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DETERMINANTS OF OPEN EDUCATIONAL RESOURCES ADOPTION AMONG FACULTY OF HIGHER EDUCATIONAL INSTITUTIONS IN GHANA

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THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF P.HD IN ADULT EDUCATION DEGREE

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DECLARATION

I, BEATRICE AYORKOR TORTO, hereby declare that, this research "Determinants of Open Educational Resources Adoption among Faculty of Higher Educational Institutions in Ghana", is the result of my own research and it has neither been presented in part nor in whole for another degree, except for references to other people's work, which have been duly acknowledged.

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DEDICATION

This thesis is dedicated to my mother and to the memory of my father who taught me the value of education.

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ABSTRACT

Open Educational Resources are (OERs) are teaching and learning materials which are in the public domain or made freely available by means of open licenses for learners, teachers and researchers. In today's technological age, OERs have come to play a major role in higher educational institutions. There are a number of OER initiatives in higher educational institutions in Ghana. However, there is no study to determine the status of OER adoption and use by faculty in Ghana. The problem being investigated by this study is: What factors influence faculty to adopt and use OERs in higher educational institutions in Ghana?

The Unified Theory of Acceptance and Use of Technology (UTAUT) theory and two constructs from the Diffusion of Innovation (DoI) model were adopted for the study. The study used the mixed methods approach, specifically, the sequential explanatory design. Two hundred and thirty-nine faculty participated in the study. Two forms of data collection were used: questionnaire distribution and interviews. The stratified random method was adopted for the quantitative study and the purposive sampling techniques for the qualitative aspect. Quantitative data was analysed using descriptive statistics, correlations, factor analysis and multiple regression to test the proposed model while themes and sub themes were used to analyse the qualitative data.

Faculty had a high level of technological competencies (M=3.75, SD = 1.185) on how to browse the internet, use word, download and upload materials. Faculty also had a high level of OER awareness (M= 3.86 SD=0.904) and found OERs useful in their teaching and research activities. The relationship between Performance Expectancy and Behavioural Intention was moderately positive and significant *($r = 0.53$ $p = < 0.05$).* Faculty members indicated that OERs were compatible with their belief in sharing educational materials to profit everyone**.** However, faculty will experiment with

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OERs before deciding to use them (M=3.59 SD = 1.135). There was no correlation between Trialability and Actual Use. The relationship between Behavioural Intention and Actual Use was moderately positive and statistically significant ($r = 0.44$; $p = \leq 0.05$). The key barriers were technical issues, particularly low internet speed and bandwidth, and frequent power outages. There were no major significant differences in terms of age, sex and rank regarding adoption factors.

The study concluded that faculty had a good knowledge of computer applications and OER searches. Despite the technical barriers, faculty members were prepared to use OERs in their teaching because of their usefulness and ease of use. Effort Expectancy was highly positive and significant in relation to faculty's intention to use OERs. Performance Expectancy, Social Influence and Facilitating Conditions were moderately positive and significant. Trialability did predict Behavioural Intention but not Actual use. It is recommended that training programmes be completed to arm faculty with the necessary tools for OER deployment. Also, training must incorporate adult teaching and learning methodologies. Management should take the necessary steps to formulate policies that would promote the creation and use of OERs in their institutions. There is the need for a policy framework to provide OER services.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Higher education institutions worldwide are going through challenges such as cuts in funding, access, provision of quality education, and methods of teaching and learning (Brown & Alder 2008; Lwoga 2012; Albright, 2005). Muyengwa & Bukaliya (2014) have also highlighted the payment of high subscription fees for scientific information even in advanced countries as well as the lack of educational facilities in developing countries. The latter is evidenced by the inability of most African universities to provide their students with appropriate laboratory materials (Kangai & Bukaliya, 2010). Other challenges include faculty stretching the terms of fair use in order to provide learning materials to their students Keats (2003), coupled with inadequate, relevant and up-to-date books and other educational resources, outmoded pedagogies, instructional strategies and poor modes of assessment (Muyengwa & Bukaliya 2014; Percy & Van Belle 2012; University of Education, 2010). Hassall and Lewis (2017) also comment on the inadequate and often poor quality textbooks in developing countries as well as issues pertaining to relevance and appropriateness of textbooks which are often from developed countries. In such cases, language, topics, assumptions and examples could be inappropriate or irrelevant.

In the area of teaching practice, Arinto, Hodgkinson-Williams, King, Cartmill and Willmers (2017) explain that areas with inadequate teaching resources may lack the requisite resources and there may also not be well qualified personnel to teach certain subjects. Poor infrastructure and overcrowded classrooms may also affect teaching likewise the quality, frequency and duration of professional development programmes.

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To corroborate these arguments, the 2017 Commonwealth Global Report on Open Educational Resource (OERs), revealed that apart from textbooks in Africa being too expensive, and outmoded, they do not mirror local contexts. Relevance, therefore, still remains a major priority (COL 2017).

In the midst of these challenges, higher education institutions worldwide are experiencing a period of rapid innovation and transformation and a shift from teacher-centred methodologies to learner-centred ones (Hassall & Lewis, 2017). One of such innovations is Open Educational Resources. For the purpose of addressing these challenges, Arinto et al. (2017) have argued that the adoption of Open Educational Resources (OERs) can help mitigate most of the numerous challenges identified in teaching and learning.

Open Educational Resources (OERs) provide open licenses that give end-users the right to use, modify and redistribute educational materials without asking permission or paying a fee to the original creators of the materials (Lawrence and Lester, 2018). These attributes make the use of OERs flexible and give faculty the right to adapt, translate and share content to suit the needs of students The William and Flora Hewlett Foundation, (2015) including persons with disabilities (McGreal, 2017). Users also have the freedom to use educational resources such as audio, video and content without permission and without worrying about when, where, how and the length of time to use the resources (McGreal, 2013). According to Butcher (2015), the only significant difference between OERs and other resources is the license that enables reuse and modifications of materials without the permission of the copyright holder. Kaur, Nkosi and Francis-Seaman (2013) argue that access to the internet and other net 2.0 tools as

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well as social media has facilitated the reach of OERs to a wider community. Also, Brown and Adler (2008) contend that, so far, the Open Education Movement is the most noticeable influence of the internet on education.

Open Educational Resources to a large extent help reduce costs in education, widen access to education, improve the quality of education and save time (Richter & Mcpherson, 2012; UNESCO, 2012; Wright & Reju, 2012) and address issues pertaining to pedagogy (The William and Flora Hewlett Foundation 2015). The William and Flora Hewlett Foundation (2015) have also justified the use of OERs in developing countries by outlining some problems pertinent to that region. These include scarcity of high quality materials, inability of students to access educational materials because they are expensive or copyright protected so they cannot be translated. There is also no flexibility in the curriculum which is often rigid and underdeveloped and so students' needs and local contexts are not met.

The 2017 Global Report on Open Educational Resources intimated that stakeholders surveyed (including universities or colleges) stated that OERs reduced the cost of learning materials (80.88%), helped developing countries to access quality materials (77.75%) among others (COL 2017). It has also been established that between 2002 and 2012, the cost of textbooks in the US shot up by 82% which was thrice the inflation rate (The William and Flora Hewlett Foundation, 2015). According to Wiley et al. (2012), students in higher education institutions in the U.S. pay an average of $900 annually for text books alone. At the same time, tuition fees were increased by 130% without a corresponding increase in salaries of the middle class. Again, the 2018 NMC Horzion report, Higher Education edition submits that in 2018, full-time undergraduate

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students had to pay a minimum of $1,220 for the academic year (Becker, Brown, Dahlstrom, Davis, DePaul, Diaz & Pomerantz, 2018). While this contributes to students dropping out of school, the use of OERs could help overcome this trend and widen access to higher education. Other studies that showed that students use of OERs reduced costs to them include Hilton III, Gaudet, Clark, Robinson & Wiley, (2013) Jung, Bauer & Heaps (2017).

As part of solutions to the challenges relating to access, Open Educational Resources are meant to enhance instructional materials and expand faculty and learners' prospects of accessing knowledge (Albright, 2005). The William and Flora Hewlett Foundation (2013) has also indicated that traditional universities will not be able to provide quality education to a large number of qualified candidates by 2025. They estimate that by 2025, prospective students to institutes of higher education worldwide would have risen to 263 million. This figure demands the opening of at least four universities every week that would accommodate 30,000 students within the next 15 years (William and Flora Hewlett Foundation 2013, p.6). Obviously, traditional approaches to quality education will not meet the needs of prospective students. To this end, the foundation acknowledges the crucial role OERs can play in addressing the issue as well as making sure that students and teachers worldwide get equal access to knowledge.

Regarding the issue of quality and students' outcomes, various studies have attested to the benefits derived from OER use. Lawrence and Lester (2018) intimate that so far, with a few exceptions, there is evidence to show that both faculty and students accept OERs and rate the quality and value of their content as equal to traditional commercial materials. Arinto et al. (2017) posited that, OERs can improve the quality of teaching

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and learning in three areas, namely, learning materials, teaching practice and impact on students' learning outcomes This assertion has been confirmed by (Hilton III, 2016). Other studies to support this view include (Delimont, Turtle, Bennett, & Adhikari Lindshield, 2016; The William and Flora Hewlett Foundation 2013; Jhangiani, Pitt, Hendricks, Key, and Lalonde, 2016; Hennessy, Haßler & Hofmann, 2016).

Open Educational Resources also have a wider application. They are meant to broaden access to knowledge, including that which is created and taught by university faculty to any interested learner (Santos, McAndrew & Godwin, 2008). One of the key characteristics of OERs is their interdisciplinary nature which is ideal for today's learning society which requires versatile people who are also lifelong learners and who may not keep the same job for life (Kozinska, Kursun, Wilson, McAndrew, Scanlon & Jones 2010). Brown and Alder (2008) endorse this point by indicating that we are in an era where people are not likely to be tied to one job forever and as we change jobs, and take up new ones which our previous education has not prepared us for, we need to upgrade our skills and knowledge on a continuous basis. People can thus use OERs to upgrade themselves and move on to new jobs as and when it becomes necessary. Besides, OERs extend the boundaries of knowledge by giving learners access to courses in disciplines which are described as specialist areas (UNESCO and Commonwealth of Learning, 2015). OERs can thus satisfy the call for universities to provide education that would be relevant for the job market.

The value of OERs has attracted the attention of international organizations, national organizations and governments. The organizations include UNESCO, Commonwealth of Learning, the Organisation for Economic Cooperation and Development (OECD),

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the European Commission, Bill and Melinda Gates Foundation, Ford Foundation and Hewlett Foundation. These organisations are committed to funding OERs (Richter and Veith, 2014; Kelly, 2014; Richter and McPherson, 2012; Mulder & Jelgerhuis, 2013). For example, while UNESCO hosted the first and second world congresses leading to the 2012 Paris Declaration (UNESCO 2012) and the 2017 Ljubjana OER Action Plan (UNESCO 2017) respectively, Bliss and Smith (2017) report that The Hewlett Foundation donated over 170 million US dollars between 2002 and 2017 to the open movement.

At the national level, some governments have committed huge sums of money towards OER programmes. For example, the Netherlands government invested eight million Euros in its OER (Wikiwiji) programme in order to mainstream OERs into all sectors of its educational system (Mulder & Jelgerhuis, 2013). The authors maintain that the US government between 2011 and 2014 provided two billion US Dollars to be invested in the creation of OER for community colleges. Mulder and Jelgerhuis further state that the United Kingdom has also voted GBP 13 million for its JISC/HEA OER programme. More recently, Becker et. al. (2018) have reported that the New York state budgeted $8 million to deliver OERs to students in the City University and State University of New York.

Open Educational Resources also feature prominently in international frameworks. The Ljubljana OER Action Plan report asserts that the 2017 Ljubljana OER Action Plan has an impact on all relevant United Nations Frameworks (UNESCO, 2017). The report states that these frameworks include the Universal Declaration of Human rights and the 2006 Convention on the Rights of People with Disabilities. Indeed, the United Nations

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acknowledged OERs as one of the panaceas to the achievement of the 2015 Millennium Development Goals on education (Perkins, 2011).

In Ghana, the Draft Framework for the National Action Plan 2016 – 2030 has acknowledged the unique role Open and Distance learning plays in providing access to quality education through Open and Distance Learning, (ODeL), but it also laments the lack of policy to direct ODeL issues. Thus, the National Centre for Distance and Open Learning and Open Schooling (CENDLOS) under the new Education Strategic Plan, (ESP), has been mandated to "develop and implement a national policy framework on ODeL (including OER and MOOC)" (Ministry of Education, 2016). Currently, the country has a draft OER policy (COL, 2017). Open Educational Resources have also become relevant in Ghana as government strives to "create an inclusive educational system through improved access and equity, and provision of quality and relevant educational opportunities for all" (MOE, 2016, p. ii). The potentials of Open Educational Resources could help in attaining the Sustainable Development Goal 4 which aims at ensuring "inclusive and equitable quality education and promote lifelong learning opportunities for all" (COL, 2017, p. 13). In support of this, McGreal (2017) submits that OERs can be used to support the SDGs by using them to address issues pertaining to access, cost, quality and equity.

From what has been discussed, it is obvious that OERs can help address:

> The educational challenges related to: learning for the 21st century, fostering teachers' professional development, containing educational costs, continually improving the quality of educational resources, widening the distribution of high-quality educational materials, and breaking down the barriers to high-quality learning opportunities, (Orr, Rimini & van Damme, 2015, p. 16).

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1.2 Statement of the Problem

In Ghana, OER initiatives include the Teacher Education in Sub-Saharan Africa (TESSA) research and development network project. The TESSA Research and Development Network, of which the University of Education, Winneba and the University and Cape Coast are members, was established in 2005 to address challenges African countries and international organizations faced in their quest to meet the Education for All target, the Millennium Development Goals and other educational commitments in the region and sub region. (Anamuah-Mensah, Buckler, Moon, Ricketts, Sankale, Wolfenden & Pontefract, 2008). These educational commitments increased enrolments in basic schools without the commensurate number of teachers (Anamuah et. al., 2008). Poor working conditions have also affected teacher recruitment and retention, hence a shortage of basic school teachers (Moon, 2010). It has been estimated that while African countries would need 1.1 million qualified teachers (UNESCO Institute for Statistics 2012), Ghana had only a quarter of the primary school teachers required with rural areas being the hardest hit and with most teachers having inadequate skills (Anamuah-Mensah et al., 2008; Moon, 2010). It was also established that the teacher training institutions in the sub region were ill equipped to train enough teachers and provide professional development programmes to a large number of in-service teachers. This, coupled with inadequate teaching materials, has led to teachers using predominantly teacher-centered approaches to teaching (Moon, 2010). Thus the essence of the TESSA project was to provide expertise, knowledge and skills to unqualified, under-qualified and beginning teachers who lacked experience; train more teachers to improve the teacher-pupil ratio in sub-Saharan Africa and provide quality resources to enrich teaching and learning (Anamuah-Mensah et.al.). TESSA materials were also intended to help teachers shift from teacher-centred

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approaches to learner-centred ones with the aim of improving upon the standards of pupils' achievement and quality of teaching (Moon & Villet, 2017). It was also intended to provide teachers with professional development without removing them from their classrooms, cut down drastically on theory based courses and linking theory with practical activity oriented programmes which are suited to local needs (Anamuah-Mensah et al. 2008).

Currently, these resources are also being used by some Colleges of Education including Komenda College of Education, Komenda, Foso College of Education, Assin Foso, OLA College of Education, Cape Coast and Holy Child College of Education, Takoradi.

Another OER project the University of Education, Winneba was involved in is the PHEA ETI Project 4. (PHEA is a consortium of donor organisations). Based on the challenges associated with the scarcity of teaching and learning materials, the university sought the assistance of PHEA to develop the capacity of academics to source, adapt, use and make available OERs in order to improve the quality of teaching and learning. To achieve this, PHEA was to assist UEW to formulate a policy on OER and also train faculty in the following:

- Methodologies for integrating OER materials into teaching and learning activities
- Adaptation of existing OER for local curricula
- Preparation and release of local content as OER
- Creation of a University-wide OER repository.

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The short term goal involved the training of twenty faculty members tasked to find and adapt existing OERs and integrate them into existing courses and materials while the medium to long term goal was for them to integrate OERs into at least one taught course. The long term goal was meant for the creation of a university repository to store all teaching materials produced at the university with the aim of reducing repetition and increasing efficiency in the design and development of courses. (University of Education, Winneba, 2010, p.2).

At the early stages of the PHEA ETI 4 OER project, faculty technological competencies were improved. Academics were made aware of shifts in instructional practices and pedagogy towards learner centredness. As well, more and more academics started to use ICT in their teaching (University of Education, Winneba, 2013). This was made possible by training faculty to mainstream the e-learning hybrid mode of teaching and learning. In the process, the university converted 10 of its hybrid courses into OERs (University of Education, Winneba, 2013).

The PHEA ETI project was also intended to help faculty wean themselves off teacher-centered approaches to learner centered ones by adopting the role of facilitators, coaches and co-learners and integrating OERs which would cater for students' needs and learning styles in their lessons (University of Education, 2010).

However, despite the availability of OERs and their potential to improve teaching and learning, particularly in developing countries, it appears that they are not being patronized much (OECD, 2007; Ngimwa & Wilson, 2012). Indeed, (Dulle & Minishi-Majanja, 2011; Kandiero, 2015; Mtebe & Raisamo, 2014b; Percy & Van Belle, 2012)

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all attest to the fact that the adoption of OERs among faculty in Africa is low. Besides, despite massive investments in OER projects as well as advocacy, their uptake in higher education institutions appear to be limited (Coalition for Networked Information, 2016). Similarly, Guo, Zhang, Bonk and Lee, (2015) have commented on the low levels of OER usage by users in developing countries.

Generally, studies on OERs in developing countries including Ghana are very few. For example, there are a number of OER initiatives in higher educational institutions in Ghana, yet there is no study to determine the status of OER adoption by faculty in the institutions under investigation. For example, Essuman and Otami (2010) evaluated the use of TESSA OER by students and lecturers at the Early Childhood Care and Development department of the University of Education Winneba, Tangaza, Mulder, Neto, & Omollo (2018) also examined the differentiation in access to, and the use and sharing of (open) educational resources among students and lecturers at technical and comprehensive Ghanaian universities while Omollo, Rahman, & Yebuah (2012) examined the the production and promotion of health Open Educational Resources at the University of Ghana and Kwame Nkrumah University of Science and Technology. (KNUST).

The paucity of information on faculty adoption and use of OERs limits one's understanding of pertinent issues of OER adoption and strategies that can be put in place to enhance their use in higher education institutions in Ghana. It is therefore important to investigate why faculty will or will not want to produce and use OER as well as the barriers that militate against the use of OERs in order to inform management strategic planning for the future, that is, to identify and scale up what works in relation

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to accessing, using and creating OERs and finding appropriate solutions to the challenges.

Huge investments have also been made on OER projects and advocacy, but despite this and the potential of such resources to improve teaching and learning, it appears that they are not being patronized much by faculty (Mtebe & Raisamo, 2014a; Coalition for Networked Information, 2016). Again, since students are seen as the major users of OERs, faculty holds the key to their adoption and use of OERs as research shows that it is when faculty provide resources and or recommend resources to students that usage increases. For example, a study conducted in China by Li and Hu (2013) indicated that over three fourth of college students used OERs and got to know about the resources through their teachers. The usefulness of OERs to students especially in the technological age has been very well documented by researchers such as (Hilton, 2016; The William and Flora Hewlett Foundation, 2013).

There have also been studies on the adoption of OERs using the Unified Theory of Acceptance and Use of Technologies (UTAUT) model. However, these studies were carried out in Tanzania by Mtebe and Raisamo (2014), the African continent by Percy and Van Belle (2012); India by Padhi (2018) among others. Apart from that, most of the studies used quantitative approaches. Thus this study used the sequential mixed methods approach to further explain, explore and clarify major issues raised in the quantitative study from the individual faculty perspective (Creswell, 2014; Tashakkori, 1988). The study also found it necessary to extend the the UTAUT model to include compatibility and trialability from Roger's Diffusion of Innovation Theory.

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Based on the training on OERs these institutions have had from the TESSA project and other OER initiatives, the tendency is for some faculty to adopt and use them while others do not, but the extent to which this is being done needs to be investigated. Besides, awareness goes with information, innovation and creativity and that could have an effect on OER adoption and usage. Challenges faculty face with the use of OERs are also critical to its usage. These have been investigated elsewhere (Mtebe & Raisamo, 2014b; Percy & Van belle, 2012). It is important to find out whether similar situations exist in the institutions being investigated.

This study therefore tries to fill these salient gaps by investigating the issue: What factors influence faculty to adopt and use OERs in higher educational institutions in Ghana?

1.3 Research Purpose

The study seeks to examine the factors that influence the adoption decision of faculty members of higher education institutions in Ghana on the adoption and use of OERs using a modified version Unified Theory of Acceptance and Use of Technology (UTAUT) theory in addition to two constructs from the Diffusion of Innovation (DoI) model. This was done with the view to informing policy for the deployment of OERs to address the challenge of inadequate, relevant, and current learning materials and to improve the quality of teaching and learning outcomes.

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1.4 Research Objectives

The objectives of this study are to:

i. Find out the level of faculty's technological competencies in higher education institutions in Ghana.

ii. Find out the level of faculty's awareness of Open Educational Resources in higher education institutions in Ghana.

iii. Investigate UTAUT and Diffusion of Innovation (DoI) factors that influence faculty adoption and use of OERs for teaching and learning in higher education institutions in Ghana.

iv. Investigate the barriers associated with faculty's adoption and use of OERs in higher education institutions in Ghana.

1.5 Research Questions

The following research questions will be addressed.

i. What is the level of faculty's technological competencies in higher education institutions in Ghana?

ii. What is the level of faculty's awareness of OERs in higher education institutions in Ghana?

iii. How do UTAUT and DoI factors contribute to the adoption and use of OERs by faculty in higher education institutions in Ghana?

iv. What are the barriers associated with faculty's adoption and use of OERs in higher education institutions in Ghana?

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1.6 Hypotheses

i. Hypothesis 1: Performance Expectancy has a positive and significant effect on faculty's behavioural intention to use OERs.

ii. Hypothesis 2: Effort Expectancy has a positive and significant effect on faculty's behavioural intention to use OERs.

iii. Hypothesis 3: Social Influence has a positive and significant effect on faculty's behavioural intention to use OERs.

iv. Hypothesis 4: Facilitating Conditions have a positive and significant effect on faculty's actual use of OERs.

v. Hypothesis 5: Compatibility has a positive and significant effect on faculty's behavioural intention to use OERs.

vi. Hypothesis 6: Compatibility has a positive and significant effect on faculty's actual use of OERs.

vii. Hypothesis 7: Trialability has a positive and significant effect on faculty's behavioural intention to use OERs

viii. Hypothesis 8: Trialability has a positive and significant effect on faculty's actual use OERs.

vii. Hypothesis 9: Behavioural intention has a positive and significant effect on faculty's actual use of OERs.

1.7 Significance of Study

Addressing the factors that influence faculty decision to adopt OERs could lead to a more extensive OER adoption, and improve the quality of educational opportunities in the process (Percy & Van Belle 2012). Students usually look up to their lecturers to provide resources and or recommend resources to them to enhance learning. In some

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situations, faculty and institutions are commended or blamed for high and low levels of knowledge and usage because faculty is seen as an agent of change (Li, Yuen and Wong, 2014; Johnson 1984). It is clear that the success of the uptake of an innovation depends on the interest and participation of faculty. So, the findings of this study will help ascertain the factors that contribute to faculty participation in the use of OERs in order to provide policy directions to encourage faculty usage.

So far, there is no institutional policy on the creation and use of Open Educational Resources in most higher education institutions in Ghana. It is hoped that the results of this study will help the institutions to formulate a policy on OERs.

This study is also important because one needs to understand why faculty accepts or rejects OERs in order to rectify challenges and facilitate predicting, explaining and increasing faculty acceptance of OERs (Davis, Bagozzi & Warshaw 1989). Also, determinants of quality instruction include the availability of current educational resources and pedagogies. Since OERs provide current information for teaching, learning and research, the study can improve faculty awareness of and the need for the creation and use of OERs. Moreover, understanding faculty perception of OER usefulness will enable OER creators to design their materials to meet the needs of faculty (Kelly, 2014). Since the number of faculty members using OERs will determine its adoption Allen and Seaman (2014), it is hoped that findings of this study would raise faculty awareness of the usefulness of OERs for their integration into classroom work to facilitate mainstream adoption.

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Findings from this research will also help researchers and policy makers understand factors that promote or impede the integration of OER into programmes of higher education institutions so that best practices can be scaled up and problem areas resolved through training or policy formulation.

Findings from the study will contribute to knowledge by helping us to understand the variables that influence faculty intentions to use and actually use OERs. The findings will offer stake-holders, who desire to widen OER adoption, empirically based recommendations.

1.8 Delimitation of Study

The study is restricted to only full-time faculty from the University of Education, Winneba, Holy Child College of Education, Komenda College of Education, OLA College of Education and Foso College of Education who are aware of OERs. Open educational resources comprise content, software tools and licenses. It can also be used in both formal and informal situations. The study focuses on only content in a formal environment involving faculty. Data was collected with the help of questionnaires and interviews.

1.9 Definition of Terms

Higher education: this refers to universities and colleges of education that are mandated to award degrees or recognized by a country's statutes as such.

Faculty: This refers to teaching staff and researchers from the University of Education, Winneba and tutors from the selected Colleges of Education.

