. The researchers began to investigate what happens when individuals are asked to change their practice, or adopt an innovation. This work resulted in the initial development of the CBAM framework. The research team believed that change began with an individual, and concentrated its efforts on observing what happens to teachers and college professors when presented with a change (George et al., 2006).

The CBAM developers believed that the most important factor in any change were the people who would be affected most by that change (Hord, Rutherford, Huling-Austin, & Hall, 1998). Accordingly, the two authors of the original CBAM model developed the Stages of Concern Questionnaire (SoCQ) to facilitate measuring the concerns listed in the CBAM model. The SoCQ is a thirty-five-item questionnaire that uses a seven point Likert response form. Each question reveals information relating to one of the seven stages of the CBAM model.

The CBAM is premised on the fact that where an innovative change is to take place the concern of the most affected people in the chain are paramount and must be well understood and addressed (Hord et al, 1998). If OERs are to be successfully adopted at Africa University, educators will be significantly affected and some effort and commitment on their part will be required. In addition to measuring the concerns of educators the CBAM also measures the overall aggregate stage of adoption for the institution, this is useful in framing policies, measures and incentives to promote adoption.

Despite being a simple, comprehensive, well documented, with several impressive field results I could not find any recent OER researchers using CBAM.

### **2.5.3 The UTAUT Model**

There are several competing technology acceptance theories and models as noted above. As a result researchers have dedicated a lot of time and effort to analyse and compare them in order to identify the most promising theory/model in predicting and explaining individual behaviour towards the acceptance and usage of technology. From literature reviewed the UTAUT seemed to be the most promising theory.

In 2003, Venkatesh et al. created the UTAUT model by combining the following eight similar technology acceptance models:

1. Technology Acceptance Model (TAM)
2. Innovation Diffusion Theory (IDT)
3. Theory of reasoned action (TRA)
4. Motivation Model (MM).
5. Theory of Planned Behaviour (TPB)
6. Combined TAM and TPB
7. Model of PC Utilization (MPCU),
8. Social Cognitive Theory (SCT).

Table 2 is a summary of key UTAUT constructs and different models associated with each construct. In addition to the four constructs four other variables: age, gender, experience and voluntariness of use were introduced to moderate the relationships of the constructs. These relationships include Effort Expectancy [EE], Performance Expectancy [PE], Social Influence [SI], Behavioural Intention (BI) which, together with Facilitating Conditions [FC] influence Use Behaviour (UB). Results from the UTAUT model explained seventy percent (70% ) of the variation in user’s intention to accept technology and was able to explain more than 50% of actual behaviour (Venkatesh et al., 2003). Contents of Table 3 also demonstrate further how the UTAUT model incorporates concepts from several diffusion and acceptance of innovation models to give it conceptual superiority over other models. This significantly influenced the selection of this model for use in this research study.

**Table 2: Description of UTAUT variables and models derived from them**

Construct	Description of Perception	Similar Construct and Corresponding Models
Performance Expectancy	The degree to which an individual believes that using the system will help him or her to attain gains in job performance	Perceived usefulness (TAM/TAM2 & C-TAM-TPB); - Extrinsic motivation (MM); - Relative advantage (IDT); - Job-fit (MPCU); - Outcome expectations (SCT).
Effort Expectancy	The degree of ease associated with the use of the system.	-Perceived ease of use (TAM/TAM2); - Complexity (MPCU); - Ease of use (IDT).
Social Influence	The degree to which an individual perceives that important others believe he or she should use the new systems.	-Subjective norms (TRA, TAM2, TPB/DTPB and C-TAM-TPB); - Social factors (MPCU); - Image (IDT).
Facilitating Conditions	Refer to consumers’ perceptions of the resources and support available to perform a behaviour Venkatesh et al. (2003)	-Perceived behavioural control (TPB/DTPB, C-TAM-TPB); -Facilitating conditions (MPCU); - Compatibility (IDT).

Source (Attuquayefio & Addo, 2014:7)

Furthermore a review of the literature reveals that UTAUT has been used and developed by several researchers (Venkatesh et al, 2003; Kripanont, 2007; Wu, Tao and Yang, 2007; Ghobakhloo, Zulkifliand Aziz, 2010; Jayasingh and Eze, 2010).

Mtebe and Raisamo (2014) used an adapted version of UTAUT model in OER research study in Tanzania to investigate the challenges of OER adoption in Higher Learning Institutions with significantly high validity and reliability ratings. In 2012 Percy and Van Belle also used the UTAUT model to explore the barriers and enablers to the Use of Open Educational Resources by University educators in Africa. These examples are testimony of contextual relevance of the UTAUT model, further solidifying its superiority over other theories and models.

## **2.6 Contemporary OER Research Outcomes**

There are a number of OER researches that have been conducted. This section briefly presents a synthesis and comparison of some most recent OER research outcomes. The expectation is these results will help inform the interpretation and comparison of the outcomes of this research. Since this research study is on adoption a lot of reference has been done and will continue to be done on most recent studies on OER adoption and quality perceptions notably (BCG, 2011 2013; Hewlett-Foundation, 2012 2013; Mtebe & Raisamo, 2014; Percy & Van Belle, 2012; Dulle & Minishi-Majanja, 2011). This section will focus on "efficacy and perception" of Open Educational Resources.

### **2.6.1 Efficacy between OER use and traditional textbook use**

Presented at the 2014 Open Education Group (OpenEd) Conference in Washington, D.C., were a number of researches studies (Lovett et al, 2008; Petrides et al, 2011; Wiley et al, 2012; Hilton et al, 2012) focused on "efficacy and perception" of Open Educational Resources. These research studies demonstrated no significant difference in efficacy between OER use and traditional textbook use. To OER advocates these findings may not sound promising however the outcome can be interpreted differently. Students who prefer online OER resources may have different learning orientation from those who

prefer traditional textbook. The learning process and speed may be different when the different forms of learning resources are used (Rockinson- Szapkiw et al, 2013)

### **2.6.2 OER use and high assessment outcomes**

Research studies on OER use and assessment outcomes rates (Hilton and Laman, 2012; Feldstein et al, 2012; Bliss et al, 2013; Pawlyshyn et al, 2013; Robinson et al, 2014) revealed that there *is* often a correlation between OER use and high assessment outcomes, high grade average, and low withdrawal rates. In other words, many research studies confirm that learners using OER are performing well, however there is insufficient evidence to suggest that it is *because* of the open resources themselves i.e. correlations does not necessarily imply causation. Further research is still required to investigate these research outcomes further particularly in the African context.

### **2.6.3 OER acceptance by learners and educators**

Acceptability of OER by learners and educators is somewhat related to the key constructs (Effort Expectancy, Performance Expectancy, Social Influence, Facilitating Conditions) that form the basis of research questions of this research study. A number of OpenEd 2014 research studies (Bliss et al, 2013; Lindshield and Adhikari, 2013; Hilton et al, 2013; Allen & Seaman, 2014) revealed that both learners and educators *like* using Open Educational. This is an encouraging outcome; however this does not necessarily imply a direct translation to adoption and use.

### **2.6.4 OER Adoption Barriers**

Literature review (Mtebe & Raisamo, 2014a; Bliss et al, 2013; Lindshield and Adhikari, 2013; Hilton et al, 2013; Allen & Seaman, 2014), confirms that in the past half-decade there has been an increasing use of Open Educational Resources in Higher Education Institutions in both developed and developing countries. The main justification being the perceptions that OER can increase access, reduce costs and improve quality of education

outcomes (ibid). The process of OER adoption and use has met several context specific challenges.

The majority of challenges spelled out in literature cannot be therefore universalized across different contexts e.g. in the absence of empirical research evidence we cannot assume that these barriers apply to Sub-Saharan Africa countries. Despite commonalities that exist amongst countries there exists considerable diversity and they face different challenges (Mtebe & Raisamo, 2014a). Consequently a research study (Mtebe & Raisamo, 2014a) to understand OER adoption barriers in the context of Sub-Saharan Africa was conducted in Tanzania and it involved 11 Higher Education Institutions. The findings revealed the following three main barriers for Tanzania: (a) Lack of computer hardware and software; (b) Slow internet connection; (c) Lack of OER supportive policies, (d) Lack of training and practice (skills to create and/or use OER). In other contexts elsewhere in Africa the same research revealed that: (a) OER quality concerns; (b) Lack of interest in creating and/or using OER; (c) Lack of time to search and customize OER were not considered to be barriers (ibid).

These field research outcomes from different contexts emphasize the need for context sensitive research if we are to understand and conquer the challenges of OER adoption. Then need to understand specific OER adoption challenges for Africa University is the prime motivation of this research. The research will be approached with an open mind and devoid of any preconceptions to ensure that the research objectives are accomplished. There may be need to revisit existing literature on OER research to help to further understand the outcomes of this research study.

## **2.7 Chapter Summary**

Through the review of literature the following important findings have been revealed: (a) It is important not to treat Open Education Resources in isolation without considering Open Education Practices; (b) OER presents opportunities to lower the cost of educational materials and increase learning efficiencies as well as encourage continuous

improvement; (c) The barriers to OER adoption such as lack of awareness, quality concerns, lack of standards, policies, OER domain coverage etc. are not substantial challenges as some critics put them and they may be successfully mitigated; (d) OER adoption risks e.g. continued sustainable funding and lack of interest and awareness must not be overlooked; and (e) Technology integration models can be used to inform theoretical and conceptual frameworks on OER adoption research.

Outcomes from current OER research reveal that (a) There is no significant difference in efficacy between OER use and traditional textbook use; (b) Many research studies confirm that learners using OER are performing well; (c) both learners and educators *like* using Open Educational; (d) OER adoption barriers differ significantly depending on the context, and this justifies the need for context specific research studies.

Informed by the current literature on OER adoption and in particular by the theoretical perspectives used to explain it, this study uses the UTAUT model as a framework to structure the research instruments and to explain the adoption of OER by academics at Africa University in Zimbabwe.

## **Chapter 3: Research Design**

### **3.0 Introduction**

This chapter begins with a discussion of the chosen philosophical view also known as research philosophy or research paradigms. Detailed synthesis of research design, research methodology, research strategy and approaches are systematically presented. The synthesis defines, justifies and highlights strengths and weaknesses for phenomena, concepts tools and techniques adopted and used in this research study. Due to number of words limitation attributed to this minor dissertation, only concepts, tools, and techniques applicable and used in this research study are included in the synthesis and analysis.

### **3.1 Research Philosophy**

One of the challenges I faced was to select the appropriate research philosophy from a pool of various alternatives brought forward by theorists, scholars, and practitioners. The selection was complicated by the fact that the research study cuts across Social Studies and ICTs in Education (two distinct research domains).

Literature review confirms that critical realism is becoming an increasingly influential approach with increasing adoption in social sciences and science domains (Cruikshank 2002; Mingers 2004; Dobson 2002). As this research study cuts across the science and social science domains, critical realism appeared to be the most appropriate.

According to Wahyuni (2010), positivist research paradigm supports quantitative method and the constructivist research paradigm supports the qualitative method. In between positivism and constructivism we have critical realism and this paradigm allows the researcher to mix qualitative and quantitative methods. On the extreme we have Pragmatism, a more radical research paradigm. According to Barrett et al. (2010) Information Systems research in Europe have preferred constructivism while positivism has been preferred in the USA. The majority of Information Systems researches done at Africa University have used positivism. Critical realism appeals as more appropriate and

safe paradigm to adopt, however the decision could benefit from further evaluation and justification.

Critical realism has also been used by Mingers in information systems research. A consideration of the problem statement, research objectives and research questions (Chapter 1) suggested logical relation to critical realism research philosophy. Critical realism allows us to combine qualitative and quantitative methods (Wahyuni, 2010). The research hypothesis involved testing a theory and this called for quantitative method. On the other hand the research questions involved confirming not well known facts and this called for qualitative method. This is corroborated Mingers (2004) and Dobson (2002), critical realism research philosophy has been increasingly adopted in research studies involving ICTs and cutting across the science and social science domains. The critical realism research philosophy, contends the view that "... there is a world existing independently of our knowledge of it" (Sayer 2000:2), and thus provides ground between positivism and "hermeneutic analyses" (Harvey 2002:163). It is this fallibilist interpretation of the world and knowledge around and the increasing use of critical realism in related studies involving ICTs in education that influenced the adoption of critical realism in this research study.

To the benefit of the research process, the advantage of the mixed methods approach is they are mutually complementary and inform one another highlighting important relationships, changes and practices occurring at different levels (Tashakkori and Teddlie, 1998). Furthermore according to Mingers (2001), using mixed methods each with their own particular philosophy and particular challenges encourages creativity, expands the research study and offer different insights.

In further support of critical realism, according to Barrett et al. al. (2010), critical realism concurrently combines the approaches of natural and social sciences and this makes it particularly interesting in research studies involving information systems. The field of Information Systems has tenets of and social science (Application of Information Systems in business and institution have a huge component of human context) and

natural science (Information Systems have technology features with tenets of natural science).

From the discussion above it is evident and convincing that critical realism is not restricted to a single type of research, instead it gives the researcher leverage of research methods as dictated by the type of the project and the nature of research questions and objectives. The inflexibility of other research paradigms to accommodate multiplicity of research methods a concept universally known as "mixed methods" puts them lower in the preference list.

From the foregoing facts and arguments presented in this section it has been substantiated that mixed-methods provides some important benefits and depth in research. Furthermore a foundation and justification has been put forward for critical realism as an appropriate philosophy in mixed-methods research in Information Systems research.

### **3.2 Research Design**

This research study will take the form of an evaluative exploratory research. Since the purpose of the research is to elicit and discover challenges and behavioural intention on OER adoption an exploratory research approach will be employed.

The research study will generate knowledge on the OER adoption process, identify ways to improve OER adoption and in some way judge the merit of OER as a credible and acceptable intervention for the educational resources challenge facing Africa University.

### **3.3 Research Approach**

Qualitative and quantitative research designs are the two major research approaches (Bryman and Bell, 2003). Creswell (2009) put forward a research approach that combines qualitative and quantitative approaches and called it mixed methods.