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1.10 Structure of the Thesis

The study is organized into six chapters. Chapter one highlights the background information, context of the problem, problem statement, purpose of the study, objectives and research questions, hypotheses and significance of study. Others are delimitation of the study, definition of terms and organization of the study. Chapter two reviews relevant literature associated with the theories used, the topic and objectives of the study. In chapter three, the methodology used in the study is discussed. This examines the research paradigm, population, research design, sampling, data collection techniques and tools, validity and reliability, as well as ethical considerations.

Chapter four focuses on the presentation of the findings of both the quantitative and qualitative data while Chapter five discusses the results of the findings. It also shows the extent to which the qualitative data substantiates the quantitative data.

Chapter six summarises the study and highlights the key findings based on the objectives of the study. It further provides a conclusion, implications and recommendations. In addition, it addresses the study's contributions to knowledge.

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CHAPTER TWO

THEORETICAL FRAMEWORK AND RELATED LITERATURE REVIEW

2.1 Introduction

This chapter provides a theoretical basis for the study and reviews literature in relation to some pertinent issues relevant to OERs. The theoretical frameworks reviewed include the Diffusion of Innovations and the Unified Theory of Acceptance and use of technology. Literature is also reviewed regarding some key issues such as the origins of Open Educational Resources, the Open Educational Resources Movement, trends in Open Educational Resources, the impact of Open Educational Resources on teaching and learning as well as Technology and Open Educational Resources. Others are OER awareness, barriers to OER use and institutional support for the use of OERs.

2.2 Theoretical Framework

According to Reeves, Albert, Kuper and Hodges (2008), theories help us to formulate research questions, select relevant data and interpret it among others. “Theories give researchers different "lenses" through which to look at complicated problems and social issues, focusing their attention on different aspects of the data and providing a framework within which to conduct their analysis” (p. 631). This study will be guided by two theoretical frameworks, namely, Diffusion of Innovation (DoI) and the Unified Theory of Acceptance and Use of Technology. (UTAUT).

2.3 Diffusion of Innovation (DoI)

Perceptions play a major role in people’s decision to adopt an innovation (Martins, Steil & Todesco, 2004). Sahin (2006) contends that the DoI theory is “the most appropriate

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for investigating the adoption of technology in higher education and educational environments" (p.14), and has been used by many researchers from a wide range of disciplines (Sahin, 2006). Also, Nutley, Davis and Walter (2002) have stated that even though most of the literature on the diffusion of innovations theory concentrates on industrial and service settings, currently, the focus includes health care and educational settings. Perkins (2011) contends that since OERs represent one of the most recent innovations in Educational Technology, Roger's (2003) Diffusion of Innovation theory should be used as a framework to understand the challenges pertaining to their wider adoption. Researchers such as Lane and van Dorp (2011) and Perkins (2011) have used the theory to explain the adoption of OERs in higher education. In addition, Surry (1997) outlined three reasons for the use of the diffusion of innovation theory in the field of Educational Technology. Surry argued that firstly, it is to help education technologists to better explain, predict, and account for the factors that help or prevent the diffusion of their products. Secondly, it will prepare instructional technologists to work effectively with clients and potential adopters. Thirdly, it could result in the development of a systematic, prescriptive model of adoption and diffusion.

According to Rogers (2003), "diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system" (p. 5). Thus the four main components of the diffusion process are innovation, communication channels, time and social system.

Rogers (2003) explained that the innovation might be "an idea, practice, or object that is perceived as new" (p.12) even though it might have been in existence much earlier without the knowledge of the individual. He referred to diffusion as a specialized type

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of communication whereby the idea to be diffused is perceived as being new. When this is applied to OERs, it can be said that OERs are an innovation because they are new (Perkins, 2011). Also hitherto Open Educational Courseware materials, including full courses, seen as private property are now openly available in the public domain; besides they represent a new learning method for especially self-directed learners (Arendt & Sheldon, 2009). The idea of newness creates some amount of uncertainty. And an idea that is diffused can be adopted or rejected both of which have outcomes that can lead to social change. Rogers (2003) also concedes that some innovations are harmful and uneconomical; and the rate of adoption may differ from person to person depending on their situation. He also states that diffusion is a "social change" which could be either "planned" or "unplanned."

Rogers (2003) maintained that when users decide to adopt an innovation, they will take the following attributes into consideration. These are: relative advantage, compatibility, complexity trialability and observability. Besides, the estimated 49% to 87% variation in the rate of adoption can be explained by the perceived attributes above (Rogers 2003; Arendt and Shelton, 2009).

In a meta data analysis of a total of 75 articles, performed by Tornatzky and Klein (1982) using Roger's five innovation attributes, they found that out of the five attributes, only three, namely compatibility relative advantage, and complexity were the key predictors of adoption. And more recently, Kapoor, Dwivedi and Williams (2014) who carried out a meta-analysis of publications spanning 1996 to the middle of 2011 have also confirmed that trialability and observability did not have a significant statistical effect on the adoption of an innovation. What could be implied by these

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studies is that participants were advanced in the use of technology hence they did not need a trial period.

In this study, I shall limit myself to compatibility and trialability. Relative advantage and complexity have been taken care of by performance expectancy and effort expectancy respectively in the UTAUT model. However, compatibility and trialability are added for reasons that would be discussed presently.

2.4 Compatibility

Compatibility is "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and the needs of potential adopters" (Rogers 2003, p. 240) An idea that is more familiar or an innovation that meets the needs of the individual is regarded as more compatible hence the level of uncertainty is reduced. In other words, potential adopters of an innovation are more likely to adopt an innovation that is compatible with their values, experiences and practices faster than those that are not. This in turn increases the rate of adoption (Rogers, 2003).

In relation to OERs, however, Perkins (2011) opines that compatibility is not only limited to end users. According to Perkins, those who produce OERs can be regarded as adopters because "they must commit to a system of content production, storage, and dissemination that is likely quite a bit different than models with which they are already familiar"(p. 62). Further, the mode of funding OER initiatives might not fit into the models users already know. As regards copyright issues, faculties in tertiary institutions as well as the institutions themselves are more used to proprietary rights covering materials they create rather than the open licensing standards that cover OERs.

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Also, according to Sugar, Crawley and Fine (2004), teachers' teaching philosophies determine their teaching beliefs as regards technology. Therefore, their teaching beliefs play a role in their resistance of technology. Thus, for teachers to adopt technologies, they need to change their teaching philosophies which are often based on teacher-centred approaches to learner-centred and constructivist ones as advocated by (Sugar, Crawley & Fine, 2004). Gilakjani (2012) acknowledges the important role teachers' pedagogical beliefs have on technology use, the need to understand teachers' beliefs in order to help them increase their technology skills and usage. Nevertheless, Gilakjani is quick to add that rather than trying to change teachers' beliefs, efforts should be directed at boosting teachers' confidence by introducing them to the types of computer technology uses that would support their most immediate needs. Gilakjani has further explained that for teachers to adopt an innovation, its use must be consistent with their existing beliefs. This is consistent with Roger's diffusion attribute of compatibility.

Sahin and Thompson (2006) have observed that even though technology is frequently used in administration and research, its use is limited in the teaching field because it "challenges the traditions and practices of faculty members and universities" (p. 82). Yet current research shows that when teachers use technology over a period, some of them adopt more learner-centred methods of teaching (Windschitl & Sahl 2002).

2.5 Trialability

According to Rogers (2003), "Trialability is the degree to which an innovation may be experimented with on a limited basis" (p.258), or used on a trial basis. Trialability influences the decision to adopt an innovation because "the personal trying out of an innovation is one way for an individual to give meaning to an innovation and to find

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out how it works under one's own conditions" (Rogers, 2003 p. 258). In relation to OER, this means that when individuals get the chance to try out an OER, they can decide whether to adopt it or reject it (Hodgkinson-Williams & Paskevicius, 2011). For example, if faculty members get the chance to try out an OER, it would give them the opportunity to know how to modify it to suit their students in order to improve their learning.

Rogers (2003) additionally submits that the trialability phase also helps individuals to tackle their fears of uncertainty about an innovation. Again, Rogers noted that early adopters see the trialability attribute as more significant than late adopters. This is because they do not have peers around them who have already adopted the innovation unlike late adopters. Similarly, trialability is relevant because faculty members can be classified as initial adopters. Again, the more users become experienced in the use of technology, the less trialability becomes relevant (Moghavvemi, Hakimian & Feissal 2012). Besides, Tully (2015) has suggested that users try out innovations such as free and open source software because of the minimal risk and cost involved.

Further, Rogers (2003) maintains that innovations that can be easily divided are easier to adopt than those that cannot. To this end, Perkins (2011) has stated that OER content should be created in divisible chunks by declaring: "content units, in particular, must be catalogued and indexed in such a way that allows users to choose what, and how much, they want on a given resource" (p. 63).

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2.6 Compatibility and Trialability: Emperical Evidence

In a case study that investigated postgraduate students' adaptation of academics' teaching materials as OERs, using semi-structured interviews, compatibility emerged strongly as the most favoured attribute that would make students help faculty to convert some of their teaching materials into OERs (Hodgkinson-Williams & Paskevicius 2011). This was because the postgraduate students found that it was "compatible with departments', academics' and postgraduates' existing values, policies and practices of sharing Hodgkinson-Williams & Paskevicius, 2011 p. 6). Trialability trailed behind as a reason for OER adoption.

Also, in a study of incentives and disincentives for the use of Open CourseWare involving 753 adult residents of Utah, Arendt and Shelton (2009) found that compatibility accounted for 34.88% of the total weighted mean of the other variables which is inconsistent with Rogers' notion of 'Relative advantage' scoring higher. Relative advantage however came second with 19% while trialability explained 18.34% of all variables thus displacing complexity to take the third position.

Further, in a mixed methods study by Coleman-Prisco (2017) the report showed that for both quantitative and qualitative studies, compatibility was highly rated as the most favoured attribute for adoption. For example, 93.75 of respondents surveyed voted in favour of compatibility while in the qualitative study, over one third of respondents (43%) affirmed that compatibility, which signified their values in teaching and learning was the most significant attribute in OER adoption. On the other hand, trialability which expressed their ability to try new materials to improve students' learning was insignificant to the adoption of OERs. According to Coleman-Prisco (2017), the results

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showed that both faculty and students had a belief in OERs. Coleman-Prisco (2017) however attributed the low response in relation to trialability to the fact that respondents had gone beyond the trialability stage. Perhaps this is the reason why other studies do not include this attribute at all.

Moreover, a study of faculty experiences and perception of OERs at Zhejiang University in China, Zhang and Li (2017) observed that of the 360 respondents, the majority of faculty indicated that compatibility was one of the reasons for OER adoption while the rating regarding trialability was neutral.

In another instance, Kebritchi (2010) examined the factors that affect teachers' adoption of computer games in a qualitative study involving mathematics teachers who had taught for more than seven years and wanted interactive tools that would complement the teaching of difficult subjects. Compatibility was the second most influential attribute of Rogers' innovations attributes. Trialability on the other hand placed fourth.

Again, Al-Jabri and Sohail (2012) in their study of internet banking adoption in Saudi Arabia found that compatibility was the most significant variable that positively influenced adoption ($t=4.363$, $p \leq 0.001$) since it fitted the way they liked to manage their finances and working style. However, trialability did not have a significant effect on adoption.

However, in a study involving 92 language schools in Curitiba, Southern Brazil, the outcome was different. Both linear multiple regression and logistic regression models were used and it emerged that trialability was one of two variables found to significantly

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predict adoption where 65% of schools were found to have adopted the internet in teaching (Martins, Steil & Todesco, 2004). According to the study, they were able to properly try out the internet before deciding to use it. However, compatibility which involved participants' use of the internet fitting their work style did not appear to play a significant role in internet adoption by affected schools.

Additionally, Black, Lockett, Winklhofer and Ennew (2001) in a qualitative study on consumers' adoption of Internet banking using Rogers' five innovation attributes and Bauer's concept of perceived risk, using focus group discussions found that one set of participants found the innovation incompatible with their past experiences and values thus feeling uncomfortable with it. On the issue of trialability, Black found that trialability was key to internet banking adoption. In a related study by Al-Ghaith Sanzogni, and Sandhu (2010), they found that trialability positively influenced e-service adoption.

Another case is a study of faculty members at the University of Sri Jayewardenepura's adoption of online databases. Samaravickrama and Samaradiwakara (2014) found that compatibility did not positively correlate with participants' rate of adopting databases. Even though in this situation observability and relative advantage were the main factors accounting for higher adoption rates with high positive correlations, trialability also had a positive correlation. In addition, Tully (2015) using a multi-case study and interviews involving seven small to medium sized organizations in Nairobi, Kenya, found trialability playing a major role in the adoption of an open source software in those organizations. Tully (2015) opined that the influence of trialability on the adoption

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decisions could be due to the fact that it was a free online tool which could be downloaded by anyone who chose to use it.

From the discussions, it is evident that both compatibility and trialability have a major role to play in the adoption of technology. However, it is also important to note that in other situations they did not.

2.7 Technology Acceptance Models

One of the challenges associated with the study of new technologies is trying to understand people's acceptance or rejection of new information or communication technology (Park, Lee & Cheong, 2007 p.1). As the use of information technology increased in the 1970s and an increasing number of people in organizations failed to adopt information systems, the need to predict system use piqued the interest of researchers (Chuttur, 2009). Within that same period, researchers became interested in the factors that explained the use of different technologies (Bertrand & Bouchard, 2008). One of the models that attracted the interest of researchers was the Technology Acceptance Model (TAM) (Davis, 1989) which originated from Fishbein and Ajzen (1975) Theory of Reasoned Action (Ju, Hao Fan & Yu-Hsin, 2007; Park et al., 2007). The Theory of Reasoned Action ascertains that attitude and subjective norms are the two key determinants of user intention to produce a behaviour, while in the case of TAM it is perceived ease of use and perceived usefulness.

The Technology Acceptance Model is one of the most important models used to explain and predict user acceptance of information technology (Davis Bagozzi & Warshaw, 1989). Li (2010) has acknowledged its extensive use involving a variety of technologies

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and maintains that there is no doubt that TAM is the most influential theory in the field of information systems. Chen, Li and Li (2011) have stated that because of TAM's specificity, robustness, powerfulness and parsimoniousness in many information systems application, it is more useful in online contexts. It has been extensively used to explain whether the appearance of new technology will be accepted by users (Ju, Hao Fan & Yu-Hsin, 2007; Park, et al., 2007).

The Technology Acceptance Model also makes one understand the formation of behavioural intention. Behavioural intention measures the strength of one's intention to perform a specific behaviour. It is correlated with usage (Davis et al., 1989) and is a predictor of usage (Szajna, 1996). According to TAM and TRA, behavioural intention is the most appropriate predictor of actual use (Ajzen & Fishbein, 1980; Davis, et al., 1989). These are mediated by external variables. Currently, the original TAM has been extended, and simplified and it is known as Parsimonious TAM (Davis et al., 1989). Further developments and extensions have evolved into TAM2 (Marangunić & Granić, 2014) and TAM 3. The Technology Acceptance Model has been replicated many times and validated extensively together with its instruments (Kelly 2014). Besides, even though the Technology Acceptance model has been revised many times, the original model stands out and is being used.

2.8 Limitations of the TAM

Even though the Technology Acceptance model has been touted as a useful model, Legris, Ingram and Collerette (2003), it also has its limitations. According to Chuttur (2009), despite the robustness of the TAM, the model has some limitations. Chuttur indicated that most of the studies using the TAM model concentrated on information

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systems in voluntary settings with just a few in mandatory environments. Legris et al. (2003) have identified three limitations of the TAM model. Firstly, TAM studies usually involve students. Secondly, most studies investigated the introduction of office automation software or systems development applications. They recommend an investigation into the introduction of business process applications. Finally, most studies measure self-reported use (Legris et al. 2003; Lee, Kozar & Larsen, 2003) rather than measuring system use. As a result, the measurement of self-reported use is not precisely and rigorously done (Legris, 2003).

Even though both TAM and TRA predict user intention, it is easier to apply TAM (Mathieson, 1991). However, TAM provides general information while TRA gives specific information (Mathieson, K. 1991). Another key drawback is that most studies associated with TAM mostly concentrated on longitudinal studies worked on tasks that were considered to be too broad (Lee et al., 2003). Also, one of the main disadvantages of the TAM is that it does not give a detailed explanation about the formation of perceived ease of use and perceived usefulness or how they can be used to change the behaviour of users (Koh et al., 2010).

To overcome its limitations, many researchers have recommended the integration of TAM with other theories such as Innovation Diffusion Theory (IDT) or Delone and Mclean's (Information Systems) IS success model to accommodate the rapid changes in information systems and improve specificity and explanatory power (Carter & Bélanger 2005; Lee, Hsieh & Hsu, 2011). Some of the constructs of the Technology Acceptance Model and IDT are similar and can complement each other to investigate Information Systems or Information Technology.

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In response to the limitations of TAM and other technology acceptance models such as TRA, the Unified Theory of Acceptance and Use of Technology (UTAUT) was created by (Venkatesh, Morris, Davis & Davis, 2003). This study will be guided by Unified Theory of Acceptance and Use of Technology (UTAUT) and two constructs, namely compatibility and trialability from Rogers' Diffusion of Innovation attributes.

2.9 The Unified Theory of Acceptance and Use of Technology (UTAUT) Model

The Unified Theory of Acceptance and Use of Technology (UTAUT) was created by Venkatesh, Morris, Davis and Davis (2003) by combining constructs from eight Technology Acceptance models. These comprise the Theory of Reasoned Action (TRA), Technology Acceptance Model, (TAM), Motivational Model, (MM), Theory of Planned Behaviour (PTB) Combined TAM and TPB (C-TAM-TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT) (Venkatesh, et al. 2003). The choice of theses eight models was as a result of their empirical and conceptual similarities.

The UTAUT model explains a variance of about 70% of usage intention and 50% actual use which is a significant improvement on the eight models used which explain between 30% and 60% of users' behavioural intension to use technology (Venkatesh et al. 2003). Also the more recent UTAUT 2 explains about 51 to 74% of behavioural intentions and 40 to 52 percent of actual usage (Venkatesh, Thong & Xu, 2012). These models have been used in different contexts either on their own, with some modifications or extended to suit various contexts. The UTAUT model is used to analyse constructs which directly determine a users' behavioural intention to use a technology and their usage behaviour.

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2.10 Direct Determinants of Users' Behavioural Intention to Use and Actual Use of Technology

According to Venkatesh et al. (2003), the UTAUT model suggests that there are three direct determinants of intention to use. These are, performance expectancy, effort expectancy and social influence. It also posits two direct determinants of usage behaviour, namely, facilitating conditions and intention to use. Performance expectancy, effort expectancy, social influence and facilitating conditions constitute the independent variables, while the dependent variables comprise behavioural intention and use behaviour.

According to Venkatesh et al., facilitating conditions did not have a direct effect on intention to use. Venkatesh et al. also found self-efficacy and anxiety to be indirect determinants of users' intention to use a technology and therefore unnecessary.

Besides these, the model also comprises four moderators which moderate the independent variables. According to Yol, Serenko and Turel (2006), moderators are variables that affect the strength or the direction between independent and dependent variables. According to Sun and Zhang (2006), the inclusion of moderators in a model enhances its explanatory power also referred to as predictive validity. Also, Venkatesh et al. (2003) buttress the point that the variables significantly increased with the addition of moderators. They further indicated that the inclusion of extensions or moderators in previous studies greatly improved their explanatory power. Serenko, Turel and Yol (2006) have suggested that the exclusion of key moderators such as gender and age which reflect individual differences in many models account for the low explanatory powers and inconsistencies in various models.

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The four moderators used in the UTAUT model are: gender, age, experience and voluntariness. Findings from Venkatesh et al (2003) showed that the influence of performance expectancy on behavioural intention was moderated by age and gender, while the effect of effort expectancy was moderated by age, gender and experience. Social influence was however moderated by age, gender, experience and voluntariness of use. On the other hand, age and experience affected the influence of facilitating conditions on usage.

2.11 UTAUT Model: Venkatesh et al., 2003

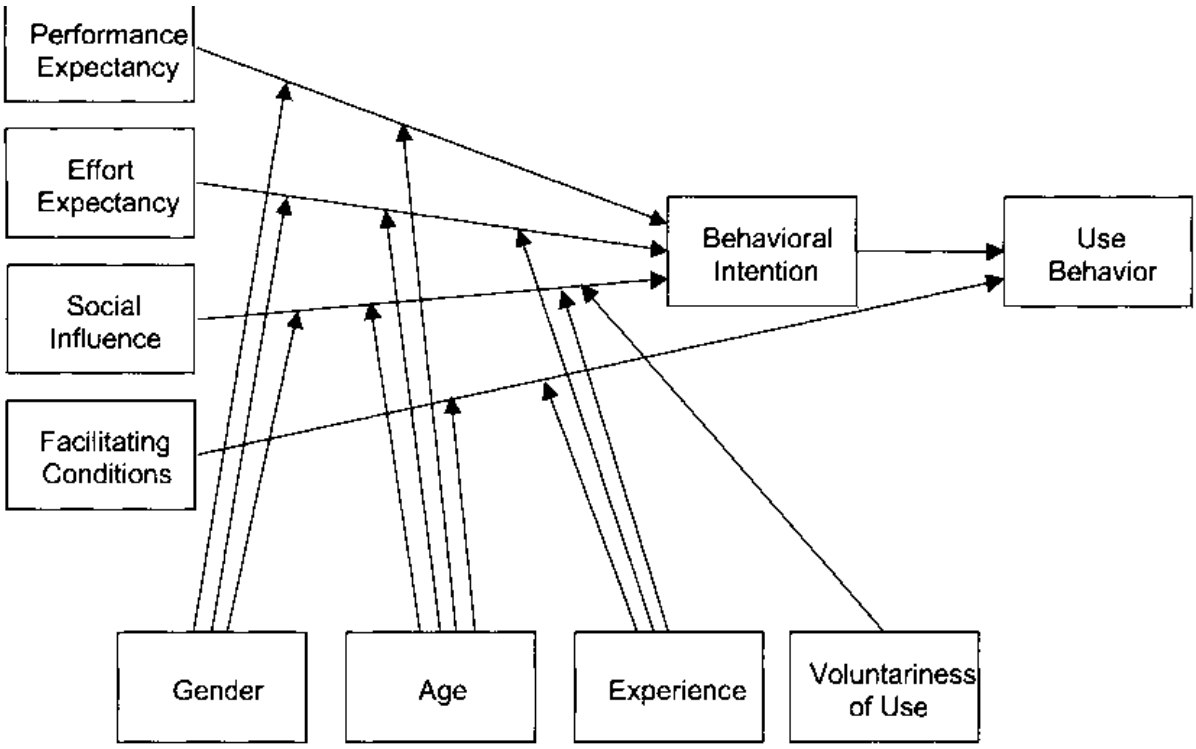

Figure 2:1 UTAUT Model

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2.12 Adapted framework from the Diffusion of Innovation (DoI), (Rogers, 2003) and the Unified Theory of Acceptance and Use of Technology (Venkatesh, Morris, Davis and Davis, 2003).

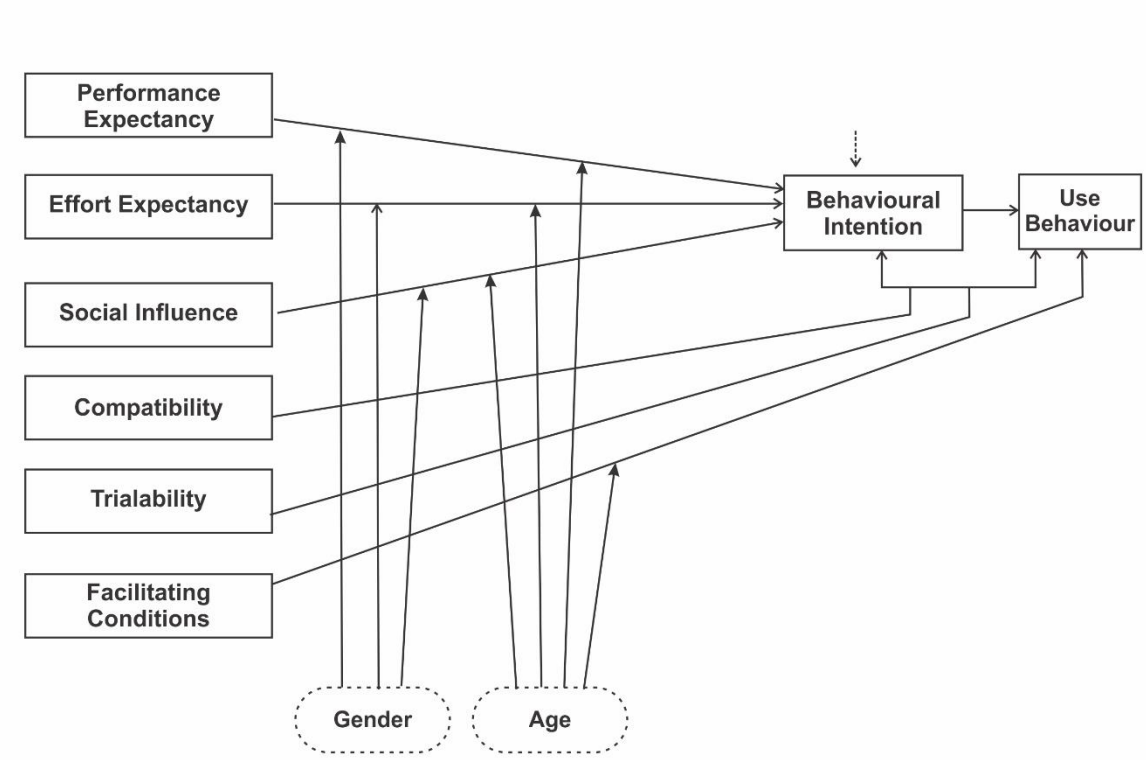

Figure 2.2: Adapted framework from the Diffusion of Innovation (DoI), (Rogers, 2003) and the Unified Theory of Acceptance and Use of Technology (Venkatesh, Morris, Davis and Davis, 2003)

This study has modified and extended the UTAUT model to suit the context of OER adoption and use at the University of Education, Winneba, Foso College of Education, Assin Foso, Holy Child College of Education, Takoradi, OLA College of Education, Cape Coast and Komenda College of Education, Komenda. Two constructs, Compatibility and Trialability borrowed from Rogers' Diffusion of Innovation have been included as independent variables. Moderators such as gender and age have been used to find out the relationship between those variables and faculty uptake of OERs.

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2.13 Justification for Using the UTAUT Model

The UTAUT model was chosen for this study because of its high ability to explain users' intention to use and usage of technology compared to other technology acceptance and use theories (Venkatesh et al., 2003). It has been used in over 700 articles (Mtebe & Raisamo (2014c). The model is also known for its proven robustness and validity in predicting the acceptance of new technologies better than the other eight constructs forming it (Li, et al., 2014; Mtebe & Raisamo, 2014b; Venkatesh et al. 2003). Besides, the model is applicable in both voluntary and mandatory situations and is prominent at the early stages of usage (Venkatesh, et al. 2003).

Additionally, Dadayan and Ferro (2005) assert that technology acceptance should be investigated from three perspectives, namely, individual context, technological context and implementation context since these can influence an individual's acceptance of technology. "Individual context refers to the characteristics of individual end-users; the technological context refers to the characteristics of the technology such as functionality and user-friendliness, among others; and implementation context refers to the user's professional environment (Dadayan & Ferro 2005, p.139). The UTAUT model addresses all these dimensions. The model has been used in the banking, education and healthcare sectors among others (Goswami & Dutta, 2016).

2.14 Performance Expectancy (PE)

Performance expectancy is the extent to which an individual believes that a technology or an innovation will help him or her perform more efficiently at a job (Venkatesh et al., 2003). In this study, it is defined as the degree to which faculty believes that using OERs will help them perform better at their jobs in terms of quality of teaching, students

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learning outcomes, efficiency and effectiveness among others. Therefore, faculty is likely to use OERs if they perceive that they are useful. Performance expectancy is similar to five constructs of the eight models forming the UTAUT model. These are perceived usefulness from TAM and TAM 2, C-TAM-TPB; extrinsic motivation from MM; job fit from MPCU; relative advantage from IDT and outcome expectations from SCT (Venkatesh et al. 2003).

In their research, Venkatesh, et al. (2003) found that performance expectancy in most situations directly determines intentions. They also found that it is the strongest predictor of intention but the strength of the relationship varied with gender and age which was more significant for men and younger workers.

Drawing on faculty from East, West, and Southern Africa, Percy and Van Belle (2012), sought to find out the enablers and barriers to the use of OERs by African academics. They used the UTAUT model. Their study modified the UTAUT model to exclude the moderators. The researchers indicated that most respondents (87.9%) of faculty rated Performance Expectancy high indicating that OERs have value and quality and impact positively on faculty teaching. They also found that Performance Expectancy had a significant effect on faculty intention to adopt OERs. For example, there was a statistical correlation between PE and BI ($p < 0.05$). They conceded that in the end, the validated model turned out like the original, more parsimonious Technology Acceptance Model. However, these two variables PE and EE, explained over 50% of the variance in Behavioural Intention to Use OERs. These findings also resonate with findings from Li, Yuen and Wong (2014) who found a correlation of 0.501 between intention to use and performance expectancy. Likewise, in a study that investigated

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faculty perceptions and intentions about OER acceptance and usability involving faculty from 22 universities in India, Padhi (2018) found 26.43% who indicated that performance expectancy positively affected intentions to use OERs ($\beta = .342$, $P < .001$). Dulle and Minishi-Majanja (2011) had related results. This shows that OER use by faculty in course development facilitated teaching, improved students' learning outcomes and provided faculty with access to current resources. However, in a survey on the intentions of instructors to adopt and use OERs by Mtebe and Raisamo (2014b) the researchers, found that performance expectancy did not have a significant effect on lecturers' intention to adopt and use OERs (Beta = -0.187, $p < 0.069$).

2.15 Effort Expectancy (EE)

Effort expectancy is defined as the degree of ease associated with the use of technology (Venkatesh et al. 2003, p. 450). It is similar to perceived ease of use (TAM/TAM2, complexity (MPUC) and ease of use (IDT). In the context of this study, it implies that when faculty finds it easy to locate, adapt, and use OERs, they will be more likely to engage with it. However, if the process is complex or complicated they are not likely to use it (Li, et al., 2014; Mtebe & Raisamo, 2014b; Percy & Van Belle, 2012). Further, Allen & Seaman (2012) in their survey of faculty have noted that the majority of faculty (86%) ranked ease of use as important or very important in their decision to select online resources.

The majority of respondents (55%) in Percy and Van Belle's study agreed that it was easy to format and mix OERs while 24% were undecided. The researchers concede that about (46%) who were undecided were non-users unsure of the amount of effort needed to use OERs. Effort Expectancy had a significant effect on faculty intention to adopt

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OERs. Similarly, Mtebe and Raisamo (2014b) found that effort expectancy had a significant influence on instructors' intention to adopt OERs (Beta = 0.250, $p < 0.005$) so did Padhi (2018) ($\beta = .434$, $P < .001$) – an indication of faculty belief in the ease of using OERs. Dulle and Minishi-Majanja (2011), and Lee, et al. (2014) had comparable results. In a study by Birch and Irvine (2009) which examined the factors that influence pre-teachers' acceptance of ICT integration into classrooms, only effort expectancy significantly predicted behavioural intention.

The UTAUT model posits that effort expectancy influences behavioural intention and is stronger for women, older workers, and those with limited experience than for other categories of people. Effort expectancy is moderated by age, gender and experience (Venkatesh et al., 2003). Dulle and Minishi-Majana in their study found that indeed, the effect of effort expectancy on intention to use open access was significantly moderated by gender, age and experience. It showed that academics who were older and more experienced in the use of internet were more likely to publish in open access outlets than their younger less experienced counterparts. This is contrary to the popular belief that the younger generation is more technologically savvy than the older generation Kandiero found age had an effect on effort expectancy with a correlation of 0.901. However, there was no significant correlation between gender and effort expectancy. On the other hand, Birch and Irvine found in their study that only age had a significant moderating effect on effort expectancy.

2.16 Social Influence (SI)

"Social influence is defined as the degree to which an individual perceives that important others believe he or she should use a system" (Venkatesh et al., 2003, p. 451).

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In other words, it has to do with the influence of people and organisations faculty members consider important for their use of OERs. Percy and Van Belle (2012) found the correlation between Social influence and Behavioural Intention too low to be significant. As a result, in their study, Social Influence had the least impact on faculty intention to use OERs. Li, Yuen and Wong (2014) also found that social influence did not have any influence on students' desire to use OERs (0.075). Similar results were recorded by (Mtebe & Raisamo, 2014b) (Beta = -0.094, $p < 0.366$). and Padhi (2018) found that social influence had no impact on intention to use (β =.042, P<.423). Kandiero (2015) however found social Influence had a statistically significant positive influence on faculty Behavioural Intention to adopt and use OERs. Social influence was moderated by age, gender and experience (Venkatesh et al, 2003).

2.17 Facilitating Conditions (FC)

"Facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system" (Venkatesh et al. 2013, p. 453). In relation to OERs, facilitating conditions refer to the extent to which academics think that organizational support in relation to technical infrastructure, policies, incentives, skills and resources exist for the use and creation of OERs (Li, et al. 2014). The UTAUT model shows that facilitating conditions influence user behaviour to use OERs, but not user intentions to do so. However, Percy and Van Belle found that facilitating conditions were positively and statistically significantly correlated to both faculty Behavioural Intention to use and Use Behaviour. In a related case, (Dulle & Minishi-Majanja, 2011; Lwoga & Questier, 2014) found that facilitating conditions had an influence on actual use. However, (Kandiero, 2015; Mtebe & Raisamo, 2014) did not find any statistical significance on the effect of facilitating

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conditions on faculty intention to adopt and use OERs. According to Venkatesh et al., the influence of facilitating conditions on usage is moderated by age and experience in a way that the effect is felt more strongly by older and experienced workers.

2.18 Behavioural Intention to use (BI)

The construct, Behavioural Intention to use indicates users' desire to use OERs. This has to do with academics' intention to use OERs and it is regarded as a dependent construct in the UTAUT model and in this study. According both Davis (1989), Venkatesh et al. (2003), empirical research has shown that the strongest predictor of actual use is behavioural intention. In a survey conducted by Donaldson, Nelson and Thomas (2012), most members of faculty (73%) revealed that they were likely to use OERs in future. The Babson survey by Allen and Seaman (2014) also reported that 77.5% of faculty who were not using OERs stated that they would contemplate using the resources within the next three years. Percy and Van Belle (2012) found a statistically significant and positive relationship between Behavioural Intention and Use behaviour. In their study of faculty adoption and usage of open access to scholarly journals in health and science universities, Lwoga and Questier (2014) found behavioural intentions as one of the variables that predicted actual use. Birch and Irvine (2009) use of multiple regression revealed 27% of the variance in pre-service teachers' intention to use ICT. They attributed the low figure to the small sample size (82) used. Mtebe and Raisamo's (2014b) study found that the variance in faculty intention to adopt and use OERs was 12.2%. Additionally, Mtebe and Raisamo (2014c) recorded a variance of 27.7%.

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2.19 Actual Use (AU)

Actual use has to do with the way people really use technology or innovations. In relation to OERs, it could be how faculty members really use OERs. In their research, Percy and Van Belle found that many faculty members were using OERs. However, Percy and Van Belle stated that response bias could have accounted for the high level of OER use among academics. This they attributed to the fact that respondents were more likely to be academics using OERs.

2.20 Attitude

Attitude is defined by Venkatesh et al. (2003, p.) as "an individual's positive or negative feelings about performing the targeted behavior." However, it is not one of the constructs that constitute the UTAUT model because the originators of the model felt it had been incorporated into other constructs such as effort expectancy. Even though attitude is excluded from the original UTAUT model, many research findings indicate that it has the greatest effect on behavioural intentions (Thomas et al., 2013). In their study of the utility of the UTAUT model in explaining the adoption of mobile learning in higher education institutions in Guyana, Thomas et al. (2013) found that even though attitude is excluded from the original UTAUT model, it has the greatest effect on behavioural intentions. In their study, attitude accounted for an estimated 58.3% and 59.3% of variance in attitude and behavioural intensions to use. Thomas, Singh and Gaffar (2013) established that performance expectancy, effort expectancy, social factors and facilitating conditions accounted for 58.3% of the variance in attitude.

Jairak, Praneetpolgrang and Mekhabunchakij (2009) and Nassuora (2012), in their investigation of Thai and Saudi Arabia among higher education students' acceptance

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of mobile learning respectively indicated that a positive attitude resulted in students' behavioural intention to use mobile learning.

Their findings correspond to that of Louho, Kallioja and Oittinen (2006), Dulle and Minishi-Majanja (2011) who found attitude of researchers towards open access to significantly influence their use of materials. The inclusion of attitudes to the UTAUT model has also been recommended by Mtebe and Raisamo (2014b) as one of the variables that can help better predict faculty behavioural intention to adopt and use OERs, However, in the case of Percy and Van Belle (2012), a factor analysis on attitude failed to load the items clearly hence that construct was dropped. Kim, Lee, Lee and Shon (2015) have also reported that attitude did not have an effect on the intentions of adult learners in Korea to use OERs. Thus from the negative result obtained by the two studies as regards attitude, this study did not incorporate it into the model.

2.21 History of Open Educational Resources

There are several schools of thought about the origins of Open Educational Resources. According to Perkins (2011), the establishment of libraries in Europe in the mid-18th century, which also coincided with the period of enlightenment can be said to mark the beginning of open resources repositories. In addition, Allen and Seaman (2012) believed that it emerged in the late 20th century with the development of distance and online learning. However, Wiley and Gurrell (2009) traced the origins of OER to the 1990s which saw the birth of open licenses, free software by Richard Stallman; open source software by Eric Raymond and Bruce Peren, and their colleagues as well as open content by Wiley through to 2002 when MIT launched its pilot site of Open Course Ware. These helped to break the monopoly of copyrights.

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For Attwell and Pumilia (2007), the concept of OERs is not entirely a new idea since teaching in most public funded research universities entail the open sharing of knowledge. Wiley and Green (2012) concur this by stating that education is essentially about sharing, and that education does not take place if teachers do not share what they know with their students. However, the difference is that passing resources through the internet opens up content to a wider group of users. D'Antoni (2009) corroborates this by arguing that content sharing is not new. The new twist to it is the fact that it has been facilitated by "word processing software, which allows the production of digital content, and the internet, which allows the content to be easily, almost effortlessly, shared" (p. 20).

Nevertheless, many scholars such as (Bull, Bossu & Brown, 2011; Caswell, Henson, Jensen & Wiley, 2008) trace the history of OER to the Massachusetts Institute of Technology which in 1999 decided to offer all its course materials for free on the internet, a decision based on their belief that education was for the general good (D' Antoni 2009). Wiley (2006) and Kaur et al. (2013) on the other hand, trace the origins of OERs to 1994 when Wayne Hodgins came up with the concept of learning objects. Learning objects (LO) "refer to educational content packaged in chunks to present bits of knowledge that can be reused in different contexts (Kaur et al., 2013, p3). They are defined differently by different researchers. Learning objects are self-contained and reusable. They can be aggregated and they are tagged with metadata allowing content to be easily found (Kaur et al., 2013). OpenCourseWare also has a role to play in the history of OERs because MIT by announcing in 2001 its intention to make almost all its courseware open showed institutional commitment to the OER movement (Wiley, 2006).

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The concluding part of the OER history has to do with the 2002 UNESCO forum which brought together experts committed to the development of a universal educational resource for every one which they termed "Open Educational Resources" (Wiley, 2006).

From the above discussions, it can be argued that Open Education has existed for a long time. However, the degree of openness and magnitude of sharing have to a large extent been on the type of technology available at each period.

2.22 Concept of Open Educational Resources

The concept of Open Educational Resources (OERs) emerged in 2002 at a UNESCO forum on the Impact of Open Courseware for Higher Education in Developing Countries. The forum which was dominated by academics from developing countries expressed the desire to jointly produce a universal educational resource accessible to everyone and which would in future mobilize academics throughout the world (UNESCO, 2002). Open Educational resources also originated from the belief that knowledge ought to be freely shared and the fact that learning should not be restricted by demographic, economic and geographical barriers (Yuan & Powell, 2013, p.6).

Until UNESCO introduced the term Open Educational Resources, OERs were called by various names – learning objects, open content and open courseware (Mora, Hassin, Pullin & Muegge, 2008). Participants at the 2002 UNESCO Forum on Open Courseware for Higher Education in developing countries, defined Open Educational Resources as "the open provision of educational resources, enabled by information and

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communication technologies for consultation, use and adaptation by a community of users for non-commercial purposes" (D' Antoni, 2008; UNESCO 2002, p.24).

This was modified at a follow-up online discussion as follows:

> 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. Their principal use is by teachers and educational institutions to support course development, but they can also be used directly by students. Open Educational Resources include learning objects such as lecture material, references and readings, simulations, experiments and demonstrations, as well as syllabuses, curricula, and teachers' guides. (Wiley, 2006).

The William and Flora Hewlett Foundation has also defined OER as:

> 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 or 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 (William and Flora Hewlett Foundation, 2008)

OERs are further defined as "educational resources (lesson plans, quizzes, syllabi, instructional modules, simulations, etc.) that are freely available for use, reuse, adaptation, and sharing" (Gurell, 2008, p. 2).

Similarly, Butcher (2015) portrays OERs as:

> any educational resources (including curriculum maps, course materials, textbooks, streaming videos, multimedia applications, podcasts, and any other materials that have been designed for use in teaching and learning) that are openly available for use by educators and students, without an accompanying need to pay royalties or licence fees (p. 5).

A more popular definition of OERs is "digitised materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research" (OECD, 2007, p. 30). Open Educational Resources include:

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- *Learning content*: Full courses, courseware, content modules, learning objects, collections and journals.
- *Tools*: Software to support the development, use, reuse and delivery of learning content, including searching and organisation of content, and learning management systems, content development tools, and online learning communities
- *Implementation resources*: Intellectual property licenses to promote open publishing of materials, design principles of best practice and localize content (OECD, 2007, p. 30 & 31).

Also, the UNESCO-IIEP Forum (2001), agreed that OERs should include Open Courseware Content, Open Source development tools, and Open Standards and licensing tools (Schaffert & Geser, 2008, p.1).

OERs are also defined by UNESCO as "teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions" (UNESCO, 2012, p.1).

At another level, Kanwar, Bala and Abdurrahman see OERs as "an empowerment process, facilitated by technology in which various types of stakeholders are able to interact, collaborate, create and use materials and processes, that are freely available, for enhancing access, reducing costs and improving the quality of education at all levels" (Kanwar, 2011). Here, they stressed stakeholders instead of technology and process instead of product. According to Kanwar (2011), the emphasis is on the word

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empowerment. Kanwar is of the view that the OER movement can help transform education by:

1. Involving all kinds of stakeholders to participate, collaborate, create and share;
2. Encouraging consumers to become the producers of knowledge;
3. Enabling us to harness the wealth of tacit knowledge across the globe to address the great challenges of our time (p. 5).

For Larson and Murray (2008), the definition of OERs goes beyond access to resources through the internet to include resources on DVDS, CDs and video tapes. This is to cater for the many classrooms worldwide that are unable to access broadband internet connectivity. Butcher (2015) and Kanwar, (2011) reiterate this by stating that OERs can be in the form of print, audio, video or digital.

Even though there is no standard definition for OERs, common strands run through all the definitions. Open Educational Resources have licenses attached to them that give users permission to use them in various ways. The materials are free and they are available to anyone who wishes to use them. The materials are free because the cost of production is borne by the institutions that produce them often with some support. Open Educational Resources can be localized and used in formal informal and non-formal settings (OECD, 2007).

The only difference between OERs and other educational resources is the license attached to the resources (Butcher, 2015). This license makes it possible for materials to be reused and adapted without obtaining permission from copyright holders. According to Gurell (2008), the authors of OERs can grant users of their materials a

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variety of permissions, including permission to: modify them, translate or improve them, and share them with others. Similarly, Lesko (2013) asserts that the conditions under which OER and OCW are licensed allow them to be modified and shared.

It is important to note that even though OERs may be free to end users, it may contain some cost elements. These may include the salaries of and time of the producers. Apart from that, there is a cost element associated with searching for OERs, customizing them, technical infrastructure requirements and access to trained support staff (McGreal 2017; Arinto et al., 2017).

2.23 Defining 'Open' in Open Educational Resources

According to Hatakka (2009), open in Open Educational Resources implies that the resource must not only be free, but also widely accessible. Besides, users should be able to make changes in it and be able to adapt it. Additionally, Hylén (2006) is of the view that the two most important aspects of openness have to do with free availability over the Internet and as few restrictions as possible on the use of the resource.

Additionally, Hylén states that:

> There should be no technical barriers (undisclosed source code), no price barriers (subscriptions, licensing fees, pay-per-view fees) and as few legal permission barriers as possible (copyright and licensing restrictions) for the end-user. The end-user should be able not only to use or read the resource but also to adapt it, build upon it and thereby reuse it, given that the original creator is attributed for her work.

Friesen (2013) submits that the freedom to copy content, distribute, change and distribute the changes made to that content is core to the concept of openness as regards content generally and OERs in particular. For Schaffert and Geser (2008), openness

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means open access (free content), open licence (licences that substantially remove restrictions to enable one to adapt, combine or repurpose content, open format (content design should facilitate ease of use) and open software (content should be produced with open source software tools). Schaffert and Geser (2008) are however quick to acknowledge that many OER initiatives may not include all these.

The William and Flora Hewlett Foundation (2013) defines open as "free access in addition to the legal rights to reuse, revise, remix, and redistribute a resource" (p 6). Perhaps it is because the seemingly lack of uniformity in the definition of openness in OERs that Hilton III, Wiley, Stein and Johnson (2010) have stated that "openness is not like a light switch that is either 'on' or 'off'. Rather, it is like a dimmer switch, with varying degrees of openness" (p.6).

Attwell and Pumillia (2007) have asserted that OERs are not easy to define. This has been endorsed by Hogkinson-William (2015), who states that Open Educational Resources is not an easy concept to grasp because of the different tags that are used to describe it. Hogkinson-William highlights some of these terms used which include "open content" "open sourced content" (Wiley, 1998), "learning objects" "reusable learning content" (Duval et al., 2001), "open courseware" (Malloy, Jensen, Regan & Reddick, 2002) and "learning objects" (Hodgins, 2004). Probably, it is on account of these different terms that Sir Daniel stated that "many projects are geared to allowing online access to digitized educational content (even if) the materials themselves do not appear to be explicitly stated as OER." (Hoosen, 2012, p. v).

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2.24 Open Educational Resources Initiatives

There are many OER initiatives which are a collaboration of institutions, especially in the developed countries, with a few in Africa, and usually with financial support from private organizations. For example, the Massachusetts Institute of Technology (MIT) initiative in 2002 has developed over 1900 courses which are freely available online. Moreover, there is the OpenCourseWare consortium which is a collaboration of over 200 universities and related organizations worldwide who are dedicated to advancing education and empowering people through their free resources. So far, over 2500 free courses online have been released (Butcher, 2015). Other initiatives include the Multimedia Educational Resource for Learning and teaching online (MERLOT) (Butcher 2015), and iTunes U which was launched by apple in 2007 (Butcher, 2015). Also, between 2006 and 2007, other OER initiatives were launched. These include Khan Academy, OER Commons, the Saylor Foundation Free Education Initiative and Writing Commons (Texas Higher Education Coordinating Board, 2014).

In Africa, the African Virtual University (AVU) also launched its interactive Open Education Resources (OER initiatives in Africa) in January 2011 based on the rationale that one of the main challenges Africa faces regarding access to quality education has to do with the availability of quality academic content within the African context (OER@AVU n.d). To this end, quality educational resources were developed in collaboration with twelve universities in ten African countries. In all, about 219 modules "in Mathematics and Sciences; ICT Basic Skills; Teacher Education professional courses and integration of ICTs in Education" have been developed and made openly and freely available on the AVU portal (Lesko, 2013, p. 104). It is estimated that between December 2010 and August 2011, these open courses were

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accessed by close to three hundred thousand guests from countries including Brazil, France, Portugal and the United States of America. Lesko has also stated that 50% of the materials were accessed in English, 30% in Portuguese and 15% in French. Lesko further explained that with the successful implementation of phase one of the project (Multinational Project I), the AVU has moved in to the implementation of the second phase of the project (Multinational Project II) by increasing the number of participating African countries to 21. As of 2018, the site had a total of 1,623 resources (OER@AVU n.d).

Another OER initiative in Africa is the Health OER initiative. The development and use of OERs in the health OER initiative was a collaboration among five universities in Ghana, South Africa and the United States of America as well as OER Africa. The Universities include, College of Science, University of Ghana, College of Health Sciences, Kwame Nkrumah University of Science and Technology, the University of Cape Town, the University of the Western Cape and the University of Michigan. The project which was funded by William and Flora Hewlett Foundation was implemented in 2009. This collaboration has led to a cross-institutional transfer of knowledge, skills and expertise (Ngugi & Hanss, 2011). The College of Health Sciences, University of Ghana, has produced OER modules which can be used by other medical schools in Ghana. Not only has the college adapted and used OERs from other institutions, it has also proposed a policy to support its use (Omollo, 2011).

The Kwame Nkrumah University of Science and Technology is engaged in sharing its materials. It is also the first tertiary institution in Ghana to draw up an OER policy which was approved in 2010 (Donkor & Tagoe, 2010).The policy is meant to:

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- guide the development and review of OER materials prior to sharing them on a worldwide scale
- clarify publication rights and licensing issues
- outline policies regarding the use of required infrastructure (information technology, library, etc.) and other support services
- identify human and other resources to support faculty in developing OER for teaching and learning and
- define collaborations within and without the university and the intent to allow access (KNUST, 2011, p. 6).

As a result of the collaboration, the institutions involved focused on specific areas of course development, shared the cost of producing materials and avoided duplication. According to Lesko (2013), the Health OER project has produced about 150 learning modules, many videos and open text books that are being accessed by about 8,500 guests from 190 countries each month.

2.25 The Open Education Movement

According to Okada and Ferreira (2012), besides OERs being created with open licenses and shared online, OERs are also a movement made up of advocates and collaborators comprising educators, learners and institutions worldwide who are involved in OER initiatives**.** The Cape Town Declaration document also states that the Open Education Movement "is built on the belief that everyone should have the freedom to use, customize, improve and redistribute educational resources without constraint" (Cape Town Open Education Declaration, 2007, para 2). Pena (2009) has also stated that journals covered by proprietary licenses that required students to log

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into a password protected system were the driving force behind the coming into being of the Open Education Movement to facilitate the free sharing of resources.

The OER movement takes inspiration from the United Nations Universal Declaration of Human Rights, which among other things advocated the right to education by all, free and compulsory education at the elementary level; general availability of technical and professional education, equal accessibility to higher education to all based on merit and education for personal development (United Nations, 2015).

Kaur et al (2013) submit that MIT's intent to make their courses free whipped up enthusiasm in other higher education institutions to do likewise and that marked the beginning of the Open Educational Movement. Since then, many OER initiatives have followed out of which has emerged an Open Educational Resource Movement (D'Antoni. 2008). Brown and Adler (2008) contend that so far the Open Education Movement is the most noticeable influence of the internet on education. Additionally, Kaur et al. (2013) argue that access to the internet and other net 2.0 tools as well as social media has facilitated the reach of OERs to a wider community.