According to Creswell (2009), quantitative data, is derived from statistical analysis of the data collected in the form of numbers. Using standard statistical inference measures we can objectively generalise findings from a quantitative research. Denzin and Lincoln (2005) posit that with quantitative approach we are able to derive explanations on tentative relationships and co-relationships amongst research variables, identify trends or long time developments in variables and many more.

Copper and Schindler (2003), posit that qualitative research does not depend on statistical analysis to derive result, instead other classification and qualification technics are employed. In qualitative research we are more concerned with the possible explanation of the observed phenomena (ibid). Another defining feature of qualitative approach is the use of interviews and open ended questions to explore possible explanations from the subjects of the research (ibid). Silverman (2000) posit that qualitative research allows the researcher to gain a deeper understanding of the phenomena being studied when compared to a purely quantitative research approach. According to Bonoma (1985) qualitative research approach allows close working relationship and participation with the subjects of the research.

Gupta et al. (2008) posit that technology research is multi-layered in that it spans across multiple levels of analysis. Thus, Tashakkori and Teddlie (2010) call for mixed-methods to explain the phenomenon. This is supported by Mingers (2004) who argues that mixed-methods allow deeper understanding of the complexity of reality since they focus different aspects. On a detailed level, both Bryman and Bell (2004) suggest that mixed-methods seek accuracy and validity to results by applying different aspects of the same phenomena or examining overlapping phenomena. This motive is also recognized by Mingers (2004) as a possibility to widen the scope of a study to take wider aspects.

The aim of this research study stated more broadly is to elicit measure and evaluate AU educators' challenges and behavioural intention to adopt open educational resources in mainstream teaching and learning processes. Quantitative method would do a good job of measuring frequency, magnitude and significance of challenges, however it would not be possible explain some quantitative metrics without the qualitative

background and context details. According to Barrett et al. (2010) a research study on *SWIFT (Society for Worldwide Interbank Financial Telecommunication) adoption and firm performance* done initially using econometrics (quantitative method) did not generate much attention and value until a follow up qualitative research study to collect background details and information to give practical and operational meaning to the quantitative metrics.

The four research questions seek to establish in what ways effort expectancy, performance expectancy, social influence and facilitating conditions influence the behavioral intention of AU educators to adopt Open Educational Resources. Quantitative approach would do a good job of screening the most significant variable, with their respective frequencies and magnitudes, however qualitative background information and details would help give practical and operationally significant interpretation of the quantitative metrics.

### **3.4 Research Strategy**

Creswell (2009) defines research strategy as specific technics or approaches used in the research enquiry process. They are used in the context of a particular research design category. They can be classified as qualitative (grounded theory, case studies, analysis of narrative, ethnography) , quantitative (survey, experiments and quasi experiments) and mixed (mixed, parallel, series, or alternate application of qualitative and quantitative) (Creswell, 2009). According to Saunders et al, (2007) to select the appropriate research strategy we must take into consideration the research objectives and research questions. Accordingly this research study adopts a mixed parallel approach strategy. Table 3 below conceived from Yin (2009, 2012) maps research strategy to research questions to provide selection criteria for the appropriate research strategy. Case study and survey were derived as appropriate research strategies in this research study and can be confirmed from table 3 below.

**Table 3. Research Strategies**

RESEARCH STRATEGY	FORM OF RESEARCH QUESTION	REQUIRES CONTROL OVER BEHAVIORAL EVENTS	FOCUSES ON CONTEMPORARY EVENTS
<b>Experiment</b>	How, why	Yes	Yes
<b>Survey</b>	Who, What, Where, How many, How much	No	Yes
<b>Archival Analysis</b>	Who, What, Where, How many, How much	No	Yes/No
<b>History</b>	How, Why	No	No
<b>Case Study</b>	How, Why	No	Yes

Source: conceived from (Yin, 2009, 2012)

As recommended by Saunders et al. (2007) research objectives and research questions were considered in the selection of the research strategy. The research questions were directly derived from the research questions and they involve the “what” question. From decision rules set in table 3 the, “what” question suggests a survey strategy. The research study also involves contemporary events i.e. OER and ICTs in Education and from the decision criteria in table 3 above such contexts are better addressed by a case study strategy.

### 3.5 Population

Yin (2009), defines a research study population as a composition (individual or collective) of entities (anything about which data can be collected) with similar characteristics. Examples of population can be individuals, objects, group of individuals

or objects, organizations, animals etc. In this research study, the population consisted of Africa University educators whose number range on average between, 75-110 educators. The big variance in the number of educators is because of funded programs that do not recruit continuously i.e. they have a close and resume window e.g. The World Intellectual Property Organization (WIPO) and the African Development Bank (ABDF) fund degree programs and staff complement to teach these programs and AU staff complement is very low during the cycle intervals of these funded programs. At Africa University it is compulsory for all educators to invigilate examinations and hence I was able to obtain a complete list of the population from the October-November 2014 examination/invigilation time table. During this examination period all educators, not on vacation or official external engagement, have a minimum of four randomly allocated invigilation time slots. The exact population size according to the October-November 2014 examination timetable was 55 educators.

### 3.6 Sample Size and Sampling Frame

The research study adopted probability sampling techniques. I used Gay's (1987) rule of the thumb to determine the sample size and this is summarized in Table 4 below:

**Table 4: Sample Determination - Gay's Rule of Thumb**

<i>Population group category</i>	<i>Sampling percentage</i>
0-100	100%
101-1000	10 %
1001- 5000	5%
5001-10000	3%
10000+	1%

Source (Gay, 1987:75)

The shaded row on table 4 represents the size of the target population (between 0-100 educators), using Gay's rule of thumb the goal was to survey all 55 educators (100%) on

the October-November 2014 invigilation list. However it was not practically possible as some educators had emergencies and I had four, 3 hour invigilation slots to fulfil during the same period. I was therefore unable to administer survey during my invigilation time. The response rate was 45educators (82%) out of a total of 55 possible educators. Important to note is the educators are randomly assigned invigilation dates and time slots by the examinations office i.e. the owners and custodians of the invigilation time table.

### **3.6.1 Sampling Procedure**

Saunders et al (2007) defines sampling procedures that give the research subjects equal opportunity to be part of the research (probability sampling) and those not based on statistical techniques and do not give equal opportunity to participate in the research survey (non-robability sampling). To avoid bias it was considered appropriate to give everyone a chance to participate in the survey and hence probability sampling was adopted in this research. The sampling frame was educators assigned to invigilate the Novemver-December 2014 examinations at Africa University. Educators are randomly assigned invigilation time slots by the examinations office and hence a simple random sampling also defines the sampling technique used in this research study. However for the pilot study purposeful sampling which targeted the first readily available part time lecturers was used for two main reasons (a) To avoid pre-empting the research since part timers simply come to teach and leave (b) To keep the population and sampling frame intact since the part time lecturers were not part of the research study population frame.

The advantage of simple random sampling is that it gives the flexibility to take the entire population as a sample or a qualified and quantified fraction of the population size (Cooper & Schindler, 2003). According to Sarantakos (2005), this is important as it would ensure that educators have an equal chance of being selected.

### **3.7 Data Collection Techniques and Research Instrument**

Case study and survey were identified as appropriate research strategies to be followed and from these findings a survey questionnaire was logically selected as the appropriate instrument for data collection. With a research survey questionnaire we can collect data by interacting directly or indirectly with research participants as appropriate (Saunders et al, 2003). The research study sought to investigate usage of OER and according to Cooper & Schindler (2003) survey questionnaire is the most commonly used research instrument it researches that investigate “usage”.

The data was collected using a self-administered questionnaire with a mixture of closed and open ended questions in order to measure their perceptions and attitudes towards OER adoption. The structured or close ended questions were designed using a Likert scale of 5 points (See research instrument in Appendix A). The goal was to measure the agreement rating of the respondents and the rating ranged from agreeing strongly to disagree strongly. The questionnaire was adapted from Mtebe and Raisamo (2014) and modified to fit the research objectives and context.

A pilot test must be conducted to ensure that the research instrument will meet expectations, assumptions, reliability and validity. (Bryman and Bell, 2007; Malhotra and Birks, 2007). The pilot test was administered using purposeful sampling to 10 part time educators in the Faculty of Management and Administration, and these were not included in the actual survey. As a member of this faculty, it was easy and convenient to get cooperation and immediate feedback. The sample size of 10 was determined on the basis of recommendations of a minimum pilot sample size of 10 participants by Saunders et al. (2007).

The general feedback was to increase the number of unstructured questions to help elicit some insights not covered in the structured questions. I also observed that time and commitment to respond to questionnaires could be a challenge for many educators. To get around the problem the exam invigilation window was identified as a time when educators have a three hour idle time. During invigilation educators are not allowed to

read or engage in any other activity. I sought permission of the university registrar to conduct my research during this period. The motivation was offering to take their invigilation time while they take a tea break and complete the questionnaire and it proved to be a successful strategy.

The respondents were first appraised of the purpose of the questionnaire, assured confidentiality of responses. During the pre-test stage self-administered questionnaire approach was used and the feedback was respondents did not have time to read through the background and introduction letters, they preferred a short briefing. The short interaction was also some form of an informal agreement. The respondents were left to complete and they submitted back the questionnaires to me. The questionnaire (Appendix A) included 25 closed and 4 open-ended questions and since the study was mainly exploratory in nature, these open-ended questions assisted in the exploration of the current situation.

### **3.8 Research Data Sources**

Data from research study that is directly collected by the researcher (primary data) or data obtained from other sources (secondary data) are the two main categories of research data (Bryman and Bell, 2007; Ghauri *et al.* 2005). Collecting primary data is an expensive and time consuming process however it allows detailed focus of the phenomena under research (Zikmund, 2003). In this research study primary data collected through survey questionnaire is the main source of data input. For further details of the research instrument refer to (Appendix A).

### **3.9 Analysis of Data**

The data analysis plan is depicted in Table 5 below. The Pearson Correlation Coefficient (t-Test) was used to establish the correlation amongst the research, constructs (Effort Expectancy, Performance Expectancy, Facilitating Conditions, and Social Influence). Regression analysis and factor analysis procedures were used to establish any possible

effect of independent variables (Age, Gender, Experience, Voluntariness, Effort Expectancy, Performance Expectancy, Facilitating Conditions, and Social Influence,) to the dependent variable (Behavioural Intention). Descriptive statistics (such as mean and frequencies) analysis was applied to the demographic data (age, gender, experience). The data collected from the returned questionnaires was analysed using computer software, Statistical Package for Social Sciences (SPSS) version 20. SPSS has also been widely applied by many scholars in OER adoption studies (Mtebe & Raisamo, 2014; Percy & Van Belle, 2014; Dulle & Minishi-Majanja, 2011).

**Table 5: Data Analysis Plan**

<b>Administered the research instrument to collect data</b>		
<b>Data Classification and Coding</b>		
<b>Data checked for constancy cleaned and coded</b>		
<b>Data captured into SPSS</b>		
<p><b>Research Credibility</b> (Started with factoring in the comments from the pilot test followed by computation of cronbach's alpha (<math>\alpha</math>) values for the research instrument using SPSS)</p> <p>The computed cronbach's alpha readings for all the research constructs ranged from a min of 0.705 to a max of 0.819 i.e. they all exceed 0.70. A minimum coefficient of 0.70 is required to ensure acceptable reliability and validity. (Refer Section 3.11 for further details)</p>	<p><b>Acceptance and Rejection of Hypothesis</b> (inferential statistics metrics and measures were used)</p> <p>The dependent variable (BI) was tested using regression against the four independent variables (PE, EE, SI, FC).</p> <p>The regression analysis outcome of was used to accept or reject the hypothesis</p> <p>Factor analysis method was then used to confirm the outcomes from regression analysis</p>	<p><b>Interpretation of Qualitative Data</b></p> <p>This was done by identifying key phrases and words related to the construct being explored by each open ended question. Frequencies we compiled and these were used to generate frequency distribution tables and bar graphs, from which interferences, conclusions and recommendations were drawn. This approach to analysis is documented and confirmed by (Boeije, 2010). For more details refer to section 3.9.1</p>
<b>Descriptive Analysis</b>		
<p>IBM SPSS ver. 20 to run the statistical analysis of the collected primary research data. Frequency tables and inferential statistics metrics were produced. See chapter 4 for more details</p>		
<b>Acceptance and Rejection of Research Questions</b>		
<p>Inferential statistics metrics and measures were used. See chapter 4 for more details.</p>		

### **Concluding and Recommending Actions**

The key findings from chapter 4 were used jointly with the related literature reviewed (Chapter 2)

According to Cooper & Schindler (2003) arranging data in table form gives a pictorial view that makes it quick to understand and compare the data. This approach of arranging data is known as tabulation.

Four types of tables were used in this study: i) Reliability Statistics Table; ii) Frequency Table; iii) Rotated Component Matrix; iv) Regression Coefficients Table. All four tables are part of standard output of SPSS version 20, the software package used to analyse the data.

- i. Reliability Statistics Table: tabulates the output of the reliability and validity test for the constructs. It pairs each construct and related Cronbach's Alpha value, displayed in rows and columns.
- ii. Frequency Table: was used to analyse response to questions on Gender, Age, Experience, Awareness, and Voluntariness. The tabulated measures are: Frequency, Percent, Valid Percent, and Cumulative Percent.
- iii. Rotated Component Matrix: was used to display correlation coefficients between each component being measure and the principle components (components responsible for 85% and more of the total variation)
- iv. Regression Coefficients Table: tabulates each construct as input of a regression model and the corresponding: Standardised Coefficients, Unstandardized Coefficients, t-Test values, and Significance values.

**a) Diagrammatic Presentation** For better presentation and analysis, data can be presented diagrammatically. Graphs and charts give a quick visual impression of any patterns or trends in your results. They should be used to help summarise your results (Cooper & Schindler, 2003). Bar graphs were used to depict

challenges and barriers raised and their related frequency. This helps highlight the key challenges and barriers at a glance.

**b) Qualitative Analysis** “Qualitative data analysis is a search for general statements about relationships among categories of data ”(Marshall & Rossman, 1990:75). Qualitative analysis is also “the ways in which the researcher moves from a description of what is the case to an explanation of why what is the case” (Hitchcock & Hughes, 1995:120). Qualitative data analysis was used to analyse responses from open ended questions by selecting common constructs and building frequency tables which were then used to produce bar graphs.