2.26 Key Challenges Facing the OER Movement

Despite the great strides that the OER movement has made to bring equality and equity in the provision of education to all at all levels, it is faced with some challenges. Ironically, the success of the OER movement is also its bane. According to OCED (2007), one of the key challenges of the OER movement has to do with the rapid growth of educational resources and repositories which has made it difficult for users to find the best quality and most relevant resource. Again, OECD contends that resources

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needed by teachers may not be part of a repertoire of libraries in terms of catalogues, databases and online journal subscriptions. Rather, they may be housed in local databases which although have been hosted on the web, may be difficult to find. Even though OECD acknowledges the use of metadata to solve this problem, it acknowledges that metadata has its own problems since the descriptive information about materials may be different from the perspective of the person attaching it.

Additionally, Larson and Murray (2008), submit that the Organization for Economic Co-operation and Development, through its Center for Educational Research and Innovation (CERI), identified the following four critical issues facing the providers and users of OERs:

1. There is a need to clarify Intellectual Property Rights issues linked to OER initiatives.
2. There is a need to improve access and usefulness for users of OER, including issues of quality assurance, adaptability to local contexts, technology requirements and barriers.
3. There is a need to examine the incentives and barriers for universities and faculties and staff to deliver their material to OER initiatives.
4. There is a need to develop sustainable cost/benefit models for OER initiatives. Most current initiatives rely on donor financing and are not sustainable in the long term (p. 9).

2.27 Trends in OERs

Kanwar, Kodhandaraman, and Umar (2010) have observed that one of the emerging issues in educational discourse today is the development and use of Open Educational

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Resources and their potential to expand access and improve the quality of education, particularly in developing countries where there is a shortage of quality materials.

According to the NMC Horizon Report: 2015 Higher Education Edition, OERs constitute one of the six major trends identified by experts to possibly influence technology planning, decision making, policy, leadership and practice in higher education institutions between 2015 and 2019 (Johnson, Adams Becker, Estrada & Freeman, 2015). Similarly, the NMC Horizon Report: 2017 Higher Education Edition also reiterates the usefulness of OERs to widen access to higher education, reduce costs and deal with issues of equity and improved students' performance (Adams Becker, Cummins, Davis, Freeman, Hall Giesinger & Ananthanarayanan, 2017).

Further, the Education 2030 Incheon Declaration embodies the spirit of the Open Educational Resource Movement, that is, education as a public good and education as a human right. Besides, its vision of ensuring "inclusive and equitable quality education and [promoting] lifelong learning opportunities for all" as enshrined in the SGD goal 4 point to the need to use technologies including OERs to achieve its goals (World Bank, 2015, p. 1).

D' Antoni (2009) talking at a round table forum on OERs and Open Content for Higher Education has suggested that OERs fit into the philosophy of UNESCO in that UNESCO was basically established after the second World War to promote peace and culture and UNESCO believes that this could be achieved with well-educated citizens worldwide. The availability and exploitation of these resources provide any interested and motivated user to gain knowledge and information both formally and informally.

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Also trending is the OER University (OERU) which was established to "provide free learning opportunities for learners using courses based solely on OERs with pathways for learners to undertake assessment and obtain credit from accredited higher education institutions" (Murphy, 2013, p. 202). The OERU was initiated based on concerns about the inability of current educational delivery models to provide the requisite support and recognition to students interested in learning by using OERs or MOOCS (Murphy, 2013). Institutions that developed and formally deployed the OERu are known as the OER Tertiary Education Network (OERten) (Murphy, 2013). They include "21 international universities, colleges, polytechnics and publicly funded organizations based in Australia, New Zealand, Canada, the USA, South Africa, India and the South Pacific" (Murphy, 2013, p. 203).

2.28 Massive Online Open Courses (MOOCS)

A concept related to OERs which is also an offshoot of OERs is Massive Online Open Courses (MOOCS) which is also based on the principle of openness of education. It was originally meant to provide an open, free, university level education to any learner who wished to participate, but with time, this has been modified (Yuan & Powell, 2013). Fini (2009) also describes MOOCS as "a special type of OER" (p. 3). Sir John Daniel and Stamenka Uvalic´-Trumbic´ (2013) also see MOOCs as essentially OERs with computerised appraisal questions.

On the other hand, Orr et al. (2015) have stated that MOOCS can hardly be called OERs because of the following reasons:

1. Whereas the term 'open' in MOOCS refers to free access and use, with Open Educational Resources the term 'open' not only gives users the opportunity to

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access materials freely, it also gives them the chance to freely "reuse, revise, remix and redistribute" resources.

2. Whereas MOOCs are designed as full courses that combine content with discussion forums and assessment tools, OERs are defined by their open licenses and not by their form – full courses. However, OERs can also be full courses (p. 19).

Orr et al. (2015) further stated that the differences between MOOCS and OERs notwithstanding, there are some overlaps. They explained that an OER which is a full course can be called a MOOC while a MOOC that 'has an open licence can be termed an OER. Currently, MOOCS are making waves in policy issues especially in relation to tertiary education (Orr et al., 2015, p 20).

2.29 Impact of OERs on Teaching and Learning

A study by Delimont, Turtle, Bennett, Adhikari and Lindshield (2016) on faculty and students' use of open text books using a survey and interviews showed that students ranked the open textbooks as being of good quality and preferred their use in other courses over conventional commercial textbooks. Similarly, almost all the faculty members also affirmed their preference in using the open text books and indicated their support to continue using them even after the funding period elapsed (Delimont et al., 2016).

Hilton III (2016) also analysed 16 articles which examined two issues – the effect of OERs on learning outcomes of students in tertiary institutions who used OERs instead of traditional text books, and college students and faculty perceptions of OERs. In all,

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nine studies focused on the first issue with seven on the latter. The studies were carried out between 2008 and 2015. Hilton III found that when students used OERs, their learning outcomes were similar to the use of textbooks. Moreover, OERs were cost effective. Hilton's results also showed that on the whole, both students and academics were positively disposed towards the use of OERs.

The William and Flora Hewlett Foundation (2013) has reported how 1000s of students of Salt Lake City performed better in tests using open textbooks which cost only $5 compared to the $80 traditional textbooks they would have bought. Another case is the Cognitive Tutor programme at the Carnegie Mellon University which has enabled students taking open learning initiative courses to finish their programmes in half the time and with better learning outcomes than their counterparts taking traditional courses (The William and Flora Hewlett Foundation, 2013). In an exploratory study of faculty use of Open Educational Resources, at post-secondary schools in British Columbia, Jhangiani, Pitt, Hendricks, Key, and Lalonde, (2016) report that averagely, faculty indicated that using OERs in class was beneficial to students and impacted positively on faculty teaching practices.

It appears that OERs have a positive impact on education and their potential to transform education is rated highly. Besides, current trends in education technology show that OERs have a bright future. We can thus conclude on the note that OERs have a great potential to transform higher education in Africa if awareness of their potential is created and when potential barriers are removed while their usefulness is advocated.

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2.30 Technology and Open Educational Resources

Tuomi and Miller (2011) Tuomi (2013) have asserted that every historical era creates an education system that addresses its needs. The current historical era, which is characterised by knowledge societies thus demands new methods of doing things. D'Antoni (2009) advanced three reasons why it is crucial to find effective innovative modes of increasing quality educational opportunities. These are demographics, funding and educational. Under demographics, D'Antoni explained the need for an educational system relevant to the current setting of knowledge societies. D'Antoni noted that in the knowledge society, the citizenry is expected to have high-level skills and be lifelong learners considering the rapidity with which change takes place.

On finances, D'Antoni (2009) opined that the cost of infrastructure to accommodate the increasing number of learners will not be feasible because of time and costs. Thirdly, D'Antoni argued that in the 21st century, it is only proper for people to have access to education. In all these, the use of technology and distance learning are seen as viable options.

While technology is basically the major driver currently propelling change in institutes of higher education, it is also responsible for changes in industrial requirements of human resources. Hanna (1998) observed that learners' increased demand for improved accessible, cost-effective education at their convenience as well as content that could be directly applied to the work settings was drastically changing the environment for tertiary education in the United States of America and worldwide. This observation is still relevant today and summarizes the importance of OERs in both formal and informal learning as well as in continuing professional education, lifelong and recurrent

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education. Hanna (1998) further specified that: “This combination of demand, costs, content application and new technologies is opening the door to emerging competitors and new organizations that will compete directly with traditional universities and with each other for students and learners” (p. 66). This prediction is evidenced by the emergence of Massive Open Online Courses (MOOCS) which is open to any learner who is motivated to learn and where courses are usually free except in some cases where learners want academic credentials.

There also appears to be a lack of the requisite skills and competencies among graduate students, which points to the gap between the current education offered and the job market. This is not surprising since even though technology and knowledge are the main drivers of today’s society Lwoga (2012), the educational system mostly mimics that of the industrial age, that is, educational practices for the past one hundred and fifty years have for the most part not changed. Thus, it is obvious that for the greater part, graduates are not abreast of 21st century skills. Daniel and Uvalic´-Trumbic´ (2013), recommend the use of MOOCS as a technological tool to provide employment related short courses as one way of bridging the gap between higher education and the labour market. The European Commission (2014), reiterates this trend by stating that innovative technologies such as OERs and MOOCs are influencing pedagogy and teaching modes in higher education. They are also helping to break the monopoly of universities in terms of the provision of some of their core services.

Similarly, Kaur et al. (2013) have expressed the unparalleled changes that advancement in technology together with the integration of technology in instruction has had on educational provision. Additionally, Tuomi and Miller (2011) have indicated that the

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transformations within the knowledge society is not only affecting the educational system, but learning as well. All these have necessitated transformations in higher education and the need to provide the workforce with the requisite skills and competencies as well as educating them on a continuous basis to ensure that they function effectively in the present knowledge-based economy and society. Open Educational resources used formally and informally could help in achieving these goals. D'Antoni (2008) accedes that as a result of increasing internet connectivity, the expansion of digitized open content materials as well as the production of inexpensive and improved mobile phones, OERs could stand the test of time.

Technology has also made global networking possible and this has facilitated the development, use and sharing of OERs as well as the creation of communities of practice. According to Diallo, Thuo and Wright (2013), digital devices, Web 2.0 and learning management systems have facilitated the design, production and delivery of educational content to reach a wide variety of learners who can choose to learn synchronously or asynchronously anywhere. Moreover, "growth in the Internet combined with social media are contributing to an increased number of free-tuition courses being offered online" (McGreal, Mackintosh & Taylor, 2013, p. 51). It should be noted that the current increase in internet connectivity, inexpensive computers and enhanced mobile phones, has facilitated the growth of open content in digital formats.

2.31 Benefits of OERs

OERs have several benefits particularly for developing countries because they are freely available and can be adapted to suit different situations. For instance, the Bunda College of Agriculture in Malawi used 75% of OER to produce a Communications

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Skills course book for her students who did not have the requisite textbooks (Ngalande, 2010). The text book was subsequently adopted by a lecturer from Jos University in Nigeria (Kanwar, 2011). Open Educational Resources also provide academic libraries with a variety of academic materials which could reduce the amount paid as licensing fees for journals and databases.

Moreover, OERs can be used in various teaching and learning contexts – traditional education, distance education, blended and purely on line environments. Besides, OER, are considered to be pedagogically neutral, that is, advocates of various learning theories can design OERs to suit their cause or to fit different learning contexts (McGreal, 2013). Additionally, OERs use is applicable to all levels of education. The resources can also be used in formal, informal and non-formal contexts. OERs also help to promote lifelong learning and bridge the gap between formal and informal learning (van der Merwe, 2013).

Open Educational Resources facilitate the global exchange of knowledge instead of knowledge flowing from north to south. For example, OERs developed by the University of Ghana Medical School/College of Allied Health Sciences are being used in the Netherlands. Similarly, OERs produced by the Kwame Nkrumah University of Science and Technology are being used by the World Health Organisation and the University of Michigan (Kanwar, 2011). Similarly, OERs in Nursing from Malawi are being used in African universities (COL & UNESCO 2012). The effect is that institutions are benefiting from the provision of quality OERs online.

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The quality of courses and materials online provide institutional visibility. In some cases, an increase in student enrolment is attributed to OER presence. For example, about 35% of students enrolled on MIT programmes because of their OER on the internet (Sclater, 2009). As well, 7000 students registered for an online course that was on the OpenLearn website. This is proof that OERs provide publicity to market other services of an institution. The huge financial commitments made by various governments international organisations and national organisations (Becker et al., 2018; Bliss & Smith, 2017; Mulder & Jelgerhuis, 2013) show the importance attached to them. Open Educational resources save time and costs since one can adapt or remix existing OERs and avoid duplication.

Open Educational Resources improve pedagogy, encourage critical thinking and impact positively on teaching. The resources also enable faculty to access teaching resources and methodologies of other faculty members in their disciplines. Besides, OERs expose faculty to current types of syllabus structure and pedagogy; and when faculty makes its content available online, it is enriched through feedback it receives from experts worldwide (Kursun, Cagiltay & Can, 2014).

As OERs increase, developers of curricula and learning resource including distance education modules, get a greater opportunity to adapt materials out of a wide range of resources to suit local contexts and cultural needs. Open Educational Resources also help build communities of practice which can subsequently facilitate faculty collaborating with colleagues in other institutions to publish, write grant proposals and disseminate information.

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Students also tend to benefit because it makes it easier for them to see demonstrations particularly in situations where large classes prevent some students from seeing what the lecturer is showing to them. Students can even watch these simulated demonstrations before attending classes so that they can participate fully in class discussions. While teachers can download a variety of OERs to enrich teaching and learning, students can download materials, read and watch them at their own convenience and pace (Donkor & Tagoe, 2010). Teachers can also collaborate with others to create courses and also "join communities of practice which will help them improve their teaching practices as they reflect on the community use of new open tools and technologies' (UNESCO Institute for Information Technologies in Education 2010, p.3).

At the governmental level, OERs can be customized to mirror or suit local contexts and priorities. Also, where commercial publishers are unwilling to produce educational materials in minority languages, governments or state organizations could develop OER in such languages. There could also be international agreements among countries to pool common resources to meet common needs (UNESCO Institute for Information Technologies in Education 2010, p. 3). In a survey of governments of the 195 commonwealth states regarding information on OER policies, out of which 82 countries sent their responses, respondents from Africa (24) indicated the benefits of OERs to include the ability to modify content to suit local needs, the importance of networking and sharing that enabled "institutions and users to share their expertise, avoid duplication in their efforts and contribute to reducing the digital divide" (Hoosen, 2012, p.19). Moreover, whereas 67% of respondents indicated that OERs provided open and flexible learning, 63% found OERs had the potential to innovate. Again, 58% of

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participants were of the view that OERs increased their efficiency and quality of learning and were also cost-effective (Hoosen, 2012).

Finally, in an effort to transform India into a knowledge economy, the government established the National Knowledge Commission (D' Antoni, 2009). The potential of OERs as expressed in the commission's second report in 2007 is as follows:

> Our success in the knowledge economy hinges to a large extent on upgrading the quality of, and enhancing the access to, education. One of the most effective ways of achieving this would be to stimulate the development and dissemination of quality Open Access (OA) materials and Open Educational Resources (OER) through broadband Internet connectivity (National Knowledge Commission, 2007, as cited in D'Antoni, 2009 p. 22).

In sum, OERs have the potential to transform the institutions of learning, the practices of teaching, and the processes of learning and knowledge creation (Tuomi 2006).

2.32 Studies on Faculty Awareness of Open Educational Resources

Awareness of an innovation is the first step one requires to make a decision on whether to accept or reject it. According to D'Antoni (2009), OERs in whatever form will not be fully utilized if there is lack of or inadequate awareness. According to Allen and Seaman (2014), OER awareness and adoption had not yet penetrated mainstream higher education. The fact that faculty adoption and use of OERs was low, particularly in Africa (Mtebe and Raisamo 2014b; Percy and Van Belle, 2012), could be attributed to lack of awareness of the innovation, especially, since the 2012 Paris Declaration on OER advocated the need for an OER awareness drive. Prior to that, the 2007 Cape Town Declaration document on Open Education, had indicated that the majority of educators were not aware of the increasing variety of OERs available. Earlier, at a round table internet forum in 2005, participants from both developed and developing countries

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unanimously agreed on the importance of OERs in Higher Education worldwide and the need to promote it (D' Antoni 2009).

In a 2013 survey of faculty use of OERs by Chae and Jenkins (2015) it emerged that 82% of respondents had heard about OERs, of this number 90% of them seemed to understand its basic concept and could recognize the core ideas used in defining OERs. De Hart et al (2015) reported a similar situation on OERs by Distance Education staff at UNISA. It emerged from the study that most respondents did not only know about OERs, they also knew about the key elements of OERs. However, findings from a survey by Harishankar, Balaji and Ganapuram (2013) suggested that the main reason why most teachers were not using OERs was due to lack of awareness of OERs.

In another scenario, respondents had a general knowledge about OERs but not the specific term. For example, a survey of faculty across disciplines in some 30 institutions of higher education world-wide revealed that initially, 26% of respondents stated they had "no idea" of what OERs were, 19% acknowledged that they had a "little idea" of what OERs were, 30% said they had "some knowledge" of OERs but 25% indicated that they had a "good knowledge" of OERs. Nevertheless, as participants answered the questionnaire, some of them realized that they had some knowledge of OERs (Humbert, Rebillard & Rennard, 2008). These results concur with findings of a qualitative study of socio-technical issues influencing the adoption of TESSA OERs in Kenya, Uganda and South Africa (Ngimwa & Wilson, 2014). Participants were drawn from both persons who had experiences with TESSA OERs (10) and those who had not (nine). The study showed that participants who did not have any experiences with TESSA OERs comprising two academics and seven librarians generally were not aware of

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OERs. Indeed, they reported never hearing about OERs even though they were all engaged in one OER activity or the other. Also, Rolfe (2012) indicated that only 18% of faculty members claimed that they had heard about the term OERs even though the majority of them understood what term meant.

Additionally, Guo, Zhang, Bonk and Li (2015) examining the use of OERs and barriers to OER development and use among faculty members of Zhejiang University, China, reported that out of the 360 participants, the majority revealed that they were able to make out online educational materials. However, 40% had never heard of MOOCS providers such as Coursera, edX and Udacity. Moreover, (37.46%) of them were unaware of popular OERs such as MIT courseware and Connexions while over one third of them (35.21%) did not know about open softwares. These findings are similar to findings from Allen and Seaman (2014) who studied OER usage among faculty in the US. The findings from that survey signified that the majority of faculty (between two thirds and three quarters) were not aware of OERs.

Meanwhile, in a survey involving academic staff and curriculum developers among others, 48% of participants reported being aware of OER with 51% of them ranking their knowledge as intermediate, yet most of them reported having seldom or never used OERs (Bossu, Brown & Bull, 2011). Bossu et al. established that there was a clear indication that knowledge had impacted very little on usage. Further, in a 2012 faculty and administrator Open Educational Resource survey of Open Textbooks, participants who stated that they had never heard about open textbooks were only 27% compared to a 2009 survey where as many as 52% of respondents did not know about Open Textbooks. However, the high awareness rate did not match usage as only 6% of

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participants reported having used aspects or the whole of an Open Textbook (Donaldson et al., 2012). Again, faculty and staff of Athabasca University revealed that a large number (86%) of participants were very familiar or somewhat familiar with OERs. Even though the level of creation and usage was below 50%, it was seen as promising (McKerlich, Ives & McGreal 2013). A related trend has been recorded in Africa where Mtebe and Raisamo (2014b) reported that even though over two thirds of faculty (73%) were aware of OERs the majority of them seldom or never used OERs to enhance instruction. However, in an exploratory study involving distance education teachers in India conducted by Venkaiah and Ambedkar (2012), it was reported that a high level of awareness led to a high level of use. Nevertheless, Venkaiah and Ambedkar felt the level of usage was low compared to other countries.

2.33 Licenses

As reported earlier, the only distinguishing feature between OERs and other resources is the license attached to it which makes it possible for materials to be reused and adapted without obtaining permission from a copyright holder (Butcher, 2015). Open licenses include, creative commons licensing, GNU Free Documentation and public domain (de Hart et al., 2015). Wiley (2006) explained in his blog that the licensing regimes covering OERs, gives everyone the freedom to use materials free of charge and the permission to engage in the "5R" activities when using OERs:

- Retain - the right to make, own, and control copies of the content (e.g., download, duplicate, store, and manage)
- Reuse - the right to use the content in a wide range of ways (e.g., in a class, in a study group, on a website, in a video)

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- Revise - the right to adapt, adjust, modify, or alter the content itself (e.g., translate the content into another language)
- Remix - the right to combine the original or revised content with other material to create something new (e.g., incorporate the content into a mashup)
- Redistribute - the right to share copies of the original content, your revisions, or your remixes with others (e.g., give a copy of the content to a friend)

It is apparent from the literature that most respondents were not familiar with open licenses. For example, Li, Yuen and Wong (2014) admitted that 32 full-time undergraduate students they surveyed in relation to their readiness to use OERs hardly knew about the licenses. Also, according to Mtebe and Raisamo (2014b) only 17% of faculty had heard about open licenses. Additionally, Guo et al. (2015) hinted that over half of survey respondents stated that they had not heard about OER licenses. Guo et al. further affirmed that while 42.54% of users had used open software, only 20.9% used creative commons.

Parallel to this is the study by Allen and Seaman (2014) which showed that licensing terms such as creative commons that authorize free use or re-purposing by others were seldom mentioned. The indication is that respondents preferred licenses which were less restrictive and easier to interpret. It is however essential for faculty to be aware of the various licensing regimes since they help in determining the appropriate license to use when implementing OERs, or when converting materials into OERs or when reusing, remixing or repurposing OERs.

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The literature on awareness creation is quite mixed since in some instances awareness of OERs did not automatically translate into use. It is also possible that many faculty members may know about some characteristics of OERs, yet are unable to relate it to the concept of OER. It is also obvious that awareness creation is needed to get potential users of OERs to access the 1000s of OERs that lie underutilized in repositories. To this end, one cannot help but agree with the following statement in respect of OER repositories: "Build it and they will not come unless you design a system to promote and encourage access" (Larson & Murray, 2008, p.12).

2.34 Faculty Professional Development in Relation to OERs

Training in an innovative technology is a necessity if members of a community are to adopt and use the technology effectively. The digital age however presents its own challenges to faculty members who are not adept at the use of computers, the internet and operating in learner-centred environments. Ngalande, (2010) notes that:

> University education today focuses on 'providing stimulating learning environments' rather than relying solely on didactic teaching. These learning environments are student centered and offer access to increased resource based learning. Consequently students are responsible for own learning within contextualized, scenario-based, and problem-centered methods of teaching and learning. Additionally, today's students are digital 'natives' and are more aware and have high expectations from their institution of learning. For faculty, this creates a challenge if faculty lacks computer skills and knowledge in Information Technology (IT) and or resources (P.3).

In the case of OERs, training will have to cover not only knowledge about the use of computers and the internet, but also OER pedagogies and associated issues such as copyright, licensing, legal and quality assurance issues as well as technical skills to enable faculty to take decisions on OER development and usage. It is important that

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the training programmes take into consideration the different levels of individual knowledge and needs. That way both the advanced learner and the laggard will benefit. Apart from that, faculty is faced with imminent change as tertiary institutions integrate e-learning modes of teaching and learning into face-to face modes and also from a print based distance education programme to the incorporation of technology (hybrid) form in its courses. These changes are further accentuated by the need to use OER. All these changes demand new learning environments that faculty may not be familiar with. Some may be forced to unlearn, learn and relearn their approaches to teaching and learning as the new paradigm shift is learner-centred and constructivist in approach. Learning in this new environment is also situated. Additionally, academics will have to learn to work collaboratively to create and share teaching and learning materials. All these require some level of professional development.

Vaughan (2002), has noted that quite a number of agencies including the Office of Technological Assessment (1995) and the U. S. Department of Education (1994) have recognized that the professional development of teachers and the use of technology are two critical requirements for school reforms that would provide 21st century students with the best educational opportunities. However, Vaughan is also of the view that schools have not benefited much from the professional development of the teacher. This can be attributed to the fact that in the past teachers were not involved in the identification of their needs and concerns pertaining to their professional development, instead the skills and knowledge teachers needed to learn were determined by policy makers (Vaughan, 2002). If we have to go by the contention of Guskey (1986) that professional development aims at bringing about changes in teachers' classroom practices, beliefs and attitudes in order to bring about changes in students' learning

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outcomes, then teachers should be involved in the identification of their needs and how those needs should be addressed (Vaughan, 2002), since failure to do so could make them less involved in the improvement of their schools.

One cannot help but agree with the view by (Hagenson & Castle, as cited in Sahin & Thompson, 2006), that "if higher education wants to survive in the expansion of technology, then it must be prepared and prepare faculty to implement the new technologies within their classrooms" (p. 81).

2.35 Challenges Affecting Developers of OER

At a six week internet discussion forum held from 24th October to 5th December, 2005, participants outlined some of the problems they face in the development and sharing of OERs. These included the following:

- finding suitable technologies to convey OER in a feasible, useable, effective and economically viable way;
- devising a compatible infrastructure so that there is ready transferability between the provider and the user;
- collaborating to develop models and new approaches that are educationally relevant and in appropriate contexts for the user;
- fashioning OER that can be scaled up or down to adequately meet education requirements.
- available in an open marketplace (Albright, 2005, p.11).