### 3.9.1 Data Classification and Coding

The measurement questions had to be classified and coded before input into SPSS. The 29 questions were grouped into 10 different categories, with each category having at least one question. Each question was also assigned a short SPSS label or code for easy identity of variables during SPSS data analysis. The distribution and allocation of questions into different categories is illustrated in Table 6 below.

**Table 6: Data Classification and Coding**

<b>Classification</b>	<b>Measurement question</b>
Demographics [DE]	1. Gender 2. Age 3. Working Experience 4. Rate your experience with ICTs in Teaching
Training & Workshop [TW]	5. Have you participated in any OER seminar, workshop or training?
Voluntariness to participate in the OER lifecycle [VO]	6. To what extent are you willing to share your originally created materials on an open educational resources platform (e.g. MERLOT, Connexions, and OER Africa)?
Awareness of open licensing [AW]	7. To what extent are you familiar with licensing and copyright rules (e.g. Copyright ©) and alternative options (e.g. Creative Commons (CC))?

Quality Perception [QP]	8. Generally OERs are of acceptable quality
Effort Expectancy [EE]	9. Using OER will enable me to accomplish course development activities more quickly 14. It is easy to search and find suitable OER 15. I have time to customize OER to suit my students' needs 16. I have time to create OER for others to use
Performance Expectancy [PE]	10. Using OER will increase learning outcomes of my students 11. Using OER will allow me to have access to current information about the courses I teach
Facilitating Conditions [FC]	17. My institution has facilities and incentives to promote OER adoption 22. I have access to OER 23. I have the knowledge necessary to use and integrate OER into my courses 24. OER is similar to other course content I use for teaching 25. Help will be available when I have a problem in using and integrating OER into my courses
Social Influence [SI]	19. Africa University Academics are adopting and using OER in teaching and learning 20. People who are important to me will think that I should use and integrate OER into my courses 21. The lecturers and other staff at my University encourage and promote using OER
Behavioural Intention [BI]	27. I intend to use and integrate OER into my courses in the future 28. I predict I would use and integrate OER into my courses in the future
Challenges & Barriers [CB]	12. Do you have concerns about the quality of OER available on the Internet? 13. Do you have concerns about the quality of your own teaching materials and their readiness for contributing as OER? 18. What do you see as barriers for Africa University educators with interest to adopt OER? (Tick all applicable) <input type="radio"/> Lack of access to the Internet

	<ul style="list-style-type: none"> <li><input type="radio"/> Lack of hardware</li> <li><input type="radio"/> Lack of software</li> <li><input type="radio"/> Lack of knowledge about alternative licensing systems</li> <li><input type="radio"/> Lack of training</li> <li><input type="radio"/> Lack of institutional support</li> <li><input type="radio"/> No compensation for creating or customizing resources</li> <li><input type="radio"/> No institutional acknowledgment or recognition for creating or customizing resources</li> </ul> <p>26. From your experience what can Africa University do to promote OER adoption?</p> <p>29. What might stop you from using OER as instructional material?</p>
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### 3.10 Ethics

The research was subjected to approval by Africa University Ethics Committee (March 2014) and School of Education Ethics Committee (April 2014) before commencement. All participants in the research study were not exposed to any risk than any member of staff would be when undertaking a typical staff development activity. All participant data remained confidential throughout the study. The research study did not require any other approval beyond the two ethics committees above. An informed consent form (Appendix A.2) was prefixed to each questionnaire provided to each participant at the beginning of the survey.

A confidentiality statement was provided to protect and assure the participants. The survey questionnaires did not collect any involuntary personal identifiable information that was used in the analysis and presentation of data.

### 3.11 Validity and Reliability

The pilot testing help to measure and address issues around the reliability of the research instrument. Reliability for data derived from the survey questionnaire was measured using Cronbach's alpha coefficient generated from SPSS (Table 7). “Reliability analysis allows one to study the properties of measurement scales and the items that compose the scales. The Reliability Analysis procedure calculates a number of commonly used measures of scale reliability and also provides information about the relationships between individual items in the scale.”<sup>8</sup> The “Cronbach's alpha coefficient” for the survey questionnaire was used. Cronbach's alpha coefficient of 0.70 is required for basic research (Copper & Schindler 2003).

**Table 7: Cronbach's Alpha Coefficients – Measuring Construct Reliability**

No.	Construct	Cronbach's Alpha	No. of Items (questions)	Question No.
1.	Effort Expectancy	.705	4	9, 14, 15, 16
2.	Performance Expectancy	.709	2	10, 11
3.	Facilitating Conditions	.768	5	17, 22, 23, 24, 25
4.	Social Influence	.769	3	19, 20, 21
5.	Behavioural Intention	.819	2	27, 28

The choice of UTAUT model was informed by the fact the model has documented records of validity and consistency in measuring the acceptance of various new IT innovations. This is evidenced by use of the model in similar OER research contexts in sub-Saharan Africa (Mtebe & Raisamo, 2014; Percy & Van Belle, 2012, Dulle & Minishi-Majanja, 2011). These outcomes of previous research studies helped to provide some validity and reliability benchmarks.

Analysis of qualitative data was also informed by previous research related data reviewed (Hoosen, 2012; Mtebe & Raisamo, 2014; Percy & Van Belle, 2012, Dulle & Minishi-Majanja, 2011). Common descriptors or constructs relating to challenges and

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<sup>8</sup><http://www-01.ibm.com/software/analytics/spss/>

barriers were identified by carefully reading through each open ended response. A tally system was used to derive frequency of recurring challenges and motivators. Qualitative analysis outcome from previous research data (ibid) helped confirm and identify new challenges and motivators that were meant to be measured by the open ended questions. This approach provided some benchmarking and it made it possible to identify some illogical responses and completely new contributions. The above described were the measures of validity and reliability incorporated in this research study to boost the confidence level of the research outcome.

### **3.12 Chapter Summary**

The chapter spelled out the research philosophy or research paradigm on which the research study is based to clarify the world view assumption shaping the research. The research design, research approach, research strategy, population frame, sampling frame and techniques were presented and justified. The process of collecting data and the research instrument used were also discussed in detail followed by sources of primary data and data analysis and interpretation techniques and processes. A comprehensive data analysis plan was presented explained and justified. The chapter concludes with synthesis of issues relating to ethics, validity and reliability that were considered and instituted to give credence to the research study.

Experienced in this research is the invaluable contribution of the pre-test results that gave important input to improve the research instrument and the way the instrument was finally administered to the research participants.

## Chapter 4: Results

### 4.0 Introduction

Presented and depicted in this chapter are the research results. In the beginning, the descriptive statistics are provided to highlight the profile of the respondents and their awareness, experience and usage of OER. The next sections report and highlight the findings emanating from the inferential statistics in order to isolate factors affecting the adoption of OER by educators at Africa University. The last section covers the classification, analysis and interpretation of qualitative data to reveal trends and meaning.

### 4.1 Demographic Profile of Respondents

Gender representation among the 45 respondents is depicted in Table 8 below. Of the respondents 32 (71.1 percent) were male and 13 (28.9 percent) female respondents.

**Table 8: Respondents' Gender Distribution**

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	32	71.1	71.1	71.1
Female	13	28.9	28.9	100.0
Total	45	100.0	100.0	

With respect to Age (Table 9), 11 respondents (24.4 percent) were aged between 31-45 years; 30 (66.7 percent) were aged between 46-60 years; and 4 (8.9 percent) were above 60 years.

**Table 9: Respondents' Age Distribution**

Age	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 31-45 Years	11	24.4	24.4	24.4
46-60 Years	30	66.7	66.7	91.1
61Years	4	8.9	8.9	100.0
Total	45	100.0	100.0	

Working experience distribution (Table 10) was as follows: 3 (6.7 percent) had experience between 0-5 years; 10 (22.2 percent) between 5-10 years; 16 (35.6 percent)

were aged between 10-15 years; and 16 (35.5 percent) had work experience of over 15 years.

**Table 10: Respondents' Experience Distribution**

Work Experience		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5years	3	6.7	6.7	6.7
	5-10years	10	22.2	22.2	28.9
	10-15years	16	35.6	35.6	64.4
	15years+	16	35.6	35.6	100.0
	Total	45	100.0	100.0	

The ratings for experience with ICTs in teaching (Table 11) indicated that 7 (15.6 percent) educators had very strong experience; 12 (26.7 percent) had strong experience; 22 (48.9 percent) had limited experience; 2 (4.4 percent) preferred not to say; and 2 (4.4 percent) had no experience.

**Table 11: Experience with ICT in Teaching**

Rate your experience with ICTs in Teaching		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Strong	7	15.6	15.6	15.6
	Strong	12	26.7	26.7	42.2
	Limited	22	48.9	48.9	91.1
	Prefer not to say	2	4.4	4.4	95.6
	None	2	4.4	4.4	100.0
	Total	45	100.0	100.0	

#### **4.2 Determination of Factors Affecting Adoption of OER**

This section begins with descriptive statistics outlining research outcomes on OER awareness by way of training or related workshop attendance; Willingness to share original work in OER platforms (This measure of willingness is equated to voluntariness in the research model, I was attempting to measure the voluntariness to participate in the OER lifecycle and I deemed willingness to create and share OER was the closest measure); Familiarity with copyright and open access licensing; and OER quality perception. The next sections present research findings followed by the outcomes of

hypothesis testing and culminate with the analysis of the structured and open ended questions on OER adoption challenges and barriers.

#### 4.2.1 OER Training or Related Workshop Attendance

The findings (Table 12) revealed that 34 (75.6 percent) of the respondents had attended OER training or related workshops compared to 11 (24.4 percent) who had not.

**Table 12: OER Training and Workshop**

[TW] Have you participated in any OER seminar, works hop or training		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	34	75.6	75.6	75.6
	No	11	24.4	24.4	100.0
	Total	45	100.0	100.0	

#### 4.2.2 Voluntariness to Participate in OER Lifecycle

The findings (Table 13) revealed that 10 (22.2 percent) were Very willing to share their original work on OER platforms, while 12 (26.7 percent) were Willing, 11 (24.4 percent) were Not Sure, 9 (20 percent) were Partly Willing and only 3 (6.7 percent) were Not Willing.

**Table 13: Voluntariness to Participate in OER Lifecycle**

[VO] To what extent are you willing to share your originally created materials on an open educational resources platform e.g. OER Africa		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very willing	10	22.2	22.2	22.2
	Willing	12	26.7	26.7	48.9
	Not Sure	11	24.4	24.4	73.3
	Partly Willing	9	20.0	20.0	93.3
	Not Willing	3	6.7	6.7	100.0
	Total	45	100.0	100.0	

The measure of educators with prior OER training or related workshop was above 75 percent, despite this high awareness level, less than 49 percent of the respondents were willing or very willing to share their originally created materials on an OER platform like MERLOT, MIT, OER Africa etc. In other words less than 49 percent were willing or

very willing to participate in the OER life cycle. Considering the infancy of OER adoption at Africa University the combined percentage of 49 for those willing and very willing to participate in the OER life cycle may be deemed high and can be interpreted to mean that educators may be willing, but not able (technically); or have no time to enact their willingness to contribute in OER life cycle.

#### 4.2.3 Familiarity with Copyright and Open Access Licensing

The main reason for including this measure was to help extract possible explanation for the outcome on Voluntariness to share OER. The findings (Table 14) revealed that 3 (6.7 percent) were very familiar with copyright and alternative licensing options, 18 (40 percent) were Familiar, 1 (2.2 percent) was Not Sure, 11 (24.4 percent) were Partly Familiar and 12 (26.7 percent) were Not Familiar.

**Table 14: Awareness/Familiarity with Open Licensing**

[AW] To what extent are you familiar with licensing and copyright rules (e.g. Copyright) and alternative options(e.g. Creative Commons( cc)		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Familiar	3	6.7	6.7	6.7
	Familiar	18	40.0	40.0	46.7
	Not Sure	1	2.2	2.2	48.9
	Partly Familiar	11	24.4	24.4	73.3
	Not Familiar	12	26.7	26.7	100.0
	Total	45	100.0	100.0	

It is worth noting that a total of 53.5 percent were either: not sure, partially familiar or not familiar with OER licensing or copyright rules. This could be a barrier and a possible explanation for the slow OER adoption. The detailed analysis of the relationship of these two measures is not the emphasis of this research. As this is exploratory research the importance of familiarity with licensing is an important dimension to include in further OER research.

#### 4.2.4 OER Quality Perception

Some previous studies (Percy & Van Belle, 2012; Dulle & Minishi-Majanja, 2011) have looked at OER quality expectation/perception particularly the contextual relevance of resources. There is a general concern by educators that OER may not necessarily suit some contexts they are potentially required and may require a lot of time, effort and expertise to customise them. Questions on OER quality were raised by AU educators during the OER intervention workshop and this motivated the inclusion of this measure. The findings (Table 15) revealed that 3 (6.7 percent) Strongly Disagreed with the statement that “Generally OERs are of acceptable quality”, while 9 (20 percent) were neutral, 26 (57.8 percent) Agreed, and 7 (15.6 percent) Strongly Agreed.

**Table 15: OER Quality Perception/Expectation**

QP Generally OERs are of acceptable quality		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	6.7	6.7	6.7
	Neutral	9	20.0	20.0	26.7
	Agree	26	57.8	57.8	84.4
	Strongly Agree	7	15.6	15.6	100.0
	Total	45	100.0	100.0	

More directly over 73 percent of Africa University educators agree or strongly agree that OER are generally of acceptable quality. This is a positive indicator for Africa University in terms of potential adoption of OER. A related OER study (BCG, June, 2013) revealed that proof of quality and efficacy was the biggest driver accelerating adoption. This is corroborated by another related study (Rolfe, 2012) that found OER quality perception by educators not to be a major adoption barrier. However in some other contexts academics have been worried about the quality of OER. This is a very interesting finding and something to explore further.