The participants therefore suggested the need for OERs to be available and relevant to developing countries if it is to reach its full potential. In that regard, they advocated a

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global balance between production and use of OER, deploring the current situation where developed countries produce OERs while developing countries merely consume them. They felt that the localization of content would make content relevant and marketable in developing countries and hinted at the need for collaboration (Albright 2005).

Also, in relation to challenges associated with the development of OERs, Guo, et al., (2015) revealed that, lack of time was the biggest barrier to faculty's ability to develop OERs. This was followed by lack of knowledge about OER creation and lack of incentives to create OERs. Meanwhile, some key challenges associated with the development or use of OERs identified by OECD (2007) include technical barriers, economic barriers, social barriers, policy oriented barriers and legal barriers.

Economic barriers, on the other hand, comprised shortage of funds to invest in the requisite hard and software for the development and sharing of OERs as well as the cost of producing OERs and sustaining OER projects. (OECD, 2007). In developing countries, the most significant barriers identified are technical and economic barriers (OECD, 2007). However, Larson and Murray (2008) contend that the barriers associated with faculty development of OERs in developing countries are no different from that of advanced countries. Examples include the lack of time, incentives, technical and funds. In addition is the lack of knowledge about copyright issues and lack of institutional support.

Another factor Ngimwa and Wilson (2012) identified was faculty members' views about protecting the copyright of their materials which could result in their materials

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being outmoded because materials become out dated as the years roll by. One reason academics wanted to protect the copyright on their material is because they make a lot of money from them. Additionally, some did not want to expose their work to national and international scrutiny for fear that their works will not pass/survive the test. Even at MIT, some faculty were reluctant to release their teaching material to the public for fear that they were not of superior quality beside the lack of time to create and marketability (Carson, 2006). Added to this is academics' fear of losing control of their materials (Kursun et al., 2014).

Joyce (2009) shared highlights of discussions on initial findings of an OECD –CERI study on OER initiatives in tertiary education. Joyce was of the view that the issues discussed hinge on barriers to OER production. Joyce divided the barriers to the production of OERs into individual, institutional, legal and licensing, access and policy. Under individual obstacles Joyce noted the following which keep recurring in the literature:

- lack of time and skills;
- a rigid pedagogical culture with little innovation
- lack of a reward system for OER production. (p. 152)

Joyce (2009) linked the lack of incentives for OER production to university culture/tradition where premium is placed on research publications in reputable international journals rather than on teaching and learning materials published openly on the internet. Joyce also highlighted the issue of lack of knowledge and training on technical aspect of producing digital course materials as well as licensing and copyright issues. Additionally, Joyce noted the lack of institutional policy to guide OER creation

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as well as faculty fear of losing control of their material in relation to resources being taken out of context, misunderstood or poached.

Reporting on OER TESSA projects in higher educational institutions in Kenya, South Africa and Uganda, Ngimwa and Wilson (2012), revealed that socio-economic, cultural, institutional and national issues rather than low technological levels hinder their uptake. This suggests that production of OERs be tailored to meet the level of technological advancement of Africa since the current model, does not appear to work for Africa.

Ngimwa and Wilson (2012) have also suggested that faculty was reluctant to openly share their resources because it neither attracted any financial reward, salary increase and grants, nor did it count towards their promotion unlike publications in scholarly journals, which attracted such incentives. They advocated the adoption of institutional policies that would place premium on content creation and sharing. Similar findings have also been expressed by other researchers such as Albright 2005; Hodgkinson-Williams, 2010; OECD, 2007). Also, Cox (2014) investigated faculty resistance to contributing to OERs by interviewing three academics at the University of Cape Town. Cox found that institutional policies on promotion tend to favour research activities.

2.36 Factors that promote faculty use of OERs

Harishankar et al. (2013) survey of individual and institutional engagement with OERs in India reported that the reason why teachers used OERs was due to the concrete benefits students derived from their use and not because it made teaching easier. It emerged that the desire to use digital resources was more towards helping students

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rather than catching the eye of their peers and enhancing their careers. De Hart et al (2015) on the other hand, stated that respondents in their study engaged with OERs because its use improved the quality of their teaching.

In a study by Harley (2007), faculty mentioned improved students' learning, incorporating primary source resources into teaching and the unavailability of alternative teaching methods to faculty as some of the reasons why faculty incorporated digital resources into their teaching. However, using digital resource to gain promotion did not feature prominently. On the other hand, those who were not using the resources maintained that it was not relevant to their teaching approaches and also, they did not have adequate time.

In an exploratory study of faculty use of Open Educational Resources, at post-secondary schools in British Columbia, Jhangiani et al. (2016) identified the following as the three major reasons why faculty used OER – to get ideas and inspiration, to supplement existing coursework and to prepare lessons. Guo et al., (2015) conducted a survey to examine the use of OERs and barriers to OER development and use among faculty members of Zhejiang University, China. The researchers reported that faculty members seldom used university-based OER projects.

In another instance, Lesko (2013) stated the following reasons why faculty was using OERs to teach. In Lesko's survey, 69% of academics indicated that OERs served as additional resources to students, 56% stated that the resources improved their knowledge of their subject area. Masterman and Wild (2011) in an OER impact study involving faculty and students using qualitative methods found that most faculty

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teaching science made use of rich multimedia because producing them was difficult and time consuming.

2.37 Academic leadership

Plotkin (2010) has identified active support and the involvement of leadership at tertiary institutions as the most crucial factor needed to unleash the transformative power of OERs to widen access to students and institutions; and to allow OERs to operate mainstream instead of operating at the fringes where their impact is not felt much. Plotkin (2010) argued that despite the potentials of OERs to provide access to quality cost effective resources, and the fact that their usefulness has been acknowledged by innovative scholars and officials in local and national government, only a few leaders in academia are aware of the resources and taking advantage of their usefulness.

To overcome this, Plotkin (2010) entreats institutional governance officials to gather the willpower to formulate a policy that would institutionalize support for OER activities. The 2007 Cape Town Declaration on Open Education document endorses this by stating that many institutions either do not know about OERs or doubt its usefulness.

Allen and Seaman (2014) have conceded that in their previous research involving chief academic officers, the results indicated that, to a large extent, faculty and administrative officers played a primary role in decisions to adopt OERs. They also acceded that in their previous survey involving academic leaders, they deduced that the leaders had hazy ideas about OERs, with half of them affirming that OERs were used in courses at

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their institution. In the same report, the majority of faculty (83%) affirmed that they used digital resources such as simulations and videos. Allen and Seaman (2014, p.19) concluded that one cannot rely on academic leaders for the level of OER use in courses at their institutions due to the decentralized nature of the decision to use OERs as well as their flawed understanding of what constitutes OERs.

On the issue of policies on OER, it may appear that institutional leaders are not so keen on supporting OERs, but they do so because they also face challenges. According to Murphy (2013), there are costs, social and cultural elements to OERs which may call for changes to be made in the policies and strategies of higher education institutions. Secondly, it is possible that the philosophy of OERs is incompatible with current cultures and priorities (Murphy, 2013). This may be the reason for institutional policies that do not provide adequate support for the production and use of OERs.

2.38 Types of OERS Used

Faculty will prefer some types of OERs over others to achieve teaching, learning or research goals. It is therefore important to identify the types of OERs faculty are incorporating into teaching and learning. The types of OERs included, full courses, lessons, images, videos, audio, power point presentations, slide shows, course modules, and textbooks. According to OECD (2007), most respondents prefer to use smaller components of OERs instead of using bigger ones when teaching. For example, OECD report that in s survey, nearly eight out of ten respondents indicated their use of learning objects instead of full courses. Hilton and Wiley (2011) confirm this by asserting that institutions such as Rice University prefer to provide smaller chunks of OERs like flash video files and lesson plans instead of full courses. A survey by Jhangiani et al. (2016)

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showed that the majority of respondents (63%) frequently used videos, followed by images, (47%) and use of open text books (35%). This finding supports that of Harley (2007) who found that faculty used images and visual materials the most in their classrooms. This goes to support the view that multimedia content which are a combination of animations, audio, graphics and text can be used by instructors to better demonstrate and explain difficult concepts that cannot be easily described by using only text (Mtebe, Mbiwilo & Kisakka, 2016; Thomas & Israel, 2013). In our environment where there is a paucity of up to date learning materials and where some institutions cannot boast of well-equipped laboratories, these come in handy since faculty could simulate real life situations for students to understand what is being taught better.

However, Percy and Van Belle (2012) found that most academics in Africa used lecture notes and power point presentations the most. McKerlich, Ives and McGreal (2013) findings showed that the use of scholarly journals were ranked high by 72% faculty and staff of Athabasca University. This was followed by videos and images (68% and 65%) respectively. Audio were the least cited (62%). Lesko (2013) also listed image and video lectures as what faculty found useful in instruction. Carson (2006) found most educators 66.6% and 23.2% used lecture notes and lecture videos respectively, while the Boston Consulting Group (BCG) (2013), identified the top three popular resources used by (K-12) educators were lesson plans (64%), slides and presentations (59%) and video lectures (54%). In the case of Chae and Jenkins (2015), they found that most faculty preferred videos, reading materials, open text books images and course activities with only a few opting for full courses. On the other hand, Li and Hu (2013) in their study of 1239 Chinese students from the Zhejiang University experience of OERs and their perceptions about innovation attributes found that 60.2% used videos, 45% text,

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20%, syllabus while 17.5% listed BBS as the type of OERs used. It is obvious that in most of these studies, faculty preferred smaller resources to full courses.

2.39 Why Faculty Does Not Use OERs.

It is important to find out why faculty does not use OERs to enable leaders of higher education institutions to identify such factors that inhibit faculty use of OERs and provide the needed solutions for faculty uptake of technology.

Harley (2007) has submitted that faculty use of OERs is to a large extent influenced by their teaching styles and philosophies. In the study, Harley discovered that there were diverse non users of OERs some of whom had taken that stance for a variety of legitimate pedagogical reasons. Additionally, some enthusiasts were put off by technical and non-technical barriers while another group simply did not have time to even think about OERs let alone use them in class. The main reason for non-use of OERs was that most academics felt that there was a mismatch between the ways they preferred to teach vis-a-vis the use of OERs. Harley identified other major reasons for non-use of OERs by faculty as finding, managing, maintaining and reusing them in new contexts. Similarly, Chae and Jenkins (2015) found most faculty did not use OERs because they were irrelevant, the quality was either similar to other materials they used or did not align to the scope of the course. Other reasons included the difficulty of searching for OERs as well as the lack of time to experiment with OERs.

2.40 Challenges and Barriers of the Use of Open Educational Resources

The perceived benefits of OERs have been extensively recorded in the literature by researchers such as Wright & Reju, 2012, Hylén, (2006) Hoosen (2012). At the same

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time, it has been established that OERs are seldom used by academics particularly in developing countries (Hoosen, 2012; Percy & Van Belle, 2012). Further, according to Mtebe and Raisamo (2014a), Hatakka (2009) and Hodgkinson-Williams (2010) very few empirical studies on the barriers to the use of OERs has led to most researchers assuming that sub-Saharan African countries face similar challenges. It is therefore important to find out why faculty is not using OERs in order to map out strategies that would increase their use among academics (Mtebe & Raisamo 2014a)

Mtebe and Raisamo (2014a) reported the lack of access to computers and the internet (68%), low internet bandwidth (73%), lack of relevant policies (60%), and lack of skills to create and/or use (63%) as the main barriers to the use of OERs in higher educational institutions in Tanzania. On the other hand, lack of interest in creating and/or using OER (39%), and lack of time to find suitable materials were rated low as barriers.

Also, in a study of the accessibility of Open Educational Resources for distance learners at the Open University of Tanzania by Samzugi and Mwinyimbegu (2013), it emerged that the majority of OER users (74%) indicated that low levels of internet connectivity was the main barrier to OER access. Other issues were inadequate computers (38.1%) and power interruptions, poor internet search skills and irrelevant information.

Lesko (2013) also identified the following challenges on the use of OERs by academics of public higher education institutions in South Africa. These include lack of knowledge as regards copyright issues and OER use. Others were policy issues on ownership and use of OERs, challenges associated with infrastructure as well as lack of awareness about the existence of OERs.

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For many, faculty time and effort needed to locate and evaluate OERs are key barriers to increasing adoption of OERs (Ngimwa and Wilson, 2012). Chae and Jenkins (2015) in their qualitative research of faculty use of OERs in the Washington Community and Technical College System, came out with the following six key findings:

- lack of time
- institutional skepticism
- lack of technology and skills with technology,
- copyright and licensing
- feelings of uncertainty regarding the quality of the materials and its perception by others difficulty in reviewing the materials
- differences in course specifications such as scope and level of the course (p. 5).

From the perspective of Hoosen (2012), copyright and publishers were the biggest hindrance to OER adoption worldwide.

Hatakka 2009 found that irrelevant content was highly rated by content developers as challenges in a qualitative study he conducted. Most content developers indicated that they could not find relevant material to suit the level of their students, hence, found the materials to be too difficult for students. For example, one content developer stated that materials he got from the MIT platform was “too advanced.” Additionally, some felt that content for example, of a lecture material found on the internet did not fit the entire scope of a course and would need additional resources to make a lecture on a particular topic complete. As a result, they preferred smaller chunks of information, which can be used with minimal modification, to full courses. Another drawback noted was the

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suitability of context in relation to cultural relevance such as teaching a topic with all examples cited from western countries (Hatakka, 2009).

On the issue of access, respondents expressed their difficulty in finding appropriate material on the internet for their courses. This they attributed to weak IT literacy and the enormous amount of online resources to choose from as well unavailability of material suited to their courses. Here issues raised were in connection with lack of computers, internet access, basic infrastructure, bandwidth and unreliable infrastructure (Hatakka, 2009).

Challenges associated with quality identified by Hatakka (2009) were poor information quality, accessing quality information, information that has not been updated and trust. Besides, OERs are context specific, that is, what may be found as good content in one context might not be good in another context. Hatakka explained that issues pertaining to quality could be solved through reviews by faculty, and peers among others. Findings by Hatakka (2009) also included knowledge of intellectual property such as copyright protection and the fact that some respondents were hesitant to use internet resources for fear of infringing on copyright issues.

At the 2005 internet forum, Albright (2005) reported that participants also identified some obstacles that needed to be tackled to enable lower-income countries to fully contribute to the creation and use of open educational resources. Some of the barriers Albright identified included technical, funding, inadequate resources, lack of training as well as linguistic and cultural differences. Albright (2005) also mentioned that the languages and teaching methodologies used in the creation of OERs were steeped in

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the "culture and educational norms of their developers" (p.12). This situation according to Albright could lead to "dysfunctional education as well as "reduced potential for developing countries to contribute [to] research, training, experience and understanding" (p.12).

According to Larson and Murray (2008), technical resources in the form of inadequate infrastructure and difficulty in accessing technology were a main drawback to access to OERs. The Texas Higher Education Coordinating Board (2014) saw faculty's difficulty in finding quality Open Education Resources as a challenge. The board contended that giving incentives to OER creators should go hand in hand with providing quality OERs in order to promote wide use of the resources. Additionally, the Texas Higher Education Coordinating Board, (2014) explained that besides content knowledge, faculty needed to be familiar with "digital accessibility design, as well as have a technical understanding of metadata, tagging, learning management systems, [and] rudimentary coding" (p. 21).

Issues pertaining to poor cataloguing and indexing have been raised by Perkins (2011) as a source of difficulty users of OERs face when searching for resources. Besides, the issue of indexing has been highlighted by (Joyce, 2009; Mastermind & Wild (2011). Closely related to this point is the lack of standards identified by the William and Flora Hewlett Foundation (2013).This, the institution explained, is a result of unavailability of a common system of identifying OERs which made it difficult for teachers to find OERs. The William and Flora Hewlett Foundation also found the lack of a clearing house to vet OERs as a barrier.

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The inability of OERs to transform education could be blamed on the lack of institutional policies. In a research by Mtebe and Raisamo (2014a) to determine the factors that deter faculty adoption and use of OERs, most faculty members (60%) cited the lack of policy as a factor. When it comes to policy formulation, it appears it is not only a problem in developing countries. Bull et al. (2011) for example, stated that Australia, unlike the United Kingdom, the United States of America and some European countries, had neither a national nor institutional policy apart from the University of Queensland. Bull et al. further indicated that in as much as many universities were reluctant to part with their teaching materials, they were also struggling to come to terms with issues pertaining to copyright and intellectual property. In addition, they conceded that the absence of incentives from government to educational institutions would delay the adoption process. In this regard, Bossu (2013) suggested that it would take a long time for Australia to benefit from the full potential of OER adoption and use. Jhangiani et al. (2016) reported that lack of institutional support was more of a major barrier to OER use by colleges than teaching intensive and research intensive universities in their quantitative research. However, open-ended questions in the survey showed that it was a significant barrier to all the tertiary institutions.

2.41 Institutional Support

Institutional support plays a major role for faculty development and use of OERs. Sapire and Reed (2011) contend that institutional support at both senior management and departmental levels can speed up the adoption of OERs. This view was supported by OECD (2007) which advocated the training and encouragement of faculty to use OERs and provide incentives for faculty members involved in an OER project. Also,

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looking at OERs from an Asian perspective, Dhanarajan and Abeywardena (2013) acknowledged the role OERs play in providing quality and equitable education. Dhanarajan and Abeywardena however asserted that the realization of the full potential of OERs would only be possible when higher education institutions increase their knowledge of OERs, acquire skills for the effective utilization of OERs and provide policies that would support the establishment of OERs in tertiary education settings. They advocated suitable recognition and reward for faculty who produced and used OERs.

Government ICT initiatives at the university level in Indonesia has led to the development of networked electronic libraries as well as a network of most of its universities. Their collaborative efforts have greatly improved e-learning and the "development, dissemination and sharing of [Open] educational resources" (Daryono and Tian Belawati, 2013, p. 77).

However, most of the institutions had not included OER practices and initiatives in their strategic plans and that could account for low adoption rates at such institutions (Bossu, Bull & Brown & 2012). In contrast, in a survey of OER in India, it emerged that even though government had "policies on knowledge sharing and collaborative practices," "individual interest" rather than "institutional support and encouragement" motivated respondents' OER initiatives (Harishankar 2013, p. 71).

In an exploratory study of faculty use of Open Educational Resources, at post-secondary schools in British Columbia, Jhangiani et al. (2016) reported that the majority of faculty (two thirds) were not aware of "any relevant institutional policy in

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relation to OERs. Again, OECD (2015) stated that OER as a catalyst for innovation, highlights some key policy interventions which could be used to support the enhancement of OERs in teaching and learning. These interventions include establishing repositories, encouraging research on OER production and use by teachers and learners as well as supporting the supply of open license materials.

Policy will provide guidance in the development, adoption and use of OERs. It will also bring to the fore the value of OERs in relation to contributing to knowledge, enhancing access to teaching and learning resources and encouraging creativity in instructional strategies and methodologies. Still on the issue of policy, Butcher (2015) has outlined the following policy guidelines which he believes will help institutions to implement an effective and sustainable OER uptake in their institutions.

1. Provision in policy of clarity on IPR and copyright on works created during the course of employment (or study) and how these may be shared with and used by others.
2. Human resource policy guidelines regarding whether or not the creation of certain kinds of work (e.g. learning resources) constitutes part of the job description for staff and what the implications are for development, performance management, remuneration, and promotion purposes.
3. ICT policy guidelines regarding access to and use of appropriate software, hardware, the Internet and technical support, as well as provision for version control and back-up of any storage systems for an institution's educational resources.

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4. Materials development and quality assurance policy guidelines to ensure appropriate selection, development, quality assurance, and copyright clearance of works that may be shared (pp. 16 &17).

2.42 Mode of Teaching

Zhang and Li (2017) have asserted that OERs are essentially web based-materials. Therefore, prospective adopters experiences with online teaching and learning is crucial to their adoption of the innovation. Allen and Seaman (2014) support this statement by arguing that faculty members who are engaged in online learning are more aware of OERs than their counterparts who teach face to face. This they attributed to the recent development of online learning courses as well as immense growth in options of technology use. A similar report was recorded by Li and Hu (2013). It is thus important to find out whether a similar situation applies to faculty of the higher education institutions under investigation.

2.43 Computer Competencies

Prior knowledge in the use of computers could enhance faculty use of OERs. According to Samzugi and Mwinyimbegu (2013), familiarity with computers and information literacy play a major role in enhancing access to and effective use of OERs. In their study, all respondents (100%) knew how to use computers. Samzugi and Mwinyimbegu (2013), also submit that there is the need for faculty members to have adequate skills in the use of the internet if they wish to use information effectively in the current digital age. Fortunately, in their study the majority of respondents had enough skills in computer usage. For example, while 16.7% of them indicated that their expertise in the use of the internet was very good, over 50%, that is, 57.3 % revealed that they were

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good at using the internet. Only 5.3% affirmed that their internet skills were poor. Masterman and Wild, (2011) in their survey of sixteen persons mostly academics' IT competencies found that all the respondents were competent in basic IT tools such as word processing, spread sheets and search engines. On the issue of search engines, Abeywardena, Dhanarajan and Chan (2012) explained that even though most people used generic search engines such as Google, Yahoo and Bing to search for and locate OERs, it was usually ineffective. They suggested other alternatives such as Social Semantic search, DiscoverEd and OCW Finder. On the other hand, it has been observed that being technologically savvy does not automatically translate into knowledge and use of OERs (Li and Wong 2014; Kelly, 2014). This could be due to a lack of awareness of OERs and their benefits.

2.44 Gaps Identified in the Literature

After reviewing the literature, the following gaps were identified. There was scanty research on OER particularly in Ghana. Previous studies in OER use based on the UTAUT model did not extend the constructs to include compatibility and trialability. Also, essentially, the methodology used was quantitative biased. This study tries to fill these gaps by extending the UTAUT model to include Compatibility and trialability. It also uses the sequential mixed method. Many of the studies tested the variables at 0.01 test of significance.

2.45 Summary

This chapter has reviewed literature related to the theoretical framework, pertinent issues related to the study and objectives of the study. It has traced the history of open educational resources and noted that we are in a new era, that is, the 21st century that

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demands new ways of doing things to meet the demands of the knowledge society and knowledge economy. The current trend of paucity of relevant current educational materials, coupled with the use of outdated teaching materials, limited access to and high cost of education, particularly in developing countries demands new approaches of educating the citizenry. The 1948 Universal Declaration of the right to education right up to the current Sustainable Development Goals on Education also need to be met. Higher education institutions have a role to play in the realization of this dream since one of their roles is to develop the human resource of society. Technological tools including Open Educational Resources could help address these needs when barriers to their creation and use are identified and resolved.

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CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the philosophical underpinnings, the population as well as the methodology used in the study. It covers areas such as the research paradigm, population, research design, sampling design, procedures for data collection and analysis as well as ethical considerations. The study adopted a mixed method research design using cross-sectional survey research for phase one where the factors which influence faculty adoption and use of Open Educational Resources were examined. In phase two interviews were conducted.

3.2 Research Paradigm

Guba and Lincoln (1994) defined a paradigm as a basic set of beliefs or world view that guides researchers in their investigations in their choice of ontology, epistemology and methodology. Similarly, Saunders, Lewis and Thornhill, (2007) identified a paradigm as the basic belief system or world view that guides the investigation, not only in choices of method but in ontologically and epistemologically fundamental ways. Researchers' research philosophies comprise key assumptions about their worldview. The assumptions of the world view also influence the strategies and methods chosen for this research. The three key elements in research philosophy are epistemology, ontology and axiology. Epistemology refers to the knowledge or evidence of social phenomena while ontology has to do with the nature of reality. So with regard to OERs, the nature of reality would relate to respondents/participants/informants perceptions of OERs in relation to specific research questions. On the other hand, paradigms can be

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regarded as the philosophical basis of the question being asked and the nature of the enquiry needed in order to address the question that has been identified (Ellis, 2010).

The mixed methods design is positioned in the middle of two extreme worldviews, the positivists who believe in one truth or universal truths as opposed to the constructivists or interpretivists who believe in multiple or relative truths (Johnson, Onwuegbuzie and Turner 2007). This implies that they embrace both quantitative and qualitative designs respectively. The pragmatists believe that both the quantitative and qualitative methods can be used in a single study regardless of the situation or environment (Hanson, Plano Clark, Petska, Creswell & Creswell, 2005). Besides, the pragmatists contend that ultimately, the research question is the most important determinant of what philosophical approach to adopt. (Saunders, Lewis & Thornhill, 2007; Mackenzie & Knipe, 2006; Tashakkori & Teddlie 2003) since one approach may answer a question better than the other (Tashakkori and Teddlie 2003). Pragmatists also endorse both subjective and objective knowledge Hanson et al., (2005) as well as what works best and what is seen as most appropriate (Hanson et al., 2005; Saunders et al., 2007). Indeed, pragmatism is seen as the basis of mixed method research (Teddlie & Tashakkori, 2003). The pragmatic paradigm provided me an opportunity for multiple methods, different perspectives, and different assumptions, as well as different forms of data collection and analysis in the mixed methods study. Thus, ontologically, this study endorsed multiple realities, epistemologically it embraced both objective and subjective knowledge while axiological assumptions made use of multiple values from different perspectives.

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3.3 Population

The population of the study includes 448 full-time lecturers/researchers from the University of Education, Winneba and 163 tutors from the Colleges of Education. The breakdown is as follows: Holy Child College of Education, Takoradi (29); Komenda College of Education, Komenda (47); OLA College of Education, Cape Coast (49) and Foso College of Education, Assin Foso (38). The institutions were selected based on their their training in the use of Teacher Education in Sub-Saharan Africa (TESSA) OERs. The population of the University of Education, Winneba was categorized into various disciplines to ensure that each faculty was fully represented in the sampling to ascertain whether there were differences in use of OER for pedagogical purposes. In the case of the Colleges of Education, total enumeration was used for faculty of various departments because the population (163) was small.

3.4 Research Design

According to Creswell (2014), research designs are types of inquiry within qualitative, quantitative, and mixed methods approaches that provide specific direction for procedures in a research. The research design for this study was selected from the mixed methods research approach under the pragmatist philosophy. Hence, data for both quantitative and qualitative components were collected, analysed and mixed. Inferences were then drawn from both approaches.

Johnson and Onwuegbuzie (2007) defined mixed methods as a research in which "the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study or set of related studies" (p. 120). Additionally, the mixed methods design is defined as a "the collection or

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analysis of both quantitative and qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of the data at one or more stages in the process of research" (Creswell, Plano Clark, Gutmann, & Hanson, 2003, p. 212).

According to Doyle Brady & Byrne (2016), the mixed methods design is useful when the research questions of a study demand the use of both quantitative and qualitative methodologies to answer them. The adoption of the mixed methods approach was to combine the use of quantitative and qualitative approaches to help me better understand research problems than the use of just a single approach. The mixed methods research approach therefore blended the best elements of the qualitative and quantitative research in the same study thus minimizing the weaknesses of each research (Creswell, 2014). For example, results from the quantitative study can be generalized, but the same cannot be done for qualitative study. On the other hand, the qualitative study provided detailed explanations and rich information. According to Creswell (2003) when qualitative and quantitative data, are collected and mixed, it can facilitate a thorough analysis of the research problem. Similarly, Tashakkori and Teddlie (1998) contend that research questions in the social and behavioural sciences are best answered with a combination of quantitative and qualitative approaches. Besides, it gives the researcher the opportunity to simultaneously generalize their results and gain a deeper understanding of phenomenon. (Hanson et al., 2005). Additionally, the mixed methods approach also helps to explain and understand complex social and organizational phenomena (Venkatesh, Brown & Bala, 2013). Thus, it can be said that the mixed methods approach provides breadth and depth of understanding as well as complexity, perspective, differences and or corroboration (Johnson 2014). It was based on these

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underlying information that I employed the mixed method approach to study how lecturers and tutors of higher education institutions in Ghana are using the OERs.

3.5 Criteria for Choosing the Mixed Methods Design

There are some key factors to consider when choosing a mixed methods design. Creswell (2014) has identified five of these. They include expected outcomes, timing of data collection, integration of data, priority, type of design most suited for a field of study and whether the research is carried out by one researcher or by a team of researchers. The first three reasons are related to procedures while the last two have to do with practical considerations.

3.6 Expected Outcomes

If for example the expected outcome of a mixed method research is to merge two databases to show how the data converges or diverges, then it is appropriate to choose a convergent parallel mixed method design. However, if the outcome of a research is to get an in-depth understanding of quantitative results, then an explanatory mixed methods design is the recommended option (Creswell, 2014).

3.7 Mixed Methods Integration

This has to do with how the integration of the data from both the quantitative research and qualitative research will be done. Here the researcher has the option to merge, connect or embed the data. For example, a combination of quantitative and qualitative data can be merged by comparing them side by side, transforming them or displaying them jointly (Creswell, 2014). Connecting data on the other hand involves analyising one data set and building it into another data set. As regards embedded data, a data set

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which could be either quantitative or qualitative in nature is combined and embedded in a larger design. In the case of sequential mixed methods the second database is dependent on the results of the first phase (Creswell, 2014).

Additionally, Doyle et al., (2016) highlighting the integration phase contended that there should be at least one connecting point of integration for the research design of a mixed methods study. They submit that it can be done at different levels. For example, at the methods stage and the interpretation stage of a research. In the case of this study which is an explanatory sequential design, the development of the interview phase depended on the outcome of the quantitative phase where further explanations were provided based on the unanticipated results. Thus Johnson (2014) sums up by asserting that mixing usually is done to obtain breadth and depth of understanding, perspective, complexity, and difference and/or corroboration.

3.8 Timing of the Data Collection

This has to do with whether both the quantitative and qualitative data are collected concurrently, that is, at the same time or sequentially where one data is collected first followed by another. In this research the latter applies (Creswell, 2014).

3.9 Emphasis placed on each database

This has to do with the priority or weight put on a particular research approach. The emphasis can be equal for both quantitative and qualitative approaches. It is denoted as QUAN and QUAL and it is used in concurrent designs. At other times the emphasis is unequal, for example, emphasis will be placed on one approach as against another.

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3.10 Mixed Methods Design Selected and justification for selection

The study made use of the sequential explanatory design with the quantitative data taking priority over the qualitative data. In other words, the researcher first used a quantitative method as the main method of data collection and analysis followed by a qualitative method (QUAN qual) (Creswell, 2013). The qualitative data was used to help explain in more detail the quantitative results and interpret its findings. This was due to unanticipated results from the quantitative study.

The questions and sample of the qualitative study was based on the outcome of the quantitative analysis. Also, by adding qualitative data to quantitative data, I was able to better explain the relationships emerging from quantitative data. It also facilitated the combination of "empirical precision with descriptive precision" (Onwuegbuzie and Leech 2004 p. 771). Venkatesh, Brown and Bala (2013) also suggested that a quantitative study should precede a qualitative one "if IS researchers plan to conduct a study for which a strong theoretical foundation already exists, but the context of the research is novel." This description fits the research under investigation because the UTAUT model is a well-grounded theory. However, very few research works on OERs have used the UTAUT model, besides, OERs are relatively new.

3.11 Study Settings

The study covers five teacher education institutions. These are, the University of Education, Winneba, Holy Child College of Education, Takoradi; Komenda College of Education, Komenda; OLA College of Education, Cape Coast and Fosu College of Education, Assin Fosu. These institutions are offering teacher education as their core mandate by training pre-service and in-service teachers for the various educational

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institutions. These institutions were trained under the TESSA OER project and have been on it for the past 10 years.

3.12 Sampling Design

According to Teddlie and Yu (2007, p.77), mixed methods sampling involves combining well-established qualitative and quantitative techniques in creative ways to answer research questions posed by mixed methods research designs. In other words, the type of mixed methods research design determines the type of sampling techniques that ought to be used. Hence the use of probability and purposive sampling to collect data for the quantitative and qualitative data respectively.

Data was collected in two phases as required by the explanatory sequential design. The first phase made use of quantitative data collection design while the second phase used qualitative data collection design. Sampling in the first phase made use of both probability sampling and non-probability sampling, while the second phase used non-probability design.

3.13 Sampling procedure Phase 1

3.13.1 Probability sampling

Probability sampling techniques were used in order to offer the lecturers at the University of Education, Winneba an equal chance of being selected from the study population to represent the whole population of lecturers. In order to achieve this, a stratified sampling technique was adopted.

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3.13.2 Stratified random sampling

This was used by the researcher to sample different sub groups to be represented in the population. The sub group form the strata while random sampling was applied to ensure that each unit in a population gets the chance to be selected (Teddlie and Yu 2007). Stratified random sampling was used because of the various faculties involved. Random sampling was used to cater for lecturers and researchers because of their large size and to ensure that each of them stood a chance to be selected. A list of faculty per department was retrieved from the Planning Department of the University of Education, Winneba and a simple random selection based on the lottery method was used to select individual lecturers from the list. However, in situations where the sample size was small after stratification, purposive sampling was used to cater for the small numbers. In departments whose population of faculty was small, all of them were included in the study. In the case of the Colleges of Education, a list of faculty members was retrieved from Heads of Department. All the tutors were included in the study since the population was small.

3.14 Sample size

The sample size for the University of Education, Winneba was calculated based on Scheaffer, Mendenhall and Ott's (1986) formula. About 40% of the population was used. According to Onwuegbuzie and Collins (2007), even though most introductory text books on methodology and statistics recommend 30 respondents for correlation and causal-comparative designs, in their view it is inadequate since it does not provide adequate numbers for determining chi-square and t-test analysis. Onwuegbuzie and Collins (2007) therefore recommended a sample size of "64 participants for one-tailed hypotheses; 82 participants for two-tailed hypotheses" in a correlational design.

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Scheaffer et al (1986:59) offer a solution with the formula:

$$\frac{Np\,(1-p)}{(N-1)\,\frac{B^2}{4} + p(1-p)}$$

where:

n = the sample size required N = population size

p = proportion of people = 0.24

B = 0.05 (p±0.05 confidence level)

This was calculated as:

$$\frac{(448 \times 0.24)(1-0.24)}{(448 - 1)\frac{0.05^2}{4} + 0.24(1 - 0.24)}$$

$$\frac{107.52(0.76)}{447\times \frac{0.0025}{4} + 0.24(0.76)}$$

$$\frac{81.72}{447\times 0.000625 + 0.1824}$$

$$\frac{81.72}{0.2793 + 0.1824}$$

$$\frac{81.72}{0.4617}$$

176.99 = 39.7%

The researcher approximated the sample size to 40% giving her 180 subjects (participants) for the study as shown in Table 3.1.

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Table 3.1: Sample Frame: University of Education, Winneba

		Population			Sample		
S/N	**Faculty**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
1	Faculty of Agricultural Education	21	2	23	**8**	**2**	**10**
2	Faculty of Science And Environment	6	1	7	2	1	**3**
3	Faculty of Business Education	21	4	25	8	2	**10**
4	Faculty of Education And Communication Science	18	3	21	7	1	**8**
5	Faculty of Technical Education	32	3	35	13	1	**14**
6	Faculty of Vocational Education	5	4	9	2	2	**4**
7	School of Creative Arts	40	8	48	16	3	**19**
8	Faculty of Educational Studies	40	15	55	16	6	**22**
9	Faculty of Foreign Education And Communication	26	18	44	10	7	**17**
10	Faculty of Ghanaian Languages Education	25	9	34	10	4	**14**
11	Faculty of Science Education	47	20	67	19	8	**27**
12	Faculty of Social Science Education	51	8	59	20	3	**23**
13	Institute of Educational Extension and Distance Education	7	5	12	3	2	**5**
14	Institute of Educational Research and Innovation Studies	9		9	4		**4**
	Total	**348**	**100**	**448**	**138**	**42**	**180**

3.15 Research Instrument for Quantitative Study

3.15.1 Questionnaire

The questionnaire based on the objectives of study was administered to faculty. The questionnaire was considered ideal for this purpose because it can cover a large number of people and the results can be generalised (Cohen, Manion & Morrison, 2007). It can also capture respondents' preferences, perceptions and attitudes. The questionnaire covered issues like demographics of respondents, OER competencies, faculty awareness of OERs adoption and use of OERs and challenges associated with OER use. The quantitative data collection was preceded by a pilot test of the questionnaire.

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3.16 Pilot study of the questionnaire

The questionnaire was pretested on 25 lecturers with similar characteristics from the University of Cape Coast to improve upon it before it was finally administered to participants. Some of the issues that the pretest brought to the fore included whether the completion of the questionnaire was time consuming, and whether there were clear directions for the participants (McMillan & Schumacher 1997). Participants were also given the chance to make other comments they thought could be used to improve upon the questionnaire.

A Cronbach's Alpha Reliability Test conducted for the various sections showed that scores ranged between .789 and .931. Based on the pre-test results, some modifications were made. These include the sequencing of some questions and reframing of some questions to make them clearer. The major comment of most respondents was the length of the questionnaire. Questions were thus reduced but they were done in such a manner that the content and context of the study was retained.

3.17 Methods of data collection for mixed methods

Data collection was in two phases based on the proposed explanatory sequential design. The first phase focused on quantitative data. It involved the use of a survey to collect quantitative data to enable the generalization of results while the second phase involved the collection of qualitative data – interviews which provided detailed opinions of respondents and helped in explaining the survey results.

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3.18 Phase 1: Quantitative Data Collection strategy

The questionnaire was distributed by the researcher and a research assistant with the assistance of some Heads of Department and lecturers from the University of Education, Winneba. This was done after prior consultation to identify faculty members that were sampled from the list of lecturers including some Heads of Department. They were given one week initially to fill in the questionnaires and return them to the identified persons. After one week, those who had not completed the questions were given a reminder and asked politely to do so within a week. Regarding the Colleges of Education, 106 subjects out of the total enumeration responded. A breakdown of the responses for the four Colleges of Education are as follows: Komenda College of Education, 35, OLA College of Education, 26; Holy Child College of Education, 24 and Foso College of Education, 21. Data collection was done with the assistance of some Heads of Department and tutors. Since the institutions were different and dispersed, data collection took about three months (15th December, 2017 to 16th March, 2018) to complete. The researcher had to travel with a research assistant to the various destinations every Friday. The personal contacts helped the respondents to have confidence in the researcher and to enter into a rapport with her and also accounted for a high response rate at the University of Education, Winneba.

Some persons selected at the University of Education, Winneba, however refused to participate due to limited knowledge about the subject and time. Thus, 133 questionnaires were retrieved and used representing approximately 73% as the response rate. The response rate for the Colleges of Education was 65% as some faculty members also refused to answer because of limited knowledge about the subject and time. Thus

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the total response rate for both the University of Education, Winneba and the Colleges of Education was 69%.

Reliability

According to Hair, Black, Babin, Anderson, and Tatham (2006) reliability refers to the assessment of the degree of consistency between multiple measurements of a construct. In other words, reliability is a measure of the stability of the proposed measure. Reliability in this study addressed two basic concerns. These were consistency of items within the measure as individual variables and question items and stability of the measure over time for replication. Hair et.al (2006) further argue that internal consistency is the common approach used to assess reliability and this is measured using the split half reliability, which is mostly measured by using coefficient alpha and Cronbach alpha.

Cronbach's Alpha Reliability Test

This was used to test the constructs for their reliability. The Cronbach's Alpha coefficients were high and met the threshold of 0.7 per the recommendations of Nunnally (1978). The coefficient ranged between .708 for trialability to .937 for knowledge of search engines. The number of items identified in the Cronbach's Alpha table matches that of the items in the factor loadings.

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Table 3.2: Study Constructs

Variables	Cronbach's Alpha	No. of Items
Knowledge of OER Search	.937	3
Knowledge of Computer Applications	.745	5
Awareness	.911	7
Performance Expectancy	.720	3
Effort Expectancy	.903	6
Social Influence	.828	5
Facilitating Conditions	.808	4
Trialability	.708	3
Behavioural Intention	.737	3
Actual Use	.830	4
Barriers	.783	7
Compatibility	.826	6

Validity

Hair, et al., (2006) define validity as the extent to which a scale or set of measures accurately represents the concept of interest. In other words, a measurement scale ought to measure what it intends to measure. The types of validity used for this study included a pilot test and construct validity. Validity was established through a pilot test and my supervisors reviewing the questionnaire for construct validity.

Structure of the Questionnaire

It comprised five sections, sections A to E (See Appendix A). Section A covered demographic characteristics such as gender, age, faculty/department, rank, mode of teaching and teaching experience. This helped the researcher to better understand some characteristics of respondents. Sections B to E addressed the five objectives of the study. Section B was meant to find out the level of faculty technological competencies and it was made up of nine items. Section C which comprised eight items was used to find out the level of OER awareness among faculty members. Section D looked at the UTAUT and DoI factors that influence faculty adoption of OERs for teaching and learning in higher educational institutions. This section had 37 items. The last section, examined the barriers that affect the use of OERs. It contained 12 items.

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Sections B-E involved likert scale questions to measure respondents' opinions, attitudes and beliefs. It was also meant to give the researcher the degree of agreement or disagreement of respondents to the issues raised. The likert's scale, ranged from a rating of 1 indicating strongly disagree, to a rating of 5 indicating strongly agree, with 3 being neutral.

3.19 Phase 1 Quantitative Data Analysis

The collection of the quantitative survey data was followed by organizing and summarizing the collected data. This was done according to the research questions and variables selected from existing literature. The data were edited questionnaire by questionnaire to ascertain whether all the questions had been properly responded to and those that were not fully answered were rejected. After that, the rest of the data were entered into SPSS and analysed using descriptive statistics and inferential statistics.

3.20 Phase 2 Qualitative Approach

This section presents the philosophical assumption of the qualitative research design, research participants, sampling size, sampling procedure, research instrument, data collection procedure, and data analysis.

3.21 Qualitative Research

Qualitative research as defined by Yilmaz (2013) is "an emergent, inductive, interpretive and naturalistic approach to the study of people, cases, phenomena, social situations and processes in their natural settings in order to reveal in descriptive terms the meanings that people attach to their experiences of the world" (p.312). It is based on the interpretivist/constructivist paradigm (Sale, Lohfield & Brazil, 2001). Since the

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interpretivist believe that individuals construct their own realities which could change over time, they believe in multiple realisms (Sale et al., 2001). The qualitative approach also makes use of images, and ornaments, to report research results. Similarly, Yilmaz reports that data collected in qualitative research are in the form of text, pictures or graphics.

The use of the qualitative approach gave faculty members the opportunity to show the meaning and clear understanding they attached to their experiences in relation to OERs. Faculty who were not using OERs were also given the opportunity to express their views. Besides, the qualitative aspect was used to explore the phenomenon that has not been properly described in the literature on OER adoption and use.

3.22 Sampling Design for the qualitative study

3.22.1 Non-Probability Sampling

Qualitative research makes use of non-probability sampling techniques to select the sample for a study. Unlike probability sampling where the sample is meant to be statistically representative, in non-probability sampling, it is not the case. Non-probability sampling involves the deliberate selection of participants or elements to reflect specific characteristics of a given population as advocated by Ritchie, Lewis & El am, (2003). Hence, making it possible to use a small unit to explore in-depth information and understand some main themes and puzzles of interest which may be related to specific experiences or demographics. Following the dictates of the sequential sampling technique, the purposive sampling used was meant to confirm or disprove cases Teddlie and Yu (2007) and to identify critical participants with the requisite

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information who were willing to dispassionately and truthfully discuss and disclose them.

The purposive sampling was relevant because the population was relatively homogeneous in that they were all working within a sector that is training prospective teachers who include one form of OER or the other in their teaching. In fact, Ritchie et al., (2003) indicated that a homogeneous sample refers to samples chosen from people within the same sub-culture or persons with similar characteristics with a view to investigate a phenomenon within a specific context.

3.22.2 Sample size and Sampling

Unlike the quantitative approach which prefers numbers and generalizations, the qualitative approach is more interested in getting in-depth and rich information from participants. Hence, qualitative researchers prefer to use few participants. Qualitative research emphasizes the understanding of process that is, a researcher's area of interest rather than numbers that would represent a population. Therefore, it uses a purposefully selected small number of participants to provide important information to achieve its aim (Mason 2002). Several researchers in the field have recommended what they perceive to be ideal sample sizes for qualitative studies. For Example, Bertaux (1981) suggested 15, while Creswell (1998) suggested between 5 and 25 for phenomenological study and between 20 and 30 for a grounded theory study.

However, according to Mason 2002,

> … You sample until you reach theory-saturation point, that is, until you know that you have a picture of what is going on and can generate an appropriate explanation for it. This point is reached when your data begin to stop telling you anything new about the social process under scrutiny, and you cannot therefore anticipate in advance when and how that point will be reached (pp.134-135)

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Similarly, Onwuegbuzie and Collins (2007) submit that sample size should be big enough to achieve data saturation, theoretical saturation and informational redundancy. However, it should not be too big that carrying out a deep case-oriented analysis becomes a difficulty. Based on the explanatory research design, a small sample was drawn from the quantitative study and that was purposively sampled. From the survey, l asked respondents whether they would be willing to participate in the interviews. Twelve participants as advocated by Guest, Bunce, & Johnson, (2006) were chosen purposively to be interviewed as users of OERs. They comprised five females and seven males. Seven of the participants were from the University of Education, Winneba while the other five were from the Colleges of Education. Additionally, three participants, two males and one female from the University of Education Winneba and the Colleges of Education who identified themselves as non users of OERs were interviewed for their views. The selection of participants was based on their willingness to participate and interest.

3.22.3 Interview Guide

Based on the gaps identified in the quantitative results, interview guides were developed for the qualitative study. Questions were asked with probes for clarification based on issues identified in the quantitative results. Some of the issues identified were, faculty knowledge of OERs, the factors that influenced their decision to use OERs and some of the barriers to the effective adoption and use of the resources. Some faculty members who were not using the resources gave their reasons for not doing so. Finally, participants also suggested the form of support they would have their institutions give them to help them use OERs more effectively and to encourage potential to use the resources.

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3.22.4 Interviewing

Unstructured interviews were conducted based on the outcome of the quantitative analysed results. To this end, questions asked filled gaps that needed clarifications and explanations. This is because the aim of the design is for the qualitative aspect to provide an in-depth explanation of the quantitative results by exploring the interaction of the variables. For example, Creswell (2014) submits that the quantitative results that need to be further explored in-depth may be extreme or outlier cases, significant predictors, significant results relating variables, insignificant results, or even demographics.

Unstructured face-to-face interviews were mostly used to explore in-depth the views of faculty. The face-to-face interview was preferred over other forms of interview such as mailed or telephone interview because that enables one to get a high response rate (McMillan & Schumacher, 1997). Interviews also enable respondents to answer questions in-depth and from their own points of view (Cohen, Manion & Morrison, 2007). Further, the interview is appropriate because probing questions can be asked, and one can follow up and clarify issues to ensure accurate responses (McMillan & Schumacher, 1997). The face to face interview also gave me the opportunity to observe verbal and non-verbal behaviour. However, telephone interviews were also used in situations where participants were living far away and had limited time. Despite all these advantages, the interview method is noted for its 'subjectivity and bias' requiring a lot of time and anonymity may be compromised (McMillan & Schumacher 1997, p. 263). These challenges were controlled to ensure credibility of the results.

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Each interview conducted at times convenient to the respondents lasted for 30 minutes. The conducted of the interviews took 15 days to complete (30th April, 2018 - 18th May, 2018) and they were audio taped with permission from the participants.

3.22.5 Data organization and analysis for the qualitative study

According to Cohen et al. (2007), "there is no one single or correct way to analyse and present qualitative data; how one does it should abide by the issue of fitness for purpose" (p.461). The researcher therefore chose to analyse data based on the six thematic analysis phases outlined by (Braun & Clarke, 2006). The phases and description of the process are as follows.

Data was organised and analysed by transcribing the audio recorded interviews one after the other, including the researcher's questions and probes. Each recorded version took about four hours to fully transcribe. After that, the recorded version was compared with the transcripts to ensure that they really matched or represented exactly what was required. This was done with the assistance of two research assistants who were graduate students of University of Education, Winneba. Data transcription took into consideration verbal and nonverbal expressions as well as keeping to the original verbal version. Thus, after the transcription, the recorded work was played back three times to make the necessary adjustments, additions and insert omissions. I also indicated the main pauses, question marks, commas, etc. I then familiarised myself with the data by reading through it from the beginning to end several times, while at the same time I tried to make meaning and find patterns (Braun & Clarke, 2006). This marked the end of phase one in line with Braun and CIarke's proposition. For phase two, I looked for the key codes and jotted down some notes for coding.

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Phase three dovetailed into phase four as initial codes from the data were generated and all the key phrases and ideas were coded and categorised into themes and compared to establish conformity and clarity. This was done three times as a reflection and also interacting with the data to ensure that all the major ideas were captured and to establish clear themes and boundaries as well as eliminate redundancies from the data. Coded data were sorted for potential themes and sub-themes. In phase four, the Research Assistants and I reviewed and refined the themes. To facilitate our work, a rough sketch was developed to make sense of the connections among the themes and to see which ones were dominant and critical for descriptions. These concepts and the themes were then matched with the key responses provided by the participants as we highlighted them. This was after a consensus was built among all three of us. This process helped us to delve deeper into the meaning of the texts, exploring the themes that emerged and identifying the patterns that underlie them. It is important to note that the themes were inductively generated. In other words, the researcher did not go with preconceived ideas of which theme should correspond to a particular research question. Instead, the themes emerged from the field notes that I received from participants. I also generated sub themes out of the themes. Expressions and statements that related to the themes and sub themes were highlighted and served as anecdotes. Finally, in phase six, data results were presented in narrative form using the anecdotes. The greatest challenge was the audibility of some of the participants' voices and so we had to constrain ourselves over specific tapes to get the real ideas presented without losing the import of the interviews.

3.22.6 Interpretation

According to Creswell (2014), the interpretation stage reports the results of the two phases sequentially in the discussion section. This is followed by a third phase where

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the qualitative results are used to explain the quantitative phase by providing a more in-depth view of the questions analysed. This assertion was basically adhered to in the study.

3.22.7 Ensuring trustworthiness or rigour for the qualitative study

Trustworthiness connotes a moral value that ensures the degree of confidence and reliability of the data, interpretation and methods used for the quality of the study. In quantitative studies it is referred to as validity and reliability. However, since qualitative studies do not use instruments with established matrices and measurements trustworthiness establishes that the study's findings are credible, transferable, confirmable and dependable (Lincoln & Guba, 1985).

Credibility: According to Golafshami (2003) and Connelly (2016) this determines how confident the study is in the truth of the study's findings. In order to ensure credibility triangulation was applied to make sure that the information received is cross examined with other verifiable sources.

Transferability: This refers to how the qualitative study demonstrate that the research findings are applicable to other contexts and relate to similar situations, population and phenomenon. According to Amankwaa, (2016) cited in Connelly (2016), "Researchers support the study's transferability with a rich, detailed description of the context, location, and people studied, and by being transparent about analysis and trustworthiness. Researchers need to provide a vivid picture that will inform and resonate with readers" (p. 436). To this end I used thick descriptions to show that the research findings can be applicable to other contexts, circumstances and situations.