#### 4.3 Research questions

The research questions are based on the four constructs (Effort Expectancy, Performance Expectancy, Facilitating Conditions, and Behavioural Intention). This section analyses

each research construct in detail and attempts to identify important factors that will help answer each of the four research questions using inferential statistics. Factor analysis attempts to identify underlying variables, or factors, that may explain the pattern of correlations within a set of observed variables. A factor analysis procedure was used, specifically the Principal Component Analysis, using the Extraction Method and Rotation Method with Varimax with Kaiser Normalization (Everitt & Hothorn, 2010). “Factor analysis is often used in data reduction to identify a small number of factors that explain most of the variance that is observed in a much larger number of manifest variables. Factor analysis can also be used to generate hypotheses regarding causal mechanisms or to screen variables for subsequent analysis (for example, to identify co-linearity prior to performing a linear regression analysis).”<sup>9</sup> One of the outputs of factor analysis is the Rotated Component Matrix and this was preferred to interpret the results because of its clarity and simplicity. Percy and Van Belle (2012) also used Factor Analysis and a Rotated Component Matrix to analyse results in a similar OER research in sub Saharan Africa. Only strong correlations of 0.9 and above are considered significant. However correlations of 0.8 and above will also be given special mention in recommendations as they are sufficiently close to 0.9.

#### **4.3.1 RQ1. In what ways does performance expectancy influence behavioural intention of AU educators to adopt OER?**

The Principal Component Analysis for Performance Expectancy and Behavioural Intention variables yielded a Rotated Component Matrix depicted in Table 16. The variable “[PE] Using OER will increase learning outcomes of my students” has a statistically significant correlation (0.901) with a principal component. *We also note that the same variable as a principal component with statistically significant correlation (0.920) with variable “[BI] I intend to use and integrate OER into my courses”.* Hence AU educators are inclined to adopt OER if using OER will increase learning outcomes of their students.

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<sup>9</sup><http://www-01.ibm.com/software/analytics/spss/>

**Table 16: Rotated Component Matrix – Performance Expectancy**

	Principal Variability Component	
	1 [PE] Using OER will increase learning outcomes of my students	2 [PE] Using OER will allow me to have access to current information about the courses I teach
[PE] Using OER will increase learning outcomes of my students	.011	.901
[PE] Using OER will allow me to have access to current information about the courses I teach	.339	.823
[BI] I intend to use and integrate OER into my courses	.920	.037
[BI] I predict I would use and integrate OER into my courses into my courses in the future	.893	.292

“Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a Rotation converged in 3 iterations.”

When moderated with Age, Gender, Experience and Voluntariness the results (Table 17) revealed that variable “Age” has significant correlation (0.913) as does the “Voluntariness” variable (0.914). *Hence Age and Voluntariness have impact on Performance Expectancy of AU educators. Regarding Age impact we have disparity in numbers between the main Age groups 31-46 years 24.4%, 46-60 years 66.7% and above 61 years 8.9 % (Table 9 above). Detailed statistical analysis of the behaviour and pattern within each intervening variable (age and voluntariness) was not performed at this initial stage of this exploratory research. However the big variation in the age group of educators is a possible reason why age and voluntariness are having a significant impact on adoption.*

**Table 17: Rotated Component Matrix – Performance Expectancy Moderated**

	Principal Variability Component		
	1 [PE] Using OER will increase learning outcomes of my students	2 [PE] Using OER will allow me to have access to current information about the courses I teach	3 [PE] Using OER will allow me to have access to current information about the courses I teach
[PE] Using OER will increase learning outcomes of my students	-.128	.836	.025
[PE] Using OER will allow me to have access to current information about the courses I teach	.178	.859	.014
[BI] I intent to use and integrate OER into my courses	.826	.285	.089
[BI] I predict I would use and integrate OER into my courses into my courses in the future	.667	.563	-.078
Age	-.157	.092	.913
Gender	-.661	.086	-.055
Work Experience	-.682	.121	.352
[VO] To what extent are you willing to share your originally created materials on an open educational resources platform e.g. OER Africa	.099	-.082	.914

"Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.  
a. Rotation converged in 5 iterations."

**4.3.2 RQ2. In what ways does effort expectancy influence behavioural intention of AU educators to adopt OER?**

The Principal Component Analysis for Effort Expectancy and Behavioural Intention variables yielded a Rotated Component Matrix depicted in Table 18. The variable “[EE] I have time to customize OER to suit my students’ needs” has a significant correlation (0.964) with a principal component and also variable “[EE] I have time to create OER for others to use” has a significant correlation (0.908) with the same principal component. *Hence time to customize OER to suit student needs and time to create OER are the most important Effort Expectancy variables for Africa University educators.*

**Table 18: Rotated Component Matrix – Effort Expectancy**

	Principal Variability Component	
	1 [EE] Using OER will enable me to accomplish course development activities more quickly	2 [EE] It is easy to search and find suitable OER
[EE] Using OER will enable me to accomplish course development activities more quickly	.005	.666
[EE] It is easy to search and find suitable OER	.802	-.182
[EE] I have time to customize OER to suit my students' needs	.964	-.032
[EE] I have time to create OER for others to use	.908	-.045
[BI] I intent to use and integrate OER into my courses	-.409	.788
[BI] I predict I would use and integrate OER into my courses into my courses in the future	-.011	.911

"Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 3 iterations."

When moderated with Age, Gender, Experience and Voluntariness the results (Table 19) revealed that variable "Age" has significant correlation (0.901) with a principal component and "Voluntariness" variable "[VO] To what extent are you willing to share your originally created materials on an open educational resources platform e.g. OER Africa" also has a significant correlation (0.914) with a principal component. *Hence Age and Voluntariness have impact on Effort Expectancy of Africa University educators.*

**Table 19: Rotated Component Matrix – Effort Expectancy Moderated**

	Principal Variability Components		
	1 [EE] Using OER will enable me to accomplish course development activities more quickly	2 [EE] It is easy to search and find suitable OER	3 [EE] I have time to customize OER to suit my students need
[EE] Using OER will enable me to accomplish course development activities more quickly	.001	.644	.091
[EE] It is easy to search and find suitable OER	.761	-.122	.261
[EE] I have time to customize OER to suit my students needs	.945	.034	.007
[EE] I have time to create OER for others to use	.900	.015	-.022
[BI] I intent to use and integrate OER into my courses	-.464	.765	.072
[BI] I predict I would use and integrate OER into my courses into my courses in the future	-.067	.913	-.140
Age	.213	.051	.901
Gender	.512	-.223	-.041
Work Experience	.615	-.264	.296
[VO] To what extent are you willing to share your originally created materials on an open educational resources platform e.g. OER Africa	-.039	.007	.920

"Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a Rotation converged in 5 iterations."

**4.3.3 RQ3. In what ways does social influence affect behavioural intention of AU educators to adopt OER?**

The Principal Component Analysis for Social Influence and Behavioural Intention variables yielded a Rotated Component Matrix depicted in Table 20. The principal component variable “[SI] Africa University Academics are adopting and using” is the only one with a significant correlation (0.906). Hence the adoption of OER by other

*academics (peer influence), is a significant Social Influence variable for Africa University educators' intention to adopt OER.*

**Table 20: Rotated Component Matrix – Social Influence**

	Principal Variability Component	
	1	2
	[SI] Africa University Academics are adopting and using OER in teaching and learning	[SI] People who are important to me will think that I should use and integrate OER into my courses
[SI] Africa University Academics are adopting and using OER in teaching and learning	-.625	.560
[SI] People who are important to me will think that I should use and integrate OER into my courses	.225	.813
[SI] Lecturers and other staff at my university encourage and promote using OER	-.243	.858
[BI] I intend to use and integrate OER into my courses	.906	-.004
[BI] I predict I would use and integrate OER into my courses into my courses in the future	.880	.015

"Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.  
a. Rotation converged in 3 iterations."

When Social Influence was moderated with Age, Gender, Experience and Voluntariness the results (Table 21) revealed no significant correlations. *Hence variables Age, Gender, Experience and Voluntariness do not have significant impact on Social Influence for Africa University educators' intention to adopt OER.*

**Table 21: Rotated Component Matrix – Social Influence Moderated**

	Principal Variability Component	
	1 [SI] Africa University Academics are adopting and using OER in teaching and learning	2 [SI] People who are important to me will think that I should use and integrate OER into my courses
[SI] Africa University Academics are adopting and using OER in teaching and learning	.562	.648
[SI] People who are important to me will think that I should use and integrate OER into my courses	.675	-.165
[SI] Lecturers and other staff at my university encourage and promote using OER	.747	.312
[BI] I intent to use and integrate OER into my courses	.091	-.889
[BI] I predict I would use and integrate OER into my courses into my courses in the future	.017	-.786
Age	.870	.118
Gender	-.008	.586
Work Experience	.425	.590
[VO] To what extent are you willing to share your originally created materials on an open educational resources platform e.g. OER Africa	.776	-.060

"Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.  
a. Rotation converged in 3 iterations."

**4.3.4 RQ4. In what ways do facilitating conditions influence behavioural intention of AU educators to adopt OER?**

The Principal Component Analysis for Facilitating Conditions and Behavioural Intention variables yielded a Rotated Component Matrix depicted in Table 22. None of the five Facilitating Conditions variables yielded any significant correlations. *Hence Facilitating Conditions variables (OER Access, Incentives, Usage and integration knowledge, Relevance, and Technical Support) are not significant predictors or influencers of the*

*Behavioural Intention to adopt OER by Africa University educators. This is because educators are content with the current levels of Facilitating Conditions.*

Table 22: Rotated Component Matrix – Facilitating Conditions

	Component	
	1 [FC] My institution has facilities and incentives to promote OER adoption	2 [FC] OER is similar to other course content I use for teaching
[FC] My institution has facilities and incentives to promote OER adoption	.857	.099
[FC] OER is similar to other course content I use for teaching	.834	-.314
[FC] I have access to OER	.781	.039
[FC] I have the knowledge necessary to use and integrate OER into my courses	.254	.633
[FC] Help will be available when I have a problem in using and integrating OER into my courses	.858	-.156
[BI] I intent to use and integrate OER into my courses	-.399	.746
[BI] I predict I would use and integrate OER into my courses into my courses in the future	-.151	.409

"Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a Rotation converged in 3 iterations."

When moderated with Age, Gender, Experience and Voluntariness the results (Table 23) revealed no significant correlations. *Hence variables Age, Gender, Experience and Voluntariness do not have significant impact on Facilitating Conditions (OER Access, Incentives, Usage and integration knowledge, Relevance, and Technical Support) for Africa University educators' intention to adopt OER.*

**Table 23: Rotated Component Matrix – Facilitating Conditions Moderated**

	Principal Variability Component		
	1 [FC] My institution has facilities and incentives to promote OER adoption	2 [FC] OER is similar to other course content I use for teaching	3 [FC] I have access to OER
[FC] My institution has facilities and incentives to promote OER adoption	.840	.042	.059
[FC] OER is similar to other course content I use for teaching	.791	-.349	.203
[FC] I have access to OER	.775	.020	.099
[FC] I have the knowledge necessary to use and integrate OER into my courses	.269	.376	-.786
[FC] Help will be available when I have a problem in using and integrating OER into my courses	.826	-.295	-.088
[BI] I intent to use and integrate OER into my courses	-.276	.873	.138
[BI] I predict I would use and integrate OER into my courses into my courses in the future	-.073	.895	-.153
Age	.630	.143	.614
Gender	.529	-.195	-.408
Work Experience	.697	-.380	.017
[VO] To what extent are you willing to share your originally created materials on an open educational resources platform e.g. OER Africa	.290	.077	.876

"Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a Rotation converged in 7 iterations."

#### 4.4 Hypothesis testing

To test the proposed research hypotheses, regression analysis was used to determine the causal relationship between the Dependent Variable (Behavioural Intention) and four Independent Variables (Effort Expectancy, Performance Expectance, Facilitating Conditions and Social Influence). Each Independent Variable was measured by more than

one categorical variable. The SPSS feature to merge categorical variables into a single variable produced one Dependent Variable and four independent variables which were used to create a multivariate regression model. Table 24 shows the result of non-standardized and standardized regression coefficients for the constructs entered in the model. The last column of Table 24 is the significance column and this is what was used to confirm or deny the hypothesis. All values less than 0.05 represent a statistical significance (or confidence level) of 95% or higher e.g. the significance value of 0.029 for the Performance Expectancy construct means that we have 97.1% confidence that Africa University educators believe in the hypothesis that adopting OER will lead to increased performance.

**Table 24: Regression Coefficients for the Constructs**

Constructs	Unstandardized coefficients		Standardized coefficients Beta	t	Sig.
	B	Std. Error			
(Constant)	3.7803E-017	.092		.000	1.000
Performance Expectancy	.257	.102	.257*	2.839	.029
Effort expectancy	.260	.104	.260*	2.400	.018
Social influence	.195	.123	.160*	.917	.048
Facilitating conditions	-.170	.097	-.170	-1.752	.083

$p < 0.05$

The Regression Coefficients Table (Table 24) shows inferential statistics predictive factors in terms of beta and significance values for each hypothesis obtained from regression analysis. The results show that one hypothesis (Facilitating Conditions) did not have significant effect on educators' intention to adopt OER. In inferential statistics language probability values were not less than 0.05. *The hypothesis, Effort Expectancy (Sig = 0.018 = 98.2 percent), Performance Expectancy (Sig = 0.029 = 97.1 percent) and*

*Social Influence (Sig = 0.048 = 95.2 percent) had significant positive effect on educators' behavioural intention to adopt and use OER in teaching.*

**Table 25: Summary Hypothesis Testing Results**

Hypothesis	Results	Conclusion
<b>Hypothesis 1:</b> Performance Expectancy has a positive effect on behavioural intention to adopt and use OER.	Yes significant (Beta = 0.257, $p < 0.005$ )	Supported
<b>Hypothesis 2:</b> Effort Expectancy has a positive effect on behavioural intention to adopt and use OER.	Yes significant (Beta = 0.260, $p < 0.005$ )	Supported
<b>Hypothesis 3:</b> Social Influence has a positive effect on behavioural intention to adopt and use OER.	Not significant (Beta = -0.160, $p < 0.366$ )	Supported
<b>Hypothesis 4:</b> Facilitating Conditions have a positive effect on behavioural intention to adopt and use OER.	Not significant (Beta = -0.170, $p < 0.083$ )	Not supported

#### 4.4.1 Factor Analysis Procedure

In this section a factor analysis procedure is used firstly to confirm the findings of the hypothesis testing above which were derived using multiple regression analysis. Factor analysis can be used to generate hypotheses regarding causal relationships of variables.<sup>10</sup> Secondly a factor analysis procedure was used to test the significance of Age, Experience, Gender and Voluntariness when all the constructs are considered. The regression analysis method above considered the Dependent Variable (Behavioural Intention) and the four Independent Variables (Effort Expectancy, Performance Expectancy, Facilitating Conditions and Social Influence) and left out Age, Gender, Experience and Voluntariness.

<sup>10</sup><http://www-01.ibm.com/software/analytics/spss/>

The extract of Table 26, shows significant correlation values for the unmoderated Rotated Component Matrix. Variables with statistically significant correlations are “[EE] I have time to customize OER to suit my students’ needs” (0.956); “[EE] Using OER will enable me to accomplish course development activities more quickly” (0.927); and “[PE] Using OER will increase learning outcomes of my students” (0.925). Social Influence did not yield significant values. From the full version of Table 26 in Appendix B we can see that two Social Influence variables had correlation values of 0.784 and 0.768. Perhaps with a higher sample size these would have risen to higher significance levels. *Hence the factor analysis procedure confirmed the Effort Expectancy, Performance Expectancy hypothesis. However it narrowly misses confirmation of the Social Influence hypothesis. This should be viewed positively and give credibility to the research findings. The two methods are showing the same trend of results. Some statistical methods are more consistent with larger samples and others with smaller sample. The variation may be attributed to the sample size.*

**Table 26: Extract of Rotated Component Matrix– BI Unmoderated (Extract)**

	Principal Variability Component			
	1 [EE] Using OER will enable me to accomplish course development activities more quickly	2 [PE] Using OER will increase learning outcomes of my students	3 [PE] Using OER will allow me to have access to current information about the courses I teach	4 [EE] It is easy to search and find suitable OER
[EE] Using OER will enable me to accomplish course development activities more quickly	-.158	.068	.927	.132
[PE] Using OER will increase learning outcomes of my students	.061	.042	.925	-.043
[PE] Using OER will allow me to have access to current information about the courses I teach	.119	.128	.745	.383
[EE] It is easy to search and find suitable OER	.725	.390	-.007	-.182
[EE] I have time to customize OER to suit my students needs	.956	.118	.040	-.024
[EE] I have time to create OER for others to use	.833	.145	.092	-.103
<i>Some rows with data not required in this section have been excluded refer to Appendix B for complete version of Table 26</i>				
[SI] Africa University Academics are adopting and using OER in teaching and learning	.468	.563	.019	-.467
[SI] People who are important to me will think that I should use and integrate OER into my courses	-.122	.784	.180	.240
[SI] Lecturers and other staff at my university encourage and promote using OER	.208	.768	.041	-.136

"Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a Rotation converged in 6 iterations."

The extract of Table 27 below shows the effect of moderating with Age, Gender, Experience and Voluntariness. The revelation is the Voluntariness to participate in OER

life cycle variable “[VO] To what extent are you willing to share your originally created materials on an open educational resources platform e.g. OER Africa” yielded a significant correlation with a principal component of 0.901. The full version of Table 28 in Appendix C reveals that the moderators Age and Gender have correlations of 0.800 and 0.807 respectively. Though not expressly significant according the cut off level used in this research study it is not advisable to ignore these variables. *Hence voluntariness to participate in OER life cycle has significant impact on educators’ Behavioural Intention to adopt OER. Age and Gender correlations of 0.800 and 0.807 are satisfactorily high to warrant attention of these variables.*

**Table 27: Extract of Rotated Component Matrix - BI Moderated**

	Principal Variability Component					
	1 [EE] Using OER will enable me to accomplish course development activities more quickly	2 [PE] Using OER will increase learning outcomes of my students	3 [PE] Using OER will allow me to have access to current information about the courses I teach	4 [EE] It is easy to search and find suitable OER	5 [EE] I have time to customize OER to suit my students needs	6 [EE] I have time to create OER for others to use
[EE] Using OER will enable me to accomplish course development activities more quickly	-.118	.042	.934	.044	.152	-.018
[PE] Using OER will increase learning outcomes of my students	.067	.053	.923	-.049	.017	.179
[PE] Using OER will allow me to have access to current information about the courses I teach	.232	-.050	.736	.193	.353	-.331
[EE] It is easy to search and find suitable OER	.719	.297	-.027	.134	-.103	.330
[EE] I have time to customize OER to suit my students needs	.966	.001	.010	.086	-.018	.106
[EE] I have time to create OER for others to use	.887	.017	.079	.088	-.120	.023
<i>Some rows with data not required in this section have been excluded refer to Appendix A for complete version of Table 27</i>						
Age	.126	.800	.046	.288	.021	.172
Gender	.266	-.013	.045	-.013	-.245	.807
Work Experience	.456	.058	.012	.620	-.396	.000
[VO] To what extent are you willing to share your originally created materials on an open educational resources platform e.g. OER Africa	.003	.901	-.009	.063	-.004	-.151

"Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 6 iterations."

The analysis of quantitative data confirms that Effort Expectancy, Performance Expectancy and Social Influence have positive influence in the Behavioural Intention of Africa University Educators to adopt OER. In other words addressing these three Independent Variables will increase the adoption of OER at Africa University. The important finding is spending resources on facilitating conditions will not result in

significant positive change towards OER adoption. The next section analyses responses to structured and open ended questions.

#### **4.5 Structured and Open Ended Questions**

The research instrument had a provision for, educators to share their opinion in structured and open ended questions to elicit what educators see as barriers to potential OER adopters at Africa University; what might stop Africa University educators from adopting OER as instructional material; what concerns Africa University educators have about the quality of OER available on the internet; and what concerns Africa University educators have about the quality of their own teaching materials and their readiness for contributing as OER.

Only 35 of the 45 questionnaires had completed open ended questions, the other 10 respondents opted not to answer open ended questions. The total numbers of responses per question in some cases exceeds the number of respondents, because some respondents provided a long list of suggestions regarding barriers, quality issues, and motivators. The word “citations” is used where the number of responses exceeds the number of respondents as are result of multiple suggestions/responses provided by one respondent.

An analysis summary table and a frequency bar graph are provided for each open ended question. The table consists of a category column, a column of cited descriptors, and a frequency column. The cited descriptors are not repeated to match total frequency for clarity and simplify of the table.

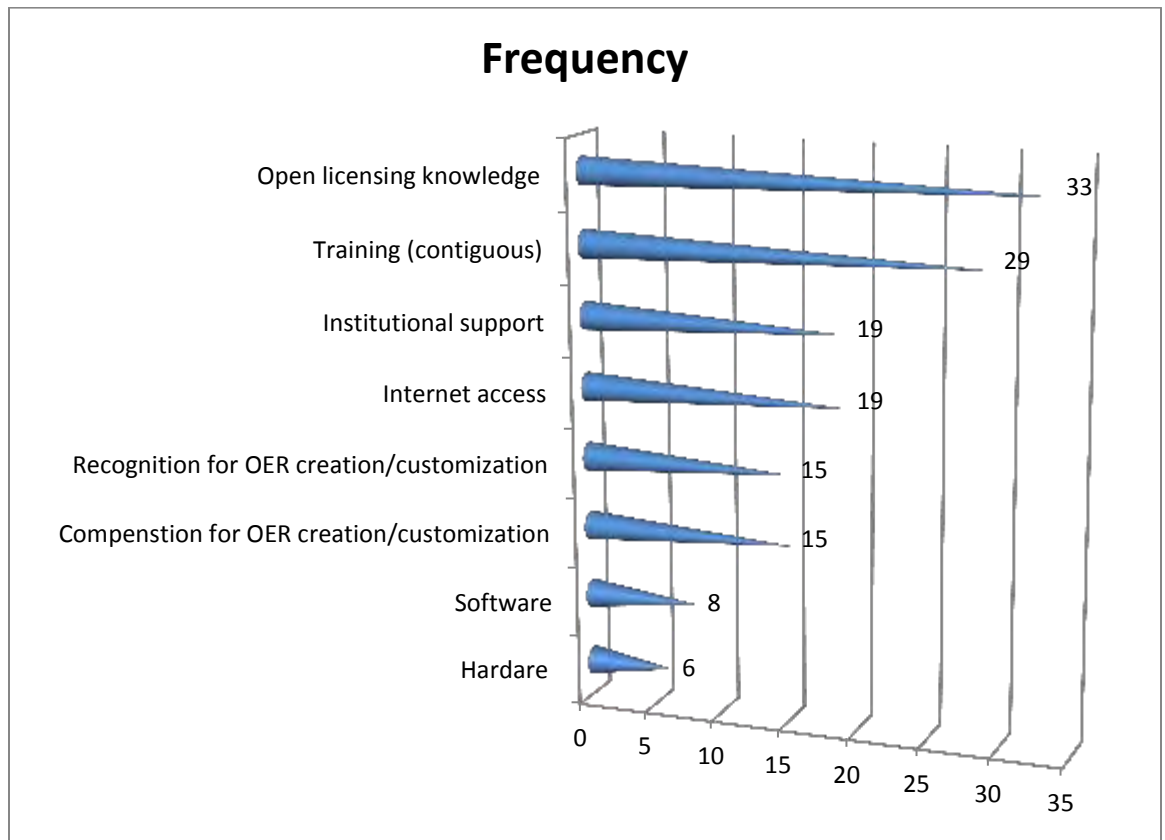
##### **4.5.1 Perceived Barriers to OER adoption**

Two questions, one structured question and one open ended question were used to elicit OER adoption barriers. The questions were meant to solicit more open responses for each construct in addition to the five point Likert scale (from strongly agree to strongly disagree) questions. The section begins with the analysis of the structured question followed by the open ended question.

***What do you see as barriers for Africa University educators with interest to adopt OER? (Tick all applicable)***

- Lack of access to the Internet
- Lack of hardware
- Lack of software
- Lack of knowledge about alternative licensing systems
- Lack of training
- Lack of institutional support
- No compensation for creating or customizing resources
- No institutional acknowledgment or recognition for creating or customizing resources

The results of the analysis (Figure 8) revealed that 33 respondents felt open licensing knowledge is a barrier or challenge for them to participate in the OER life cycle; 29 cited the lack of contiguous/continuous training i.e. training with defined break or time intervals; 19 cited the lack of institutional support and the lack of internet access (most probably after hours or off campus since facilitating conditions did not raise any significant variables); 15 cited the lack of OER related recognition and compensation. Lack of software and hardware scored the lowest frequencies of 8 and 6 respondents respectively suggesting that facilitating conditions concerning knowledge about how to correctly licence, create, customise and combine OER are more of a challenge than institutional support (recognition and compensation for of OER adoption) or institutional infrastructure (internet access, software and hardware).



**Figure 8: Frequency Distribution for Barriers and Challenges**

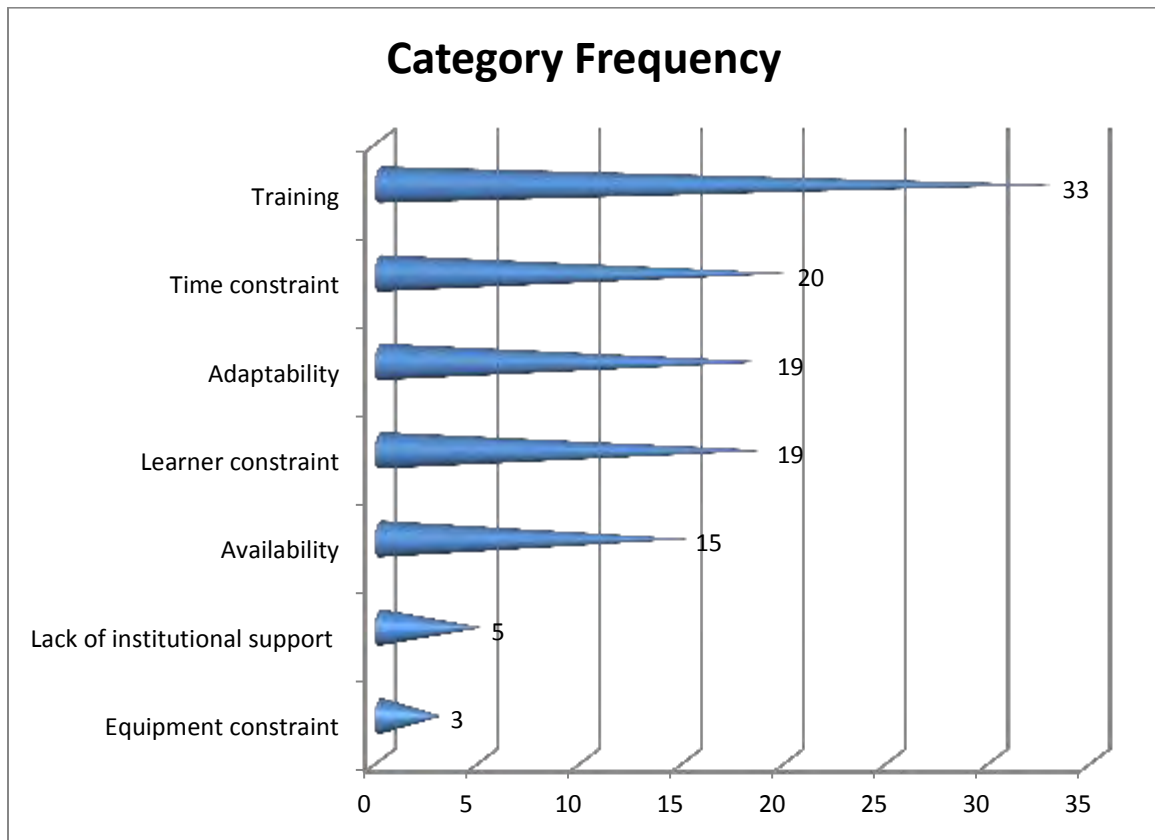
***What might stop you from adopting OER as instructional material?***

The analysis summary (Table 28) shows Barrier/Challenge Category, Cited Descriptors and Frequency. The Bar Graph on Figure 9 is a pictorial summary of the outcome of the analysis. The Bar Graph reveals that Training (33 citations); Time constraints (20 citations); Adaptability (19 citations); Learner constraints (19 citations) and Availability (15 citations) are compelling factors that might stop Africa University educators from using OER as instructional materials. Lack of Institutional Support and Equipment Constraints attracted relatively few numbers of citations of 5 and 3 respectively. This corroborates the hypothesis tests outcomes that Facilitating Conditions were not compelling factors for OER adoption at Africa University. This may be due to

the fact that the ICT department had taken significant measures to address Facilitating Conditions at AU.