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Confirmability: this constitutes the degree of neutrality in the research findings. To ensure confirmability, the findings were based on the participants' responses and not any potential bias or personal motivations from me. This involved making sure that my biases did not tilt (skew) the interpretations of what the research participants' said to fit a certain narrative. To establish further confirmability, an audit trail was done by keeping records of the raw data, field notes, transcripts (see Appendices D & E for sample transcripts) and a reflective journal to highlight every step of data analysis made to provide a rationale for the decisions made. This helped to establish that the findings accurately portrayed participants' responses.

Dependability: This constitutes the extent to which the study could be repeated by other researchers. This constitutes replicability and that the finding would be constant. In order to ensure this, an inquiry audit was used to establish dependability which requires an outside person to review and examine the research process and data analysis to ensure that the findings are constant and could be repeated.

Another element in ensuring trustworthiness has been provided by Connelly (2016) in which she argued for authenticity. By this she meant the extent to which researchers fairly and completely show a range of different realities and realistically convey participants' lives as posited by Polit & Beck, (2014). In this case the "selection of appropriate people for the study sample and provision of a rich, detailed description are ways the researchers address this criterion … to portray fully the deep meaning of a phenomenon to increase readers' understanding".

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3.23 Ethical considerations for the study

Respondents were informed about the purpose and outcome of the study. They were also assured of confidentiality and anonymity. Therefore, no names were attached to the forms. Serial numbers were used instead. As well, respondents were assured that no psychological harm would befall them. The questionnaire was constructed in such a way that it would not put any mental stress on participants. An introductory letter was collected from the Department of Adult Education and Human Resource Studies to the various institutions for permission to conduct the study. Also the Heads of the various institutions response to the permission was orally received before pilot study and data collection commenced. Their willingness to cooperate ensured the smooth collection of data and active participation. Permission was also sought from participants before the interview started and they were not identified by their names. All the participants consented to the interview schedule and the times of the day allocated. For both the survey and interviews, participants willingly participated and had the option to opt out.

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CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

4.1 Introduction

This chapter presents results, analysis and interpretation of both quantitative and qualitative data for faculty at the University of Education, Winneba and four Colleges of Education – OLA College of Education, Komenda College of Education, Holy Child College of Education and Foso College of Education. This was based on the research questions of the study. The presentation is in two phases. The first phase involves the presentation of quantitative data whiles the second phase describes the qualitative study.

4.2 Phase One: Quantitative Results

The quantitative phase begins with a presentation of demographic characteristics of respondents using descriptive statistics followed by inferential statistics. Independent studies of institutions or comparative analysis was not made because there were no significant differences between the University of Education, Winneba and the Colleges of Education. As a result, analysis of the data was made composite.

4.3 Demographic characteristics

The demographic characteristics were used to determine the nature of the respondents and to establish relationships with the theoretical constructs of the study. These are provided in Table 4.1.

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Table 4.1: Demographic Factors

Demographic Factors	Category	Frequency	Percentage
Gender	Male	170	71.1
	Female	69	28.9
Age	26 – 35 years	17	7.1
	36 – 45 years	111	46.4
	46 – 55 years	85	33.9
	Above 55	30	12.6
Academic Rank	Tutor	103	43.1
	Senior Tutor	3	1.3
	Lecturer	88	36.8
	Senior Lecturer	40	16.7
	Associate Professor	3	1.3
	Professor	2	0.8
Teaching Experience	1 – 5 years	41	17.2
	6 – 10 years	61	25.5
	11 – 15 year	47	19.7
	16 – 20 years	29	12.1
	21 +	61	25.5

Gender

The respondents were made up of 170 males and 69 females representing 71.1% and 28.9% of the respondents respectively. More men responded to the questions than women. This corresponds to the dominance of male population in the institutions being investigated.

Age

The dominant age of the respondents was between 36 and 45 years. This was followed by the 46 and 55 year group representing 33.9% of respondents. The age group 26 – 35 lagged behind with 17 respondents representing 7.1% of respondents. The mean age of the respondents was 46.5 years. This indicates that faculty members are mature and in the middle adulthood bracket.

On the Academic rank of the respondents**,** most of them (103 or 43.1%) were tutors. This was followed by 36.8% who were lecturers. Senior Lecturers were few (40) 16.7%

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while Associate Professors and Senior Tutors constituted 1.3% each. Full Professors were 0.8%. It was important to find this out because in studies conducted on OERs, it emerged that professors had inadequate knowledge of OERs (BCG 2013).

Teaching experience

It was important to examine the teaching experience of respondents in their various institutions of study to find out how that impacts their adoption and use of OERs. The teaching experience of respondents shows that 42.7% of them had worked less than 10 years while 57.3% had served for over 10 years. The mean working experience was 11.26 years.

4.4 Descriptive Statistics

This section of the results analyses the descriptive statistics of all the close ended items of the study to establish their means and the standard deviations in order to answer the research questions. All the means were on the Likert scale of 1= Strongly Disagree; 2 = Disagree; 3 = neutral; 4 = Agree; 5= Strongly Agree.

While the mean was used to summarize faculty responses, the standard deviation was used to ascertain whether faculty responses were clustered towards the mean or dispersed. When the mean is 3.0 to 3.3 it indicates neutrality or indifference. A mean of 3.4 or higher shows faculty agreement with the item in a construct. However, a mean of 2.99 or lower suggests that faculty is in disagreement with the items.

As regards the standard deviation, a relatively small deviation, that is, within 1, implies that faculty responses are homogeneous or related. Conversely, a relatively large

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deviation, that is, above 1.5 shows that faculty responses are heterogeneous or dispersed on the views expressed. In other words, faculty is not unanimous in its decision over an issue or does not share similar ideas.

4.5 Conditions or Factors for OER Adoption and Use

This section tries to find out the factors that account for the adoption and use of OERs among faculty members of the various institutions. They are developed along the research questions.

4.5.1 Technological Competencies

According to Samzugi and Mwinyimbegu (2013), familiarity with computers and information literacy play a major role in enhancing access to and effective use of OERs. Faculty technological competencies are thus revealed in table 4.2.

Table 4.2: Technological Competencies

	Mean	**±SD**
Technological Competencies	**3.75**	**1.185**
I am able to use computer applications such as Word Processing	4.56	0.886
I am able to use computer applications such as Spreadsheets	3.70	1.299
I am able to use computer applications such as Power Point	4.48	0.943
I can browse the internet	4.71	0.720
I know about OER search engines	3.83	1.273
I know how to access OER repositories	3.64	1.258
I can search for OERs	3.78	1.241
I can upload materials	4.08	1.186
I can download materials	4.41	0.930

Source: Field Survey 2017/2018 n = 239

Table 4.2 reveals that technological competencies of faculty was high ((M=3.75; SD = 1.185). It is evident that faculty knowledge of computer applications was very high as evidenced by their ability to browse the internet (M = 4.71;SD = 0.720), use word (M = 4.56; SD = 0.886), download and upload materials (M = 4.41 SD = 0.930; M = 4.08, SD = 1.186). It is significant to note that all the items on knowledge of OER

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searches were also high. Faculty also indicated a high competency in their knowledge of OER search engines and how to access OER repositories.

4.5.2 OER Awareness

This study sought to find out faculty knowledge on some features of OERs in order to ascertain their level of awareness or whether they were conversant with OERs.

Table 4.3: Results on OER Awareness

OER Awareness	Mean	±SD
	3.86	**0.904**
OERs are educational materials that are available to everyone	3.97	1.209
OERs are inexpensive sources of educational materials for teaching, learning and research	3.85	1.210
OERs are materials that can be adopted for use in the classroom	4.18	.964
OERs are materials that can be adapted for use in the classroom	4.18	.994
I know about OERs	4.08	1.089
I will rate the quality of OERs as high	3.74	1.061
I am aware of open licenses that permit the free use of OERs	3.48	1.238
I am aware of open licenses that permit the creation of OERs	3.35	1.250

Source: Field Survey 2017/2018 n= 239

Table 4.3 shows that generally, the level of faculty awareness of OERs is high or above average (M=3.86, SD = 0.904). Among others, faculty strongly agreed that OERs are materials that can be reused and revised for use in the classroom (M= 4.18, ±SD .964); (M=4.18, ±SD .994) respectively. Additionally, faculty had a good knowledge of OERs (M=4.08, SD = 1.089). On the average, they were aware of the open licenses required or permitting OER use and creation (M = 3.48 SD = 1.238; M = 3.35 SD = 1.250).

4.5.3 Performance Expectancy

One area of importance in the theoretical model was performance expectancy**.** Performance expectancy is the extent to which an individual believes that a technology or an innovation will help him or her perform more efficiently at a job. (Venkatesh et

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al., 2003). Therefore, faculty is likely to use OERs if they perceive that they are useful. Their Reponses to this is indicated in Table 4.4.

Table 4.4: Performance Expectancy

Performance Expectancy	**Mean**	**±SD**
	4.17	**0.616**
I would find OERs useful in my teaching	4.21	0.441
Using OERs enables me to accomplish teaching tasks more quickly	2.35	1.416
Using OERs increases my productivity	3.85	0.982
Using OERs will allow me to have access to current information about the courses that I teach	4.29	0.866
Using OERs will increase learning outcomes of my students	4.01	0.912

Source: Field Survey 2017/2018 n= 239

Faculty members strongly believed that OERs were useful. (M=4.17, SD = 0.616) and that such a technology or an innovation will help them perform more efficiently at their jobs. Specifically, faculty members strongly agreed that OERs will allow them to have access to current information about the courses that they teach (M=4.29, SD = 0.866). They were of the view that OERs would be useful in their teaching (M=4.21, SD = 0.441) as well as increase the learning outcomes of their students (M = 4.01 SD = 0.912). The academics however, disagreed that using OERs enables them to accomplish teaching tasks more quickly (M=2.35, SD = 1.416).

4.5.4 Effort Expectancy

This represents the degree of ease associated with the use of technology (Venkatesh et al. 2003). Effort expectancy, determined by the questions in the survey depicts the ease with which faculty are/will be able to use OERs. The study therefore wanted to determine if they found it easy using the OERs in their daily academic work – both teaching and research. Table 4.5 exhibits the results.

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Table 4.5: Efforts Expectancy

Effort Expectancy	Mean	±SD
	4.02	**0.777**
My interaction with OERs will be clear and understandable	3.89	0.964
Learning to use OERs would be easy for me	4.22	0.889
It would be easy for me to become skillful at integrating OERs into my courses	4.15	0.864
I will find OERs easy to use	3.97	0.801
I will find it easy to modify OERs	3.96	0.819
I will find it easy to search for relevant OERs	3.96	0.847

Source: Field Survey 2017/2018 n = 239

The results of faculty perceptions of Effort Expectancy as exhibited in Table 4.5 indicated that faculty members found it was easy to use OERs (M=4.02, SD = 0.777). Specifically, faculty members felt strongly that learning to use OERs will be easy for them (M=4.22, SD = 0.889) and it would be easy to integrate OERs into their courses M=4.15, SD = 0.864). They conceded that it would be easy for them to use OERs (M= 3.97, SD=0.801). Faculty acceded that customizing OERs will be effortless and searching for OERs would not be a problem (M =3.96, SD 0.847).

4.5.5 Social Influence

Social Influence has to do with the influence of people and organisations faculty considers important for their use of OERs. In other words, colleague lecturers and tutors may request or inform them about how they are using OERs and how the resources are helping them to apply different teaching methodologies. Their responses are summarized in Table 4.6

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Table 4.6: Social Influence

Social Influence	Mean	±SD
	3.59	**0.838**
People who influence my behaviour think that I should integrate OERs into my courses	3.86	1.024
People who are important to me think that I should integrate OERs into my courses	3.76	1.004
The senior management at my institution has been helpful in the use of OERs	3.81	1.034
In general, my institution has supported the use of OERs	3.37	1.170
In general, my institution has supported the creation of OERs	3.17	1.196

Source: Field Survey 2017/2018 n = 239

Table 4.6 shows the result of the entities faculty believes influence their adoption and use of OERs. There is an agreement among faculty members surveyed that management, peers and subordinates will play a role in influencing their adoption and use of OERs (M=3.59, SD = 0.838). Of interest is the fact that faculty members agreed that people who influence their behaviour think that they should integrate OERs into their courses (M=3.86, SD = 1.024). Also most academics agreed that senior management had been helpful (M=3.81, SD = 1.034 and supportive M=3.37, SD = 1.170 in the use of OERs. To a lesser degree, faculty believed that management of their institutions had supported them in their effort to use and remix OERs.

4.5.6 Facilitating Conditions

Facilitating conditions constitute the degree to which an individual believes that organizational and technical infrastructure exists to support use of the system" (Venkatesh et al. 2013, p. 453). In relation to OERs, facilitating conditions refer to the degree to which academics think that organizational support in relation to technical infrastructure, policies, incentives, skills and resources exist for the use and creation of OERs (Li, et al. 2014). Table 4:7 thus presents results on facilitating conditions which influence faculty use of OERs.

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Table 4.7: Facilitating Conditions

Facilitating Conditions	Mean	±SD
	3.21	**0.911**
I have the resources necessary to access OERs.	3.04	1.187
I have the knowledge necessary to integrate OERs into my courses	3.33	1.125
Help will be available when I get a problem in integrating OERs into my courses	3.23	1.113
Help will be available when I get a problem in creating OERs	3.25	1.145

Source: Field Survey 2017 n = 239

Faculty found the conditions in their institutions averagely or moderately conducive for the use of OERs (M=3.21, SD = 0.911). There was some level of ambivalence on faculty perception that they have the resources necessary to access OERs (M=3.04, SD = 1.187) and that help will be available when they encounter difficulties in remixing OERs (M=3.25, SD = 1.145) or incorporating them in their courses M=3.23, SD = 1.113). This shows that faculty is ready and willing to use OERs if management puts some support systems in place or strengthen existing ones.

4.5.7 Compatibility of OER with Teaching and Learning

On the issue of compatibility, faculty's views were quite mixed. The study sought to find out how the use of OERs are consistent with their teaching practices and their pedagogical beliefs in their respective faculties and departments. Table 4.8 shows faculty views on how compatible OERs are to their teaching practice and beliefs.

Table 4.8: Compatibility of OER with Teaching and Learning

Compatibility	Mean	±SD
	3.43	**1.080**
OERs are similar to other course content I use for teaching	3.56	1.084
I think that using OERs fits well with the way I like to teach	3.29	1.077
Using OERs fits into my teaching style	3.26	1.074
Using OERs fits into the practice of sharing resources in my department	3.55	0.952
My department has a website with open materials	3.32	1.268
Creating OERs is compatible with my belief in sharing educational materials to benefit everyone	3.62	1.026

Source: Field Survey 2017/2018 n = 239

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Faculty members surveyed felt that using OERs were highly compatible with their academic and research work (M = 3.43; SD = 1.080). They supported the fact that OERs are not only compatible with their belief in sharing educational materials to profit everyone (M=3.62, ±SD1.026)**,** but also that OERs are similar to some existing course materials used for teaching (M=3.56, ±SD = 1.084). However, on the issue of whether that OERs fits into teaching styles of faculty members, the result (M=3.26, SD = 1.074) indicates some level of ambivalence.

4.5.8 Trialability

Another area worth considering for OER adoption is trialability as shown in Table 4.9. Rogers (2003) posits that trialability refers to the extent to which a person experiments with an innovation or pilots it before deciding to adopt and use it.

Table 4.9: Trialability

Trialability	**Mean**	**±SD**
	3.28	**1.233**
I will use OERs if I get a great deal of opportunity to try various OER applications	3.59	1.135
I will like to be able to properly try OERs out before deciding whether to use them	2.84	1.460
I will need to know where I can go to satisfactorily try out various uses of OERs	3.25	1.145
I will need to use OERs on a trial basis long enough to see what they can do	3.44	1.243

Source: Field Survey 2017/2018 n = 239

Faculty confirmed trying OERs out before deciding to use them (M=3.59 SD = 1.135). They also affirmed the need to try the OER materials for a length of time before finally recommending them to their students and colleagues to use (M=3.44 SD = 1.243). However, they disagreed with the notion of properly trying out OERs before opting to use them.

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4.5.9 Behavioural Intention to Use OERs

This section looked at faculty decision to use OERs. Decision making in the use of technology is manifested by many factors including the expectation of its benefits and the problems it may have in future. Thus sustainability becomes important so far as intention to use technology is concerned. The views of the respondents are captured in Table 4.10.

Table 4. 10: Behavioural Intention to use OERs

Behavioural Intentions	Mean	±SD
	3.90	0.770
I intend to integrate OERs into my courses next semester	3.71	1.066
I predict I will integrate OERs into my courses next semester	3.98	0.921
I plan to adopt OERs in future	4.02	0.884

Source: Field Survey 2017/2018 n = 239

Regarding faculty behavioural intention to use OERs, the means in Table 4.10 suggest that faculty was in agreement with their intention to adopt and use OERs in tertiary institutions (M=3.90, SD = 0.770). This is further reflected in academics' agreeing to adopt OERs in future (M = 4.02, SD = 0.884) as well as their expectations to integrate them in courses in the upcoming semester (M =3.71; SD = 1.066).

4.5.10 Actual Use:

This refers to faculty members who are really using OERs

Table 4. 11: Actual Use

Actual Use	Mean	±SD
	3.22	0.983
I frequently use OERs	3.29	1.170
I use OERs many times in a week	3.10	1.214
In the past six months, I have incorporated OERs into my courses	3.58	1.178
In the past year, I have incorporated OERs into my courses	2.91	1.265

Source: Field Survey 2017/2018 n = 239

The means in table 4.11 suggest that faculty will moderately adopt and use OERs in tertiary institutions (M = 3.22, SD = 0.983). The majority of faculty stated that they had

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used OERs within the last six months of the data collection (M= 3.58, SD= 1.178, followed by many faculty claiming using OERs frequently (M= 3.29) SD =1.170) while almost half used it many times in a week (M= 3.10. SD = 1.24). However, faculty did not support the fact that they had incorporated OERs in their courses in the past year (M=2.91, SD = 1.265).

4.5.11 Barriers to the use of OERs

The adoption and use of OERs is often impeded by some barriers. Barriers to the adoption and use of OERs as expressed by faculty is presented in table 4.12. This was divided into legal, institutional and technical.

Table 4. 12: Results on barriers to the use of OERs

Barriers	**Mean**	**±SD**
	3.22	0.839
Legal Barriers	2.84	1.327
Lack of awareness of copyright issues	2.83	1.285
Lack of awareness of intellectual property (IPR) issues	2.85	1.370

Source: Field Survey 2017/2018 n = 239

Overall, barriers to the use of OERs could be described as moderate (M=3.22 SD=0.839).

Regarding legal issues, faculty sampled had knowledge or were aware of copyright issues (M=2.83, SD = 1.285) and also OER intellectual property (M=2.85, SD = 1.370). This implies that they were familiar with copyright and intellectual property issues.

Institutional barriers**:** On the issue of institutional barriers particularly policies regarding OERs, the results are presented in table 4.13.

Table 4. 13: Institutional barriers

Institutional Barriers	**Mean**	**±SD**
Lack of institutional policies on the use of OERs	3.13	1.395
Lack of support from management level	3.52	0.714
Lack of time to evaluate OERs	3.47	0.690

Source: Field Survey 2017/2018 n = 239

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Faculty agreed that there was a lack of support from management level on issues regarding OERs (M=3.52, SD = 0.714) and also lack of time to evaluate OERs (M=3.47, SD = 0.690). Similarly, faculty lamented the lack of institutional policies on the use of OERs.

Technical Barriers**:** There were many technical elements that faculty agreed were inadequate. The results of faculty views are depicted in table 4.14.

Table 4. 14: Technical Barriers

Technical barriers	**Mean**	**±SD**
Inadequate technical support	3.35	1.222
Inadequate infrastructure	3.43	1.181
Low internet bandwidth	3.56	1.202
Frequent power outage	3.44	1.243
Lack of access to the internet	3.52	1.172
Lack of access to computers	3.68	1.152
Low internet speed	3.84	1.102

Source: Field Survey 2017/2018 n = 239

Low internet speed (M = 3.84, SD = 1.102) was flagged as one of the inadequacies faculty agreed on. Other technical components were also flagged. For example, lack of access to computers (M = 3.68, SD= 1.152) and low internet bandwidth (M = 3.56; SD = 1.202) frequent power outage (M= 3.44; SD= 1.243).

The results on barriers suggest that for faculty to engage more, management should address issues such as low internet speed, lack of access to computers, low bandwidth and power outages. From the results it was evident that technological barriers are the most significant factor that influence the smooth adoption and use of OERs.

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4.6 General Means of Measured OER Constructs

This represents the pooled means of all the constructs used to determine which of them constitute the greatest factor in the construct to adopt OERs in the institutions studied for higher education. Table 4.15 exemplifies this.

Table 4. 15: Result of General Means of OER Constructs

Constructs	Mean	±SD
OERs awareness	3.86	0.904
Technological competencies (knowledge of OER searches)	3.75	1.185
Effort expectancy	4.02	0.711
Social influence	3.59	0.838
Behavioural intention	3.90	0.777
Facilitation condition	3.21	0.911
TC Knowledge of computer application	4.44	0.710
Performance Expectancy	4.17	0.616
Barriers	3.22	0.839
Actual use	3.22	0.983
Compatibility	3.43	1.080
Trialability	3.28	1.135

Source: Field Survey 2017/2018 n = 239

The overall OER means as represented in table 4.15 suggested that faculty strongly supported the notion that their technological competencies which are reflected in their knowledge of technological applications and knowledge of OER searches were necessary for the adoption of OERs in tertiary institutions (M = 4.44, ±SD = 0.710; M=3.75, ±SD = 1.185). The table also reveals that faculty perceptions about usefulness of OERs coupled with the ease with which it can be used is very high (M=4.17, ±SD 0.616; M=4.02, ±SD=0.711. The least cited is Facilitating Conditions (Mean = 3.21 and ±SD 0.911). The finding is an indication that for OERs to be operationalized in higher education, knowledge of computer applications, faculty perceptions of the usefulness (Performance Expectancy) of OERs as well as the ease with which they can be used (Effort Expectancy) are essential.

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4.7 Conditions or determinants for adoption by personal characteristics

The six independent factors identified in the UTAUT that were used to analyze participants' responses include their Effort Expectancy, Compatibility, Facilitating Conditions, Performance Expectancy Social Influence and Trialability while the dependent variables are Behavioural Intention to Use and Actual Use of OERs.

These were tested using independent-sample *t* tests to determine if there were significant differences between the means of the six OER dimensions that could be attributed to any of the six independent factors included in the study. The statistical level of significance as measured by *p* was .05. The data analysis for the OER determinants by each of the independent factors is summarized in Tables 4.16 through 19.

Results of the independent-samples *t* tests were used to determine if differences in the Unified Adoption Model factors mean scores could be attributed to age, sex and rank.

Table 4.16: Conditions for Adoption by Sex

UTAUT factors	Sex	Mean	SD	t	p
Effort expectancy	Male	4.01	0.82	-0.19	0.58
	Female	3.89	0.76		
Performance expectancy	Male	4.10	0.72	0.12	0.05
	Female	4.01	1.02		
Social influence	Male	3.11	0.58	-0.66	0.93
	Female	3.23	0.84		
Facilitating conditions	Male	2.99	0.79	-0.84	0.43
	Female	3.04	1.02		
Compatibility	Male	3.35	0.75	0.92	0.11
	Female	3.36	0.66		
Trialability	Male	3.17	0.68	0.27	0.64
	Female	3.01	0.34		
Level of Awareness	Male	3.77	1.04	0.46	0.13
	Female	3.86	0.88		

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Table 4.16 shows that apart from Performance Expectancy which produced a significance difference in terms of sex, the rest of the constructs or conditional factors were non-significant. This indicates that sex has no influence on the adoption factors.

Table 4.17: Conditions for Adoption by Age

UTAUT factors	Age	Mean	SD	T	p
Effort Expectancy	Below 46 years	3.23	0.82	0.31	0.86
	46 years and above	3.33	0.76		
Performance Expectancy	Below 46 years	3.99	0.72	0.44	0.74
	46 years and above	3.73	1.02		
Social Influence	Below 46 years	3.57	0.58	0.86	0.04
	46 years and above	3.01	0.84		
Facilitating Conditions	Below 46 years	2.99	0.79	0.64	0.05
	46 years and above	3.04	1.02		
Compatibility	Below 46 years	3.35	0.52	0.92	0.32
	46 years and above	3.36	0.60		
Trialability	Below 46 years	3.17	0.56	0.27	0.02
	46 years and above	3.61	0.44		
Level of Awareness	Below 46 years	3.27	1.12	0.46	0.13
	46 years and above	3.69	0.89		

Social Influence, Facilitating Conditions and Trialability were found to be statistically significant with age of the respondents. The mean statistics really portrayed that older faculty would be influenced by colleagues and those closer to them than younger faculty while older faculty would be influenced by the facilities necessary to utilize OERs and the need to try the resources to see their potential and advantages before deciding to use them. The results indicate that older faculty would like to scrutinize and evaluate the materials and try them before usage.

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Table 4.18: Conditions for Adoption by Rank

UTAUT factors	Rank	Mean	SD	t	p
Effort expectancy	Tutor/Lecturer	3.99	0.44	0.18	0.18
	Senior Lecturer/ Professor	3.69	0.92		
Performance expectancy	Tutor/Lecturer	4.01	0.86	0.72	0.09
	Senior Lecturer/Professor	3.87	1.12		
Social influence	Tutor/Lecturer	3.42	0.78	-0.83	0.93
	Senior Lecturer/Professor	3.64	0.94		
Facilitating conditions	Tutor/Lecturer	2.77	0.99	-0.95	0.03
	Senior Lecturer/Professor	3.41	1.08		
Compatibility	Tutor/Lecturer	3.31	0.28	0.52	0.76
	Senior Lecturer/Professor	3.54	0.61		
Trialability	Tutor/Lecturer	3.07	0.68	0.47	0.04
	Senior Lecturer/Professor	3.31	0.44		
Level of Awareness	Tutor/Lecturer	3.82	0.74	0.67	0.37
	Senior Lecturer/Professor	3.80	0.88		

Table 4:18 reveals that apart from Facilitating Conditions and Trialability in which significant differences were shown, the rest were not significant. The mean differences show that senior faculty members wanted to have the needed resources like computers and access to internet infrastructure before using OERs and they would like to experiment with OERs before they use them. This could be due to faculty wanting to assess the credibility of the resources.