**Table 28: What can stop you from adopting OER**

<b>Barrier/Challenge Category</b>	<b>Cited Descriptor</b>	<b>Frequency</b>
Equipment constraint	"laptop"; "internet"; "software"	3 (2%)
Lack of institutional support	"no internet at home"; "no internet in parallel programs"; "personal laptop"; "internet after work"	5 (4%)
Availability	"if I don't find them"; "limited download bandwidth"; "slow internet connection"; "internet busy during working hours"; "cannot find exact match"; "perfect match"	15 (13%)
Learner constraint	"they always need hard copy"; "do not have laptops"; "do not have internet at home"; "used to hard copies"; "paradigm shift"	19 (17%)
Adaptability	"difficulty to edit"; "software to edit"; "no experience";	19 (17%)
Time constraint	"too much work"; "have other duties"; "university committees"; "heavy workload"; "no time "; "heavy teaching load"; "overwhelmed"	20 (18%)
Training	lack of training; follow up training; no practical experience; no continuous training; real world training;	33 (29%)



**Figure 9: What can stop you from adopting OER**

#### **4.5.2 Quality of OER**

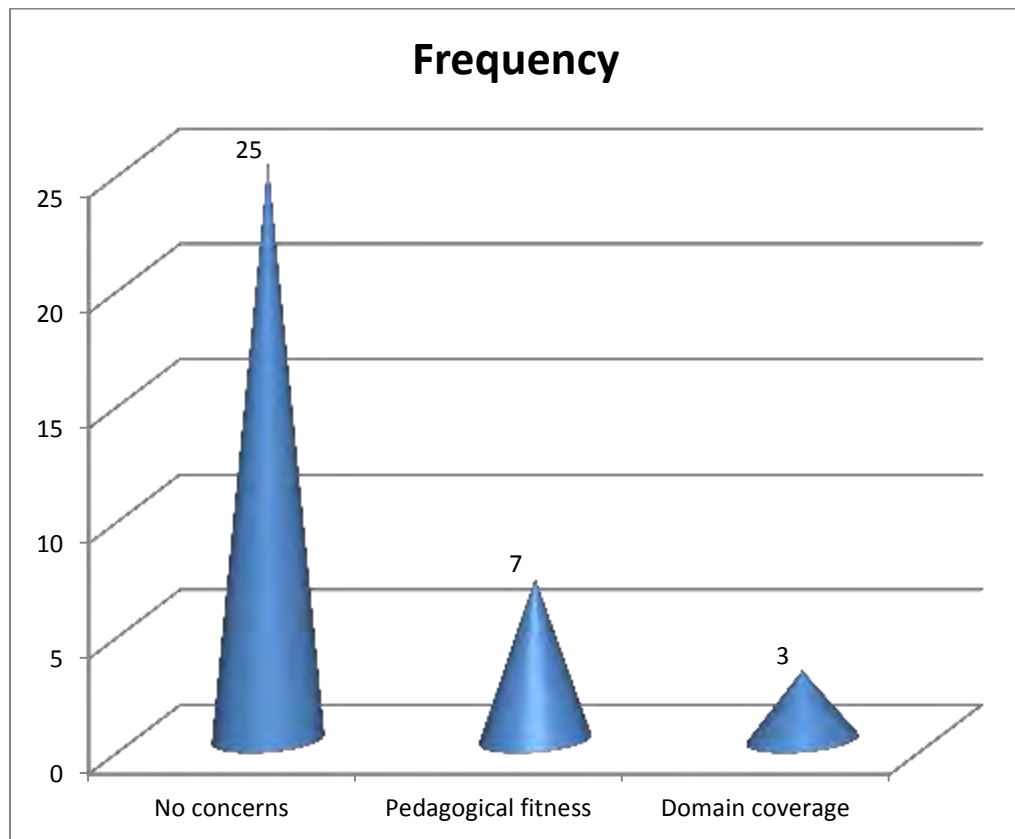
Two questions addressed the issue of the quality of OER. The first question posed was: “Do you have concerns about the quality of OER available on the Internet?”, followed by the question: “Do you have concerns about the quality of your own teaching materials and their readiness for contributing as OER?”. A detailed analysis of each question follows below.

##### ***Do you have concerns about the quality of OER available on the Internet?***

The analysis summary (Table 29) shows Quality Concern Category, Cited Descriptors and Frequency. The Bar Graph on Figure 10 is a pictorial summary of the outcome of the analysis. The Bar Graph reveals that: Generally Africa University educators have no concerns with OER quality (25 citations); OER Pedagogical fitness was the first quality concern with 7 citations, followed by OER Domain coverage with only 3 citations.

**Table 29: Concerns with OER quality**

Quality concern Category	Cited descriptors	Frequency
No concerns	"none"; "no concerns"; "no comment"; "Ok", "adequate"; "satisfactory"	25 (71%)
Pedagogical fitness	"don't match my style"; "have to change to fit the way I teach"; "not fit for my teaching style"	7 (20%)
Domain coverage	"not available for my area"; "limited in area of spiritual studies"	3 (9%)



**Figure 10: Concerns with OER quality**

***Do you have concerns about the quality of your own teaching materials and their readiness for contributing as OER?***

The analysis summary (Table 3) shows Quality Concern Category, Cited Descriptors and Frequency. The Bar Graph on Figure 11 is a pictorial summary of the outcome of the analysis. The Bar Graph reveals that: Generally Africa University educators are not engaged in OER contribution, as evidenced by the fact 15 respondents indicated they are not OER contributors, 9 respondents need help to start the creating OER and only one respondent confirmed OER creation work in progress.

**Table 30: Quality concerns of educators' own OER**

<b>Quality concern category</b>	<b>Cited descriptors</b>	<b>Frequency</b>
Not OER contributor	"just user"; "yet to start"; "future plans"; "yet to attempt"; "no yet contributing"	15 (60%)
Need help to create	"need help to create"; "training to create"; "further guidance still required"; "yet to witness the process"; "need to learn from someone doing it"; "need to share experience"	9 (36%)
Working on them	"working on them"	1 (4%)

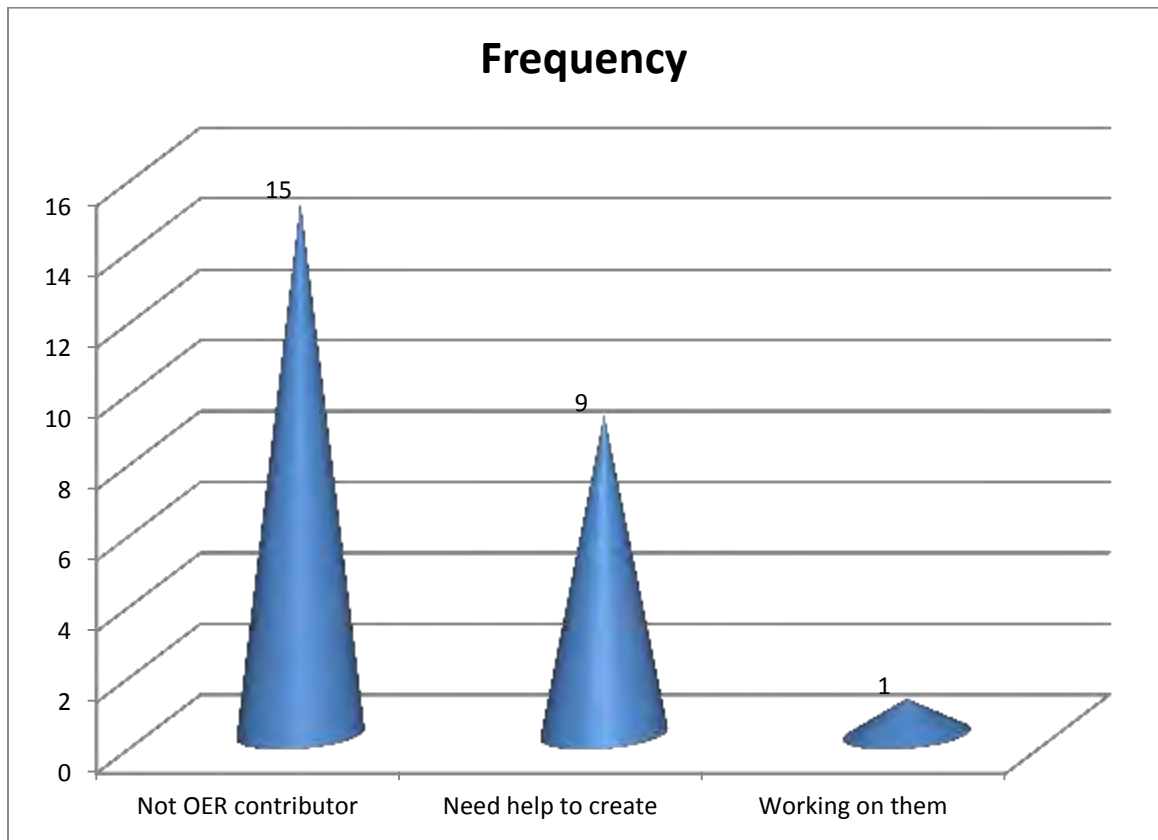


Figure 11: Quality concerns of educators' own OER

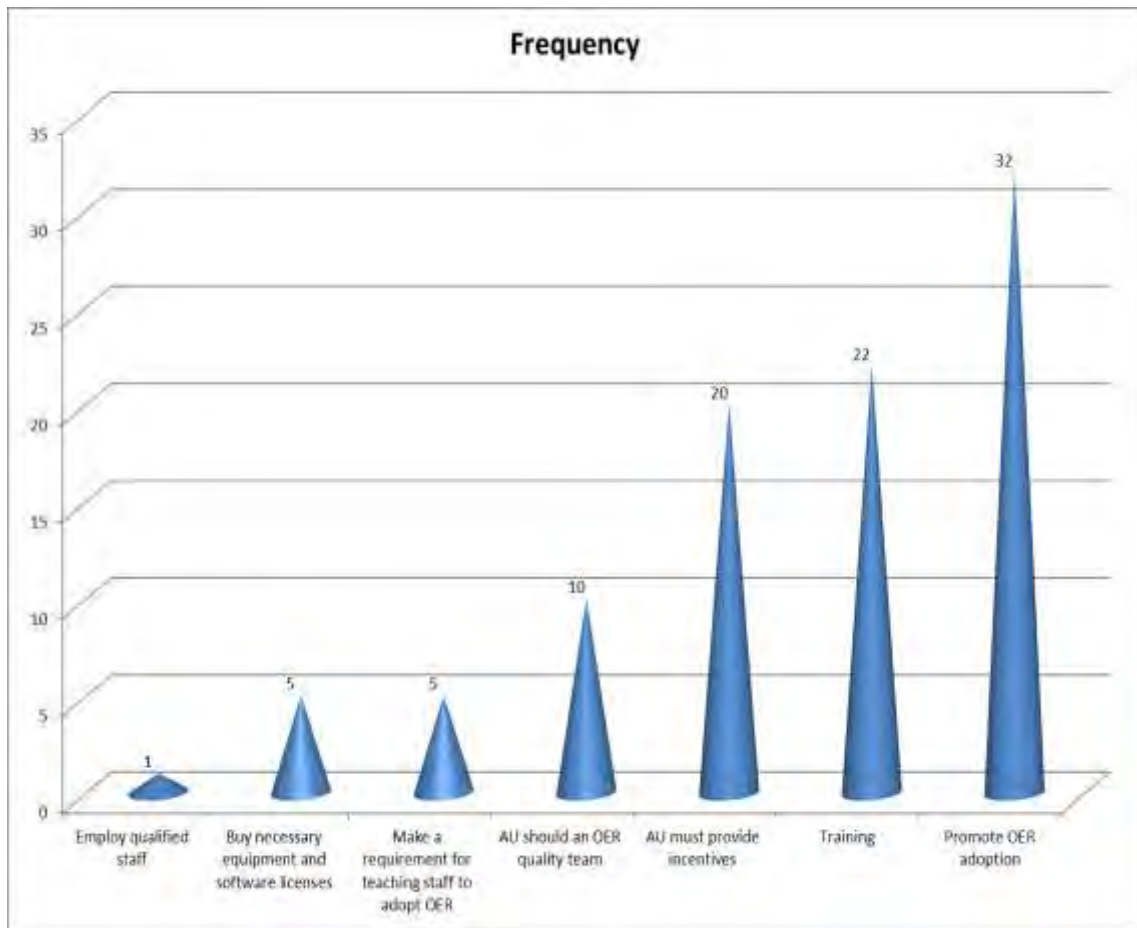
#### 4.5.3 Institutional promotion of OER

##### *My institution has facilities and incentives to promote OER adoption?*

The analysis summary Table 31 shows Promotion Action, Cited Descriptors and Frequency. The Bar Graph on Figure 12 is a pictorial summary of the outcome of the analysis. The Bar Graph reveals that: Promoting OER adoption (32 citations); OER training (22 citations); OER adoption related incentives (20 citations), and Institutional OER quality team (10 citations) are the compelling measures Africa University can take to promote OER adoption. Other measures cited with relatively fewer frequencies are: Make OER a requirement (5 citations); Buy necessary equipment and software (5 citations) and Employ qualified staff (1 citation).

**Table 31: Institutional promotion of OER**

Promotion Action	Cited Descriptors	Frequency
Employ qualified staff	"employ qualified staff";	1 (1%)
Buy necessary equipment and software licenses	"equipment"; "software"; "hardware"	5 (5%)
Make a requirement for teaching staff to adopt OER	"OER directive"; "compulsory"; "mandate";	5 (5%)
AU should have an OER quality team	"central quality control"; "quality monitors"; "central database"; "evaluated OER"; "tried and tested";	10 (11%)
AU must provide incentives	"no motivation"; "other priorities"; "nobody notices"; "extra load"; "why OER"; "recognition"; "reward"	20 (21%)
Training	"follow up training"; "workshop"; "seminars"; "exchange program"; "share experience"; "regular update"; "train students"; "capacity building"; "content development"	22 (23%)
Promote OER adoption	"promote adoption"; "OER policy"; "incentives for lecturers"; "incentives for students"; "show cause"; "show precedence";	32 (34%)



**Figure 12: Institutional promotion of OER**

#### **4.6 Chapter summary**

The regression analysis method confirmed the hypothesis that Effort Expectancy, Performance Expectancy, and Social Influence have significant influence in the Behavioural Intention of Africa University educators to adopt and use OER. However the factor analysis method narrowly missed the confirmation of the Social Influence hypothesis and this can be attributed to the sample size. Other statistical inference methods require higher sample sizes. Facilitating Conditions was not found to be a significant predictor, in other words educators are fairly content with existing facilitating conditions (internet access, smart class rooms, access OER from the library, a supportive policy framework etc.). The factor analysis procedure confirmed Effort Expectancy and

Performance Expectancy as significant predictors and fail slightly short of confirming the Social Influence variable and this may be attributed to the sample size. When moderated with age, gender, experience and voluntariness, the outcome proved voluntariness to be a significant predictor and missed by a narrow margin to confirm age and gender. However these moderators must not be completely ignored because the small difference may be arising from the size of the population and sample.

The analysis of the adoption challenges and barriers highlighted open licensing knowledge, lack of contiguous/continuous training, lack of institutional support, lack of internet access (after hours and/or off campus), lack of OER related recognition and compensation as the top challenges or barriers. Lack of training; time constraints; adaptability of materials; learner constraints and availability of suitable OER were the most cited compelling factors that might stop Africa University educators from using OER as instructional materials.

With regard to perceptions about the quality of OER , generally Africa University educators have some concerns with OER quality, but highlight pedagogical fitness as a moderate concern (7 citations), followed by the lack of OER domain coverage (3 citations). The measure of the perception of educators about the readiness/quality of their teaching materials as OER reveals that most Africa University educators are not yet engaged in OER contribution and only one respondent confirmed OER creation work in progress. AU educators are not concerned with OER quality, the recommendation for an institutional OER quality team could be related to those educators with intention to participate in the OER life cycle and think they could benefit from the presence of a quality team within AU.

Promoting OER adoption; providing OER training; introducing OER adoption related incentives; and forming an institutional OER quality team were featured as the most compelling measures that Africa University leadership could take to promote OER adoption.

## Chapter 5: Discussion, Conclusions, and Recommendations

### 5.0 Introduction

This chapter outlines and discusses the key findings for the four research questions and the four hypotheses set out in Chapter 1, followed by sections on the limitations of the study; some conclusions drawn from the research findings; recommended action items emanating from the research; and recommendations for further research.

### 5.1 Summary of Findings

The findings are categorized into research questions and hypothesis testing, OER challenges and barriers, OER quality issues, and what the institution can do to promote adoption of OER.

#### 5.1.1 Research questions and hypotheses

*RQ1. In what ways does **performance expectancy** influence the behavioural intention of AU educators to adopt OER?*

The correlation analysis indicated that Africa University educators are inclined to adopt OER if using OER will increase learning outcomes of their students (confirmed with correlation of 0.901). The regression analysis method confirmed the hypothesis, that Performance Expectancy has a positive effect on AU academics' Behavioural Intention to adopt OER, with 97.1 percent significance. In other words we can say with 97.1 percent level of confidence that performance expectancy influences positively the behavioural intention of AU educators to adopt OER. The finding is corroborated with previous technology acceptance studies regarding the significance of the performance expectancy construct in predicting behavioural intention (Mtebe & Raisamo, 2014; Percy & Van Belle, 2012; Dulle & Minishi-Majanja, 2011; Louho, Kallioja and Oittinen, 2006). Age (correlation 0.913) and Voluntariness (correlation 0.914) also have significant impact on Performance Expectancy of AU educators.

*Hence Age and Voluntariness have impact on Performance Expectancy of AU educators. Detailed statistical analysis of the behaviour and pattern within each*

*intervening variable (age and voluntariness) was not performed at this initial stage of this exploratory research. However the big variation in the age group of educators (31-46 years 24.4%, 46-60 years 66.7% and above 61 years 8.9 %) may be a possible reason why age and voluntariness are having a significant impact on adoption. The explanation is speculative. The next phase of the research should concentrate on detailed analysis of the behaviour and trend within each intervening variable.*

*RQ2. In what ways does **effort expectancy** influence the behavioural intention of AU educators to adopt OER?*

Time to customize OER to suit student needs (confirmed with correlation of 0.964) and time to create OER (confirmed with correlation of 0.908) are the most important Effort Expectancy variables for Africa University educators. Effort Expectancy hypothesis was confirmed with 98.2 percent statistical significance. In other words we can say with 98.2 percent confidence level that addressing Effort Expectancy variables (Faster completion of development activities; Easy search of suitable material; Time to customize and Time to create OER) will increase the behavioural intention of Africa University educators to adopt OER. This outcome with respect to the effort expectancy factor support previous research results by other scholars, contending that this construct plays a significant role in new technology adoption process (Dulle & Minishi-Majanja, 2011; Mtebe & Raisamo, 2014; Percy & Van Belle, 2012; Louho, Kallioja & Oittinen, 2006). Influence of Age and Voluntariness on effort expectancy was confirmed with correlations of 0.901 and 0.920 respectively for Africa University educators. Moderating effects of gender towards effort expectancy did not yield significant correlation. This is contrary to previous research findings by Venkatesh et al. (2003), Ilie et al (2005), and Steinerova and Susol (2007), which reported more effort expectancy towards technology usage by women. In other words women were found to express less confidence and more reliance on assistance for usage of new technology compared to men (ibid). It is great relief and encouragement that this is not true for Africa University.

*RQ3. In what ways does **social influence** affect the behavioural intention of AU educators to adopt OER?*

Adoption of OER by other academics (peer influence) is a significant Social Influence variable for Africa University educators (confirmed with correlation of 0.906). Social Influence hypothesis was confirmed with 95.2 percent significance. In other words we can say with 95.2 percent confidence level that addressing Social Influence factors (OER adoption by fellow AU educators; Encouragement by peers, Perception of influential people) will increase the behavioural intention of Africa University educators to adopt OER. The findings of this study corroborate previous technology acceptance and usage studies that established social influence as a determinant of usage intention (Mtebe & Raisamo, 2014; Percy & Van Belle, 2012; Dulle & Minishi-Majanja, 2011; Schaper and Pervan, 2007). Moderating variables Age, Gender, Experience and Voluntariness were found not to have significant impact on Social Influence for Africa University educators.

*RQ4. In what ways do **facilitating conditions** influence the behavioural intention of AU educators to adopt OER?*

Facilitating Conditions are at satisfactory levels at Africa University. As a result there was no significant variation in the response rates. In other words facilitating conditions should not be an area of immediate attention in the effort to increase Behavioural Intention to Adopt OER by Africa University educators. The hypothesis testing for facilitating conditions was not found to be statistically significant. In other works we cannot say with 95% or higher confidence levels that improving facilitating conditions from what they are will result in a significant increase of AU academics' behavioural intention to adopt OER. Moderators Age, Gender, Experience and Voluntariness also did not have significant impact on Facilitating Conditions for Africa University educators. This outcome is corroborated by related research finding that also found facilitating conditions not to have a statistically significant influence on behavioural intention to adopt OER (Mtebe & Raisamo, 2014; Percy & Van Belle, 2012). Africa University has taken a number of measures to enhance facilitating conditions which include but are not limited to: a Distance Education Policy which promotes the use of ICTs in education,

and increased access to education at reduced costs (OER possible solution); Computer Laboratory facilities in the library to allow students to supplement the physical books with freely available electronic materials; wireless access facilities throughout the campus including student hostels; an education quality assurance policy that recognizes ICTs in education as pivotal; a lecturers' appraisal framework that includes the use of ICTs as an assessment criteria; and some internal workshops for educators to promote the use of ICTs in teaching and learning. As a result Africa University educators are fairly satisfied with facilitating conditions.

Another possible explanation is the big gap between intent and actual usage of OER by AU educators. The measure of intent to adopt and use OER revealed that, 6.7% of the educators were not willing, 22% were not sure and 69% were very willing, willing, or partly willing. Regarding actual participation in the OER life cycle 60% of the educators indicated they were not OER contributors, 36% indicated that they needed help to create OER, and only 4 % indicated that they had OER work in progress. Looking at facilitating conditions from, intention to adopt point of view we can say facilitating conditions instituted by Africa University so far are sufficient. However from the actual use point of view it is evident, we observe that 94% of AU educators need help to either get started or enhance their efforts in using or creating OER. The research focused mainly on the intention since the OER initiative at Africa University was at its inception stage. If we change the focus of research to actual use the outcome of the facilitating hypothesis might have yielded a different outcome.

### **5.1.2 OER Adoption Challenges and Barriers**

The analysis of responses to the structured questions in the survey identified the following challenges and barriers: (a) Lack of contiguous/continuous training (only isolated training intervention have been held so far), (b) Lack of institutional support (this is different from facilitating conditions which focused mainly on resources, instead it refers to policies, processes and procedures), (c) Lack of internet access (after hours

and/or off campus), (d) Lack of OER related recognition and compensation and (e) Lack of licensing knowledge.

The need for OER training (continuous training) was highlighted as were time constraints to engage in OER adoption; finding OER that can easily be customize to match the AU context; the perception that students still look forward for traditional resources and the fact that OER are not available in all subject areas were the most cited compelling factors that might stop Africa University educators from adopting OER as instructional materials. The lack of institutional support, or lack of technological infrastructure were mentioned as only minor deterrents to OER adoption.

### **5.1.3 OER Quality Issues**

Generally Africa University educators have no concerns with OER quality. The cited quality concerns were: (a) OER Pedagogical fitness (availability of OER not suitable for the educator's teaching and evaluation approach) with only 7 citations, and (b) OER Domain coverage (not possible to find OER in other subjects) with mere 3 citations. AU educators 'think' OER is generally of good quality, they are not worried about the quality of teaching materials. However 10 educators suggested some kind of quality control team or framework. This suggestion may imply that AU educators want quality assistance in creating and customising OER.

Regarding the perception of educators on the readiness/quality of their teaching materials as OER the findings are: Generally Africa University educators are not yet engaged in OER contribution and only one respondent indicated that he had OER creation work in progress. Educators also felt the institution should have a dedicated OER quality team. Since AU educators are generally satisfied with OER quality, the suggestion of an institutional OER quality team could be related to the need of quality assistance in creating and customizing OER.

#### **5.1.4 Institutional Promotion of OER**

Promoting OER adoption (through policy, official pronouncement, project enactment); providing OER training (planned, continuous and follow sessions); introducing OER adoption related incentives (some official form of recognition and reward); and creating an institutional OER quality team (responsible for OER quality assurance measures) featured as the most compelling measures that Africa University leadership can take to promote OER adoption. A few respondents suggested that making OER an institutional requirement and procuring necessary equipment and software licenses could be useful institutional responses to encouraging OER adoption at AU.

#### **5.2 Conclusions**

In the African context and specifically for countries in the South of Sahara, research has confirmed that Open Educational Resources can be used as intervention to improve education outcomes (Mtebe & Raisamo 2014; Minishi-Majanja 2011, Percy & Ban Belle 2012; Hoosen 2012). It will not be possible to harness these potential benefits if OER are not adopted in mainstream teaching and learning by educators and learners. For this to happen there is need to understand why there is a slow uptake of OER. This will help to inform and guide OER intervention initiatives. Consequently this, exploratory research study was set to illicit, measure and evaluate challenges and behavioural intention of Africa university educators to adopt OER as primary educational resources. The research also included the possible effect of moderating variables age and voluntariness.

The first hypothesis confirmed that performance expectancy is a determinant with positive impact in the intention of Africa University educators to adopt OER, with a statistical significance level of 97.1 percent. The second hypothesis confirmed that effort expectancy is a positive determinant of the intention of Africa University educators to adopt OER with 98.2 percent significance level. Hypothesis three confirmed that social influence is a positive determinant of the intention of Africa University educators to adopt OER with 95.2 percent confidence level. Finally the fourth hypothesis confirmed that facilitating conditions are a neutral determinant in the intention of Africa University

educators to adopt OER. In other words Africa University educators are satisfied with the prevailing facilitating conditions. OER adoption efforts and resources should be directed the other three determinants i.e. effort expectancy, performance expectancy and social influence.

Generalizability of research results helps increase the footprint coverage of the beneficiaries of a research study. However generalizing the outcomes of this research study across institutions of higher learning in Zimbabwe or in the general context of institutions of higher learning might not be logically correct. This is because only one category of institution of higher learning was considered i.e. private church related institution. The OER, technology and strategic orientation may differ from church to church and across the other categories of Higher Education Institutions i.e. state owned universities.

This research study adopted critical realism as research philosophy and evaluative exploratory research as the research design. The mixed method allowed the use of both qualitative and quantitative methods. The quantitative method was used to test the four hypotheses and the qualitative method helped explain the statistical inference metrics and translate them to useful conclusions and recommendations for actions. It would not be possible to effectively answer the research questions and hypotheses using one method only. Research questions required qualitative approach and the hypothesis required the quantitative approach. The methodology and research design discerned from the critical realism research philosophy that permits the mixed methods approach. Hence the research philosophy adopted was appropriate and effective.

### **5.3 Recommendations for actions**

The recommendations drawn from demographic profiling of respondents, descriptive statistics, inferential statistics, outcomes of research questions and hypothesis testing are presented in this section not in any form of ordering or ranking. The recommendations

include new actions/practices that are advised and existing actions/practices that should be maintained or sustained.

- a. ***Leveraging Performance Expectancy to enhance the behavioural intention of AU educators to adopt OER:*** From research findings Africa University educators are inclined to adopt OER if using OER will increase learning outcomes of their students. Measures and metrics must be put in place to track OER learning outcomes of students, and package them with a recognition and/or reward scheme or policy. Age and Voluntariness were also confirmed to have significant impact on Performance Expectancy of AU educators and these must be taken into consideration. In other words future interventions must: Take consideration of different performance expectancy perception between the younger and old educators; Start working with those who show willingness to adopt OER and seek to explore what exactly makes some educators not willing to work with OER.
- b. ***Leveraging Effort Expectancy to enhance the Behavioural Intention of AU educators to adopt OER:*** Research results confirmed that Time to customize OER to suit student needs and time to create OER are the most important Effort Expectancy variables for Africa University educators. There is need to consult further with educators to establish common ground on how the time constraint can best be addressed. Age and Voluntariness need to be taken into consideration since research findings confirmed their significant impact on Effort Expectancy of Africa University educators. Intervention is required to increase effort expectancy of the older educators.
- c. ***Leveraging Social Influence to enhance the Behavioural Intention of AU educators to adopt OER:*** Adoption of OER by other academics (peer influence) is a significant Social Influence variable for Africa University educators. Forming a recognized group of OER early adopters or OER champions could have significant positive impact on the behavioural intention.

- d. ***Leveraging Facilitating Conditions to enhance Behavioural Intention of AU educators to adopt OER:*** The research results revealed that all Facilitating Conditions were not significant predictors or influencers of the Behavioural Intention to Adopt OER by Africa University educators. In other words educators are satisfied with the facilitating conditions currently in place. These include ICT smart classrooms, projectors in all the lecture rooms and portable projectors that can be borrowed by lecturers, electronic library, wired and wireless internet connections. The ICT department is doing a good job and they must sustain and enhance these conditions to keep up with technological changes.
- e. ***Leveraging cited barriers and challenges to enhance the Behavioural Intention of AU educators to adopt OER:*** From the identified barriers and challenges the following action items or practices will have positive impact on behavioural intention to adopt OER in mainstream teaching by Africa University educators:
- i. Provide copyright and open licensing training for educators
  - ii. Provide continuous and complementary OER training sessions
  - iii. Establish of formal OER institutional support framework or policy that will address, enhance and sustain OER related recognition and reward scheme, OER availability, OER adaptability.
  - iv. Consider an off campus internet access scheme for educators to increase access window.

#### **5.4 Recommendations for further research**

The impact of variables age, and gender, which were found significant with some research constructs, will need further analysis to ascertain how each and in which direction age or gender class influences behavioural intention to adopt OER for Africa University educators. Voluntariness to participate in OER life cycle was found to be a significant predictor and it is important to carry further research to establish which factors influences this voluntariness and what can be done to enhance voluntariness of AU educators. Further research can consider other factors such as attitude,

position/designation this research gap is corroborated by Percy & Van Belle (2012) and Dulle & Minishi-Majanja (2011) in related OER research studies. These could derive useful insights in the specific context of Africa University, since they have not been previously explored. Venkatesh et al. (2003) posits that perceptions/attitudes of individuals are subject to change with the passage of time. Accordingly, outcomes of this research study must be considered valid and relevant within a reasonable time frame beyond which another validation research will be required (Mtebe & Raisamo, 2014). In spite of the discussed limitations the research study reveals useful outcomes that can be leveraged to stimulate, enhance and guide adoption of OER in mainstream teaching by Africa University educators.

Basing on formative feedback received this research could benefit from the use of the UTAUT2 model. In 2012 Venkatesh, Thong and Xu derived an improved version of the original UTAUT model referred to as UTAUT2 basing on field results from their research study conducted in Hong Kong. In the UTAUT2 model Venkatesh et al, introduced three new constructs. (1) ***Hedonic Motivation*** “defined as the fun or pleasure derived from using a technology, and it has been shown to play an important role in determining technology acceptance and use” (Venkatesh et al, 2012:161). Recommended ***hypothesis: Hedonic Motivation*** is a positive determinant of OER adoption at Africa University; (2) ***Price Value*** defined as an influential determinant of the use in scenarios where the consumers have to absorb costs of equipment and services. I would exclude this construct since in the context of Africa University there are no direct costs imposed on the educators; (3) ***Experience and Habit*** “Experience, as conceptualized in prior research ... reflects an opportunity to use a target technology and is typically operationalized as the passage of time from the initial use of a technology by an individual” (Venkatesh et al, 2012:161). On the other hand, “Habit has been defined as the extent to which people tend to perform behaviours automatically because of learning” (p.161). This construct helps to explain significant variation in the behavioral intention and actual use of technology (ibid). Recommended ***hypothesis: Experience and Habit*** are

positive determinants of OER adoption at Africa University. My apprehension, appreciation and acquaintance with the UTAUT2model happened at a late stage of this research study and I could not include these two additional hypotheses.

Future research could also focus on actual use. As pointed out in literature and also on the research findings there is a huge difference between intent and actual use. The drivers and dynamics of intention to adopt OER could be significantly different from those influencing the actual usage.

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## Appendix A: Research Instruments

### A.1 Survey Questionnaire

Challenges and Behavioural Intention to Adopt and Use Open Educational Resources at Africa University Zimbabwe

My name is Agripah Kandiero from the Department of Computer Science in the Faculty of Management and Administration. I am conducting a research study to elicit challenges and behavioural intentions behind adoption of Open Educational Resources (OER) in teaching at Africa University. Despite volumes of free open educational resources, their adoption has been slow. Your willingness to participate is greatly appreciated

- a) Your responses will be treated in confidence and used for the purposes of this study only.
- b) For further information contact Agripah Kandiero, [agripah@gmail.com](mailto:agripah@gmail.com) +263774593651

1. Full name (optional).....

2. Faculty .....

3. Have you ever shared your course notes with other lecturers?

- a) Yes            b) No

4. Have you participated in any OER seminar, workshop or training?

- a) Yes            b) No

(Please choose by ticking ( ✓ ) on the appropriate box

	Very Willing	Willing	Not Sure	Partly willing	Not Willing
5. To what extent are you willing to share your originally created materials on an open educational resources platform (e.g. MERLOT, Connexions, OER Africa)?					
	Very Familiar	Familiar	Not Sure	Partly Familiar	Not Familiar
6. To what extent are you familiar with licensing And copyright rules and options (e.g. Copyright ©, CC)?					

(Please choose by ticking ( ✓ ) on the appropriate box

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7. Generally OERs are of acceptable quality					
8. Using OER will enable me to accomplish course development activities more quickly					
9. Using OER will increase learning outcomes of my students					
10. Using OER will allow me to have access to current information about the courses I teach.					
11. Do you have concerns about the quality of OER available on the Internet?					
12. you have concerns about the quality of your own teaching materials and their readiness for contributing as OER?					

(Please choose by ticking ( ✓ ) on the appropriate box

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
13. It is easy to search and find suitable OER					
14. I have time to customize OER to suit my students' needs					
15. I have time to create OER for others to use					
16. My institution has facilities and incentives to promote OER adoption					
<p>17. What do you see as barriers for Africa University educators with interest to adopt OER? (Tick all applicable)</p> <ul style="list-style-type: none"> <li><input type="radio"/> Lack of access to the Internet</li> <li><input type="radio"/> Lack of hardware</li> <li><input type="radio"/> Lack of software</li> <li><input type="radio"/> Lack of knowledge about alternative licensing systems</li> <li><input type="radio"/> Lack of training</li> <li><input type="radio"/> Lack of institutional support</li> <li><input type="radio"/> No compensation for creating or customizing resources</li> <li><input type="radio"/> No institutional acknowledgment or recognition for creating or customizing resources</li> </ul>					

(Please choose by ticking (✓) on the appropriate box

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
18. Africa University Academics are adopting and using OER in teaching and learning					
19. People who are important to me will think that I should use and integrate OER into my courses					
20. The lecturers and other staff at my University encourage and promote using OER					

(Please choose by ticking (✓) on the appropriate box

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
21. I have access to OER					
22. I have the knowledge necessary to use and integrate OER into my courses					
23. OER is similar to other course content I use for teaching					
24. Help will be available when I have a problem in using and integrating OER into my courses					
26. From your experience what can Africa University do to promote OER adoption					

(Please choose by ticking ( ✓ ) on the appropriate box

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
27. I intend to use and integrate OER into my courses in the future					
28. I predict I would use and integrate OER into my courses in the future					
29. What could stop you from using OER as instructional material?					

## **A.2 Informed Consent Form**

My name is Agripah Kandiero, an MPhil final student from UCT. I am carrying out a study on Challenges and Behavioral Intentions to Adopt Open Education Resources by Educators at Africa University. I am kindly asking you to participate in this study by answering the questionnaire.

The purpose of the study is to investigate the OER adoption factors and variables in the specific context of Africa University. You were selected for the study because you are one of the educators. It will take you at most 10 minutes of your time to complete the survey questionnaire. Your responses will be treated in strict confidence.

The research study will also presumably is of interest to the following stakeholders:

1. Education authorities in Zimbabwe (Several research studies confirm that, OER have potential of improving quality of teaching, learning, publishing, and education budget cut)
2. Africa University administration (The university is on a drive to introduce instructional technology to improve quality of teaching and learning, they have held staff workshops and have now developed and appraisal policy that includes adoption of instructional technologies and target stretching to 2016)
3. Lecturers (quality of teaching, learning, appraisal, a gateway to start publishing something)
4. Students (quality of learning, budget gateway to sharing and involvement in publishing when students are given a chance to review and comment on the content)
5. Parents (quality of teaching and learning and budget constraints)
6. Development Agencies (intervention guidelines and model on OER )
7. Policy makers and strategists for OER adoption
8. Pedagogy experts evaluating the impact of OER in teaching and learning

## Authorisation

If you have decided to participate in this study please sign this form in the space provide below as an indication that you have read and understood the information provided above and have agreed to participate.

-----  
Name of Research Participant (please print)

-----  
Date

-----  
Signature of Research Participant or legally authorised representative

If you have any questions concerning this study or consent form beyond those answered by the researcher including questions about the research, your rights as a research participant, or if you feel that you have been treated unfairly and would like to talk to someone other than the researcher, please feel free to contact the Africa University Research Ethics Committee on telephone (020) 60075 or 60026 extension 1156 email [aurec@africau.edu](mailto:aurec@africau.edu)

Name of Researcher: Agripah. Kandiero

## Appendix B: Table 26: Rotated Component Behavioral Intention

**Table 26: Rotated Component Matrix – Behavioural Intention**

	Principal Variation Component			
	1 [EE] Using OER will enable me to accomplish course development activities more quickly	2 [PE] Using OER will increase learning outcomes of my students	3 [PE] Using OER will allow me to have access to current information about the courses I teach	4 [EE] It is easy to search and find suitable OER
[EE] Using OER will enable me to accomplish course development activities more quickly	-.158	.068	.927	.132
[PE] Using OER will increase learning outcomes of my students	.061	.042	.925	-.043
[PE] Using OER will allow me to have access to current information about the courses I teach	.119	.128	.745	.383
[EE] It is easy to search and find suitable OER	.725	.390	-.007	-.182
[EE] I have time to customize OER to suit my students needs	.956	.118	.040	-.024
[EE] I have time to create OER for others to use	.833	.145	.092	-.103
[FC] My institution has facilities and incentives to promote OER adoption	.586	.661	.179	-.008
[SI] Africa University Academics are adopting and using OER in teaching and learning	.468	.563	.019	-.467
[SI] People who are important to me will think that I should use and integrate OER into my courses	-.122	.784	.180	.240
[SI] Lecturers and other staff at my university encourage and promote using OER	.208	.768	.041	-.136
[FC] I have access to OER	.294	.718	-.148	-.045

[FC] I have the knowledge necessary to use and integrate OER into my courses	.394	-.215	.542	.231
[FC] OER is similar to other course content I use for teaching	.262	.753	-.016	-.395
[FC] Help will be available when I have a problem in using and integrating OER into my courses	.620	.480	-.041	-.242
[BI] I intent to use and integrate OER into my courses	-.387	-.055	.150	.788
[BI] I predict I would use and integrate OER into my courses into my courses in the future	.047	-.104	.284	.899

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Source (Own research)

## Appendix C: Table 27: Rotated Component Matrix – BI Moderated

**Table 27: Rotated Component Matrix – Behavioural Intention Moderated**

	Component					
	1 [EE] Using OER will enable me to accomplish course development activities more quickly	2 [PE] Using OER will increase learning outcomes of my students	3 [PE] Using OER will allow me to have access to current information about the courses I teach	4 [EE] It is easy to search and find suitable OER	5 [EE] I have time to customize OER to suit my students needs	6 [EE] I have time to create OER for others to use
[EE] Using OER will enable me to accomplish course development activities more quickly	-.118	.042	.934	.044	.152	-.018
[PE] Using OER will increase learning outcomes of my students	.067	.053	.923	-.049	.017	.179
[PE] Using OER will allow me to have access to current information about the courses I teach	.232	-.050	.736	.193	.353	-.331
[EE] It is easy to search and find suitable OER	.719	.297	-.027	.134	-.103	.330
[EE] I have time to customize OER to suit my students needs	.966	.001	.010	.086	-.018	.106
[EE] I have time to create OER for others to use	.887	.017	.079	.088	-.120	.023
[FC] My institution has facilities and incentives to promote OER adoption	.609	.350	.168	.468	.032	.232
[SI] Africa University Academics are adopting and using OER in teaching and learning	.511	.495	.032	.264	-.406	.216
[SI] People who are important to me will think that I should use and integrate OER into my courses	-.048	.311	.184	.758	.215	-.151

[SI] Lecturers and other staff at my university encourage and promote using OER	.314	.605	.080	.366	-.111	.150
[FC] I have access to OER	.187	.390	-.164	.516	.038	.598
[FC] I have the knowledge necessary to use and integrate OER into my courses	.197	-.526	.471	.085	.270	.518
[FC] OER is similar to other course content I use for teaching	.250	.352	-.013	.675	-.387	.221
[FC] Help will be available when I have a problem in using and integrating OER into my courses	.561	.045	-.068	.614	-.263	.210
[BI] I intent to use and integrate OER into my courses	-.373	.112	.160	-.154	.802	-.049
[BI] I predict I would use and integrate OER into my courses into my courses in the future	.044	-.152	.256	-.005	.890	-.113
Age	.126	.800	.046	.288	.021	.172
Gender	.266	-.013	.045	-.013	-.245	.807
Work Experience	.456	.058	.012	.620	-.396	.000
[VO] To what extent are you willing to share your originally created materials on an open educational resources platform e.g. OER Africa	.003	.901	-.009	.063	-.004	-.151

"Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a Rotation converged in 6 iterations."

Source (Own research)