The results signify that irrespective of the age, sex and rank of the lecturers, based on the nature of the job they are doing which revolves around teaching, learning and research, they will adopt and use materials that are relevant and compatible with their content or context.

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4.8 Factor Analysis

Validity and reliability of data are prerequisites for testing a theory. Regarding validity, factor analysis was used to confirm the validity of test items. The factor analysis identified the questions with strong loadings (Percy and Van Belle). It also makes it easier to understand a matrix of correlations (Oshlyansky, Thimbleby & Cairns 2007). Most of the items loaded onto their related constructs. Those that failed to fully load were removed. Below is a distribution of constructs and their item loadings.

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Table 4.19a Factor Analysis

Constructs	Components of the constructs	Factor loading
Compatibility	I think using OERs fits well with the way I like to teach	.815
	Using OERs fits into my teaching style	.792
	OERs are similar to other course content I use for teaching	.759
	Using OERs fits into the practice of sharing resources in my departments	.757
	Creating OERs is compatible with my belief in sharing educational materials to benefit everyone	.726
	My department has a website with open materials	.581
OER Awareness	OERs are materials that can be adopted for use in the classroom	.789
	I know about OERs	.777
	OERs are materials that can be adapted for use in the classroom	.769
	I will rate the quality of OERs as high	.764
	I am aware of open licenses that permit the free use of OERs	.748
	OERS are educational materials that are available to everyone	.741
	I am aware of open licenses that govern the creation of OERs.	.723
Technological competencies (knowledge of OER searches)	I know about OER search engines	.605
	I know how to access OER repositories	.597
	I can search for OERs	.544
Performance Expectancy	Using OERs will allow me to have access to current information about the courses that I teach	.802
	Using OERs will increase learning outcomes of my students	.745
	I would find OERs useful in my teaching	.573
Effort Expectancy	Learning to use OERs would be easy for me	.733
	My interaction with OERs will be clear and understandable	.760
	It would be easy for me to become skillful at integrating OERs into my courses	.757
	I will find OERs easy to use	.680
	I will find it easy to modify OERs	.674
	I will find it easy to search for relevant OERs	.606
Social Influence	In general, my institution has supported the use of OERs	.743
	People who influence my behaviour think that I should integrate OERs into my courses	.568
	In general, my institution has supported the creation of OERs	.686
	People who are important to me think that I should integrate OERs into my courses	.652
	The senior management at my institution has been helpful in the use of OERs	.585

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Table 4.19b Factor analysis continued

Construct	Construct components	Factor Loading
Behavioural intention	I predict I will integrate OERs into my courses next semester	.608
	I intend to integrate OERs into my courses next semester	.598
	I plan to adopt OERs in future	.594
Facilitating conditions	I have the resources necessary to access OERs	.796
	I have the knowledge necessary to integrate OERs into my courses	.742
	I have the knowledge necessary to integrate OERs into my courses	.726
	OERs are similar to the course content that I teach	.716
Technological competencies (Knowledge of computer applications	I am able to use computer applications such as Word processing	.763
	I can download materials	.721
	I can browse the internet	.714
	I can upload materials	.680
	I am able to use computer applications such as power point	.601
Barriers	Lack of awareness of intellectual property (IPR) issues	.856
	Inadequate infrastructure	.852
	Lack of awareness of copyright issues	.843;
	Lack of institutional policies on the use of OERs	.820
	Inadequate technical support	.796
	Low internet bandwidth	.754
	frequent power outage	.616
Actual use	I use OERs many times in a week	.711
	In the past year, I have incorporated OERs into my courses	.643
	In the past six months, I have incorporated OERs into my courses	.640
Trialability	I will use OERs if get a great deal of opportunity to try them	.592
	I will like to be able to properly try OERs out before deciding whether to use them	.552
	I will need to use OERs on trial basis long enough to see what they can do	.534

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

Based on the factor loadings in Tables 19a and 19b, it was established that the greatest factor for OER adoption and use was the compatibility of the materials to their pedagogical beliefs and practices. This is particularly so by the way academics like to teach and their teaching style. This is followed by level of awareness or knowledge of

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the OERs with the highest being that OERs are materials that could be adopted in classroom teaching (r= 0.789). The least factor was trialability of OERs before usage. This means lecturers need not try OERs before using or adopting them.

In furtherance to this, a Pearson product moment correlation coefficient was computed to assess the relationship between behavioural intention of faculty and performance expectancy, effort expectancy social influence, compatibility and trialability. The distribution of the results are shown in table 4.20.

Table 4.20: Pearson Correlations between Behavioral intention and Performance expectancy, Effort expectancy, Social influence, Compatibility and Trialability.

Item	Behavioural intention
Performance expectancy	.531*
Effort expectancy	.605*
Social influence	.506*
Compatibility	.288*
Trialability	.171*

N = 239 * Correlation is significant at the 0.05 level (2-tailed).

There was a positive correlation between behavioural intention and Performance Expectancy $r = 0.53$ $p = \leq 0.05$; Behavioural Intention and Effort Expectancy $r = 0.61$ $p = \leq 0.05$; Behavioural Intention and Social Influence $r = 0.51$ $p = \leq 0.05$; Behavioural Intention and Compatibility $r = 0.29$ $p = \leq 0.05$; Behavioural Intention and Trialability $r = 0.17$ $p = \leq 0.05$. This presupposes that the tendency of academics using OERs because they are easy to locate, customize and use is higher than its perceived usefulness, peer influence, compatibility and trialability.

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Another Pearson product moment correlation coefficient was computed to assess the relationship between the actual use of OERs by faculty and Facilitating Conditions, Compatibility, Trialability and Behavioural Intention.

Table 4.21: Pearson Correlations between Actual Use and Facilitating Conditions, Trialability, Compatibility and Behavioural Intention to Use

Item	Actual Use
Facilitating conditions	.455*
Trialability	0.101
Compatibility	.407*
Behavioral intention	.440*

N = 239 * Correlation is significant at the 0.05 level (2-tailed).

The results are shown in Table 4.21. Here again, a positive correlation was observed between actual use and facilitating conditions $r = 0.46$ $p = \leq 0.05$; compatibility $r = 0.41$ $p = \leq 0.05$; behavioural intention $r = 0.44$ $p = \leq 0.05$. The correlation between actual use and trialability, though positive was not significant. This shows that faculty may not necessarily want to pilot OERs before using them.

4.9 Testing of hypotheses

The null hypotheses were tested using the Pearson product-moment correlation test against the critical value of alpha is less than 0.05 to show that there is no significant relationship between the independent variables and the dependent variables. If the p is less than 0.05, then the test of the null hypothesis is significant and we consider the alternative hypothesis which states that there is a significant relationship between the independent variable and the dependent variable. On the other hand, if the p value is greater than 0.05, then the test of the hypothesis is not significant therefore we fail to reject the null hypothesis. The strength of the relationship is determined by the 'r' value of correlation coefficient (r). If r is closer to 1, it means there is a very strong

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relationship between the independent variable and the dependent variable (0.80 – 0.99). If it is between 0.60 and 0.79, then it is strong. If the r is between 0.40 and 0.60, then it is moderate. On the other hand, if the r is below 0.40 then it is weak.

Hypotheses: The test results based on tables 4.20 and 4.21 are as follows:

i. Hypothesis 1: There is no positive and significant relationship between performance expectancy and faculty's behavioural intention to use OERs.

The p is less than 0.05, $p = \leq 0.05$ so the test of the null hypothesis is significant. We therefore reject the null hypothesis and consider the alternative hypothesis.

ii. Hypothesis 2: There is no positive and significant relationship between effort expectancy and faculty's behavioural intention to use OERs.

The p is less than 0.05, $p = \leq 0.05$ so the test of the null hypothesis is significant. We therefore reject the null hypothesis and consider the alternative hypothesis.

iii. Hypothesis 3: There is no positive and significant relationship between social influence and faculty's behavioural intention to use OERs.

The p is less than 0.05, $p = < 0.05$ so the test of the null hypothesis is significant. We therefore reject the null hypothesis and consider the alternative hypothesis.

iv. Hypothesis 4: There is no positive and significant relationship between facilitating conditions and faculty's actual use of OERs.

The p is less than 0.05, $p = < 0.05$ so the test of the null hypothesis is significant. We therefore reject the null hypothesis and consider the alternative hypothesis.

v. Hypothesis 5: There is no positive and significant relationship between compatibility and faculty's behavioural intention to use OERs.

The p is less than 0.05, $p = < 0.05$ so the test of the null hypothesis is significant. We therefore reject the null hypothesis and consider the alternative hypothesis.

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vi. Hypothesis 6: There is no positive and significant relationship between compatibility and faculty's actual use of OERs.

The p is less than 0.05, p = < 0.05 so the test of the null hypothesis is significant. We therefore reject the null hypothesis and consider the alternative hypothesis.

vii. Hypothesis 7: There is no positive and significant relationship between trialability and faculty's behavioural intention to use OERs.

The p is less than 0.05, p = < 0.05 so the test of the null hypothesis is significant. We therefore reject the null hypothesis and consider the alternative hypothesis.

viii. Hypothesis 8: There is no positive and significant relationship between trialability faculty's actual use of OERs. The test failed to reject the null hypothesis

ix. Hypothesis 9: There is no positive and significant relationship Behavioural intention and faculty's use of OERs.

The p is less than 0.05, p = < 0.05 so the test of the null hypothesis is significant. We therefore reject the null hypothesis and consider the alternative hypothesis.

Correlation Matrix

Spearman's rho correlation matrix, a non-parametric technique, was used because of the categorical nature and ranked scales (Pallant 2003). It was also used to explain the strength and direction of the linear relationship between the variables under investigation. A positive value and a negative value without stars show no relationship between variables. However, a positive value with stars or a negative value with stars indicate a level of significance with the positive one being high and the negative one being low. Results of the correlation matrix are represented in table 4.22

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Table 4.20: Correlation Matrix Spearman's rho Correlation matrix for gender, age, Rank and study variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Gender	1.000														
Age	-.059	1.000													
Rank	-.093	.188*	1.000												
OER Awareness	-.014	-.160*	.024	1.000											
Technological Competencies	-.102	-.145*	.052	.649*	1.000										
Effort Expectancy	-.099	-.035	.214*	.534*	.515*	1.000									
Social_Influence	-.084	-.049	.117	.348*	.409*	.680*	1.000								
Behavioural_Intention to use	-.077	-.166*	.167*	.361*	.348*	.550*	.482*	1.000							
Facilitation Conditions	-.071	-.074	-.085	.389*	.410*	.394*	.520*	.236*	1.000						
Knowledge Of Computer Applications	-.014	-.200*	.253*	.505*	.602*	.458*	.377*	.378*	.245*	1.000					
Performance Expectancy	-.062	-.073	.080	.349*	.300*	.697*	.471*	.426*	.254*	.225*	1.000				
Barriers	-.069	-.126	-.136*	.198*	.241*	.244*	.240*	.131*	.266*	.142*	.203*	1.000			
Actual Use	-.034	-.078	.191*	.382*	.430*	.552*	.493*	.396*	.475*	.349*	.417*	.316*	1.000		
Trialability	-.066	-.143*	-.515*	.204*	.196*	.069	.108	.132*	.337*	.041	.186*	.404*	.096	1.000	
Compatibility	-.064	-.004	-.102	.275*	.237*	.304*	.315*	.218*	.375*	.150*	.295*	.162*	.295*	.247*	1.000

*. Correlation is significant at the 0.05 level (2-tailed).

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The results in the table show that there were no significant relationships between gender and OER awareness (r=-.014, P=ns); technological competencies (r=-.102, P=ns); Effort Expectancy (r= -.099, P=ns); Social Influence (r= -.084, P=ns); Behavioural Intention to use(r=-.077, P=ns); Facilitation Conditions (r=-.071, P=ns); Knowledge of Computer Appl.(r=-.014, P=ns); Performance Expectancy (r=-.062, P=ns);Barriers (r=-.069, P=ns); Actual Use (r=-.034, P=ns); Trialability (r=-.066, P=ns); Compatibility (r=-.064, P=ns). This means that gender did not have any influence on the constructs listed.

As regards age and OER constructs, the results in the table shows that there was a significant relationship between Age and OER awareness (r=-.160*); Technological competencies (r=-.145*); Behavioural Intention to use (r=-.166*) Knowledge of Computer Appl. (r=-.200*); Trialability (r=-.143*) This implies that younger faculty members were more aware of OERs and highly competent in the use of computers than older faculty. As well, the younger respondents were more ready to decide to use OERs than older ones.

The table also suggests that there was no relationship between Age and Effort Expectancy (r=-.055, P=ns); Social Influence (r=-.049, P=ns); Facilitation Conditions (r=-.074, P=ns); Performance Expectancy (r=-.073, P=ns); Barriers (r=-.126, P=ns); Actual Use (r=-.078, P=ns); Compatibility (r=.-004, P=ns). This shows that irrespective of age academics will use OERs when they find them easy to use. Age therefore has no direct influence on of ease of use.

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Regarding rank, it was found that there was a significant relationship between Rank and Effort expectancy (r=.214*); Behavioural intention to use (r=.167*); knowledge of Computer Applications (r=.253); Actual use (r=191*); Trialability (r=515*). There was also a negative relationship between Rank and Barriers (r= -.136*). This presupposes that faculty of higher ranks found it easier to use OERs and were more predisposed to deciding to use the resources. Besides, such faculty also had a higher level knowledge of computer applications. On the other hand, faculty in the lower ranks were more likely to face challenges in the use of OERs.

Finally, it is evident that there is no relationship between Rank and OER awareness (r=.024, P=ns); Technological Competencies (r=.052, P=ns); Social Influence (r=.177, P=ns); Performance Expectancy(r=.080, P=ns); Facilitation Conditions (r=-.085, P=ns); Compatibility (r=-.102, P=ns) However, Technological competencies of the lecturers and OER awareness correlated highly and positively than the other factors.

A multiple regression analysis was further conducted to ascertain if the adoption conditions or factors predict or influence behavioural intention and actual use. The results are provided in Tables 23 and 24.

Table 4.21: Multiple regression: Factors predicting behavioural intentions

	Unstandardized Coefficients		Standardized Coefficients		
Variable	B	Std. Error	Beta	t	Sig.
(Constant)	-.696	.709		-.981	.328
Performance expectancy	.122	.083	.101	1.472	.142
Effort expectancy	.037	.230	.013	.159	.874
Social influence	.074	.159	.036	.467	.641
Trialability	.422	.135	.188	3.119	.002
OER Awareness	.400	.074	.361	5.392	.000

Dependent variable: Behavioural intentions

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Multiple regression results from Table 23 indicated that, Trialability (β= .188, p=.002) and OER Awareness (β= .361, p=.000) significantly predicted academics' behavioural intentions to use OERs. On the contrary, performance expectancy (β= .101, p=ns), effort expectancy (β= .013, p=ns) and social influence (β= .036, p=ns) did not significantly predict faculty members' behavioural intentions to use OERs.

This results imply that faculty members would try various OER applications once they get the opportunity to do so. This also indicates that, once the OER materials are available for use, faculty members would be ready to adopt and modify them for use in the classroom.

Table 4.22: Multiple regression: Factors predicting actual use

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.843	.642	-	-1.313	.190
Performance expectancy	.183	.082	.146	2.216	.028
Effort expectancy	-.171	.213	-.058	-.804	.422
Social influence	.281	.149	.132	1.891	0.06
Trialability	-.232	.123	-.100	-1.881	.061
OER Awareness	.203	.074	.177	2.754	.006
Technological competencies	.292	.077	.258	3.809	.000
Compatibility	.391	.171	.151	2.293	.023
Behavioural intentions	.210	.058	.204	3.640	.000
Facilitating conditions	.229	.073	.212	3.151	.002

Dependent variable: Actual use

Results from multiple regression computations (Table 24) pointed out that, performance expectancy (β= .146, p=.028), OER awareness (β= .177, p=.006), technological competence (β= .258, p=.000), compatibility (β= .151, p=.023), behavioural intentions (β= .204, p=.000) and facilitating conditions (β= .212, p=.002)

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significantly influenced actual use of OERs among faculty. However, effort expectancy (β= -.058, p=ns), social influence (β= .132, p=ns) and trialability (β= -.100, p=ns) did not significantly predict actual usage of OERs among faculty.

These results imply that faculty members, who use the internet to browse and find OERs useful in their teaching actually used them in class. Similarly, faculty, members who could adopt and modify the content of OERs to suit their students learning actually used them for teaching and learning.

4.10 Summary of Key Findings

The key findings are as follows:

- Faculty had a high level of technological competencies and OER awareness.
- Faculty endorsed the use of OERs since it was beneficial to both academics and students
- The study established that faculty found it easy to use OERs
- Social influence played a major role in faculty intention to use OERs
- Facilitating conditions in the institutions were not optimum for the adoption of OERs
- The result on compatibility was mixed. While faculty expressed their belief in sharing OERs with others, they were not quite sure it fitted into their teaching style
- Faculty affirmed trying out OERs before using them
- The use of OERs was low
- Barriers to the use of OERs were mostly technical in nature
- As far as the UTAUT model is concerned, only Effort Expectancy was highly positive and significant in relation to behavioural intention to use.

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- There was a moderate positive and significant relationship between performance expectancy, and social influence.
- The association between facilitating conditions and actual use was positive, moderate and significant likewise that for Behavioural intention and Actual use.
- Trialability had no influence on Actual use.
- Behavioural intention had an influence on actual use
- The t-test result showed that men were more likely to find OERs useful than women,
- T-test results indicated that facilitating conditions and trialability were statistically significant with age and rank of the respondents.
- Multiple regression results showed that trialability and OER awareness significantly predicted behavioural intention to use OERs while performance expectancy, OER awareness, technological competencies, compatibility, facilitating conditions and behavioural intentions predicted actual use of OERs.

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Section B

4.11 Qualitative Results

This section complements the results of the quantitative study. It describes issues and gaps identified in the quantitative study through explanations, clarifications and elaborations by the participants. It discusses the qualitative interviews conducted with OER users and non-users. The transcribed responses of interviewees were analysed manually using themes and sub themes that emerged from the transcripts. The themes include, technological competencies, OER awareness, performance expectancy, effort expectancy, social influence, facilitating conditions, compatibility, trialability and barriers to the adoption and use of OERs by faculty. The themes and sub themes are described as follows.

4.11.1 Technological Competencies of Faculty

Participants interviewed mostly had knowledge of ICT. This included their ability to surf the internet and search for OERs and that motivated them to use the resources. Below are some comments from interviewees.

A faculty member had this to say:

> *…The first thing is that, anytime I need information, my first point of access is online. So when I go online, I try to look for OERs. It's a personal motivation because I have skills in surfing the internet. The next thing is that I also want my students to get access to materials so I also make sure that they are introduced to those sites. … And for research too…. When I am writing research articles, I also like to make use of those resources. I also teach ICT courses so there are times that I am limited in my knowledge so I go online to learn the various steps that I need … I can access online tutorials to guide me before going to class. (M, Lecturer, UEW)*

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Other views are as follows:

> *"I love computers and so when computers became available, I learnt how to use them. Somebody directed me to TESSA long before I was selected from the college to represent the school at Cape Coast. So I had that interest" (F Tutor, COE).*

> *"It is not difficult to locate them. You can just type the title of what you want and several resources will come up. You can open several windows and go through them and find out which ones interest you and go for them" (F, Prof, UEW).*

> *"Sometimes, I download some videos onto my tablet and I show them to students. So I use some of the resource as they are, without making any changes; and at times, I adapt some to suit my local needs" (M, Tutor, COE).*

This shows that Knowledge of ICT usage is important in the development and use of OERs.

4.11.2 Level of OER Awareness

Responses from most of the interviewees indicated some of the salient elements contained in the definition of OERs. Participants explained OERs in various ways. For example, they identified the resources as mainly digital, available to all and the use of open licenses that gives users permission to freely access, adopt, adapt and remix them for teaching and learning. Some of participants' views were as follows:

> *They are educational resources that are readily and freely available online with copyright licenses that allow people like us in academic environments to be able to use them for academic purposes. We can customize them, or reuse them as they are. So, roughly, that is how I view Open Educational Resources. (M, Senior Lecturer, UEW)*

A Mathematics Lecturer saw it this way:

> *OERs are those resources that you can find online and you can use them in ways that will benefit you. For example, if you are teaching Mathematics and in one particular topic you are looking for materials, you can go online and you can access free resources and transform them the way you want*

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> *and then you can use them to teach your students or you can refer students to those sites where the materials exist for them to learn more about the topic. (M, Senior Lecturer UEW)*

Others remarked:

> *"They are materials and resources for teaching made available freely on the internet. They are licensed by creative commons and GNU even though they are licensed, you must give credit to the author" (M, Tutor, COE).*

> *OERs to the best of my knowledge could be in the form of texts, videos or simulations on the internet that you can use to support teaching and learning. As a lecturer, I use some of them a lot, especially, with regards to science. There are so many texts, videos, simulations, and animations that we normally use in our teaching. They help the students to understand what you teach better. (M. Prof. UEW)*

Misconceptions about OERs

However, there were a few misconceptions about OERs. It came to light during the interviews that, while most participants had a good knowledge of what OERs are, a few of them faltered when it came to the accompanying details of OERs. These misconceptions include classifying teaching aids and props as OERs. This is exemplified by this respondent who said the following in an attempt to explain OERs.

> *... Yea OERs deal with how you can organize available resource materials to help teach or to help hammer whatever you are doing in the classroom. Usually, you don't buy the material, at least, you use those that you yourself can organize in the environment. So whatever materials you can lay hands on, you use to drive the teaching. (M, Tutor, COE)*

Another participant had this to say:

> *"They are all the materials and equipment that the learner will need to pursue the course successfully" (F, Senior Lecturer, UEW).*

In other cases, OERs were confused with computer hardware and other tactile computer-related objects applied for teaching purposes. This is further buttressed by this interviewee when he said:

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> *"We also have these boards in our classrooms so we can use them. We have a variety of OERs" (M, Tutor, COE).*

In an attempt to probe further to establish the interviewee's understanding of OERs with the question as to which OERs the participant uses, he confirmed what he had said previously with the following:

> *"... We usually use the boards because they're fixed in all the classrooms. We use the projector and laptop to present our lessons or to teach our students" (M, Tutor COE).*

On the issue of licensing which distinguishes OERs from other educational resources, it came to light that some participants did not know much about them. As a result, in explaining what OERs are, their emphasis was only on the fact that such resources are free. When probed further to find out the relationship between open licenses and OERs, they did not know about them. In another instance, a participant who had associated OERs with open licenses did not know about the types of license regimes.

Factors that influence faculty decision to adopt and use OERs

On the issue of factors that influence the use of OERs, a number of themes and sub themes emerged. The themes include usefulness of the materials, ease of using the materials, social influence, facilitating conditions, compatibility and trialability.

4.11.3 Performance Expectancy (Perceived Usefulness)

Participants outlined a lot of benefits from the use of Open Educational Resources. Most respondents reckoned that the use of OERs have been very beneficial to them and their students as well. They remarked that OERs provided them with free, quality, materials for use in the classrooms and that helped them to upgrade their knowledge and impact on students' learning. Open Educational Resources also gave faculty access

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to a lot of information as well as current information on materials they need in the classroom. This was confirmed throughout the interviews for OER users. The following responses from some interviewees confirm these assertions.

Benefits to Faculty

On access to current and relevant materials, a participant had this to say:

> *Most cases we don't have up to-date-books and there are situations where you're given a course which is not exactly your area of specialization so you have to educate yourself. And if you don't have up-to-date books, it becomes a problem, ... Sometimes, you have to fall on these materials because ... sometimes this is the best way to quickly orient yourself with a particular topic before you teach it. So they are very beneficial. As far as I'm concerned, it makes my work easy, especially in recent times where work load is very heavy. (M, Senior Lecturer, UEW)*

Others had these to say:

> *"I'm able to give current information when I teach" (M, Lecturer, UEW).*

> *"It helps me to get access to relevant information" (F, Tutor, COE).*

> *"In some cases, they suggest the approaches to use and those approaches are normally creative in nature, so you can introduce some creative learning in your lesson. they make the explanations of concepts really easy" (M, Tutor, COE).*

> *It is very, very beneficial to me. It makes me access materials and information readily. It benefits my students too. I just share with them the link and some of them are even into using the internet more than me. They have a nice way of finding information fast, and they share them with their colleagues, so it makes the burden of gathering information and materials become less. (M, Tutor, COE)*

Another respondent expressed similar sentiments in the following words,

> *... I continuously upgrade my knowledge in my field, so I can say that my competency level keeps on improving because we learn from experts and add to our little knowledge and competency. And once I'm in academia, I look forward to improving my self-learning and upgrading myself in the subject area to be become relevant and current. (M. Tutor, COE)*

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Participants mentioned many accrued advantages to users of OERs. They intimated that unlike other sources of educational and research information where users will have to pay to access needed information for such purposes, no such payment is required in the case of OERs. In the words of one interviewee,

> *"They are kept for educational purposes. They are free and whoever wants to access the resources and use them for teaching can go there and pick resources to enhance their teaching" (M, Lecturer, UEW).*

By implication, participants submitted that since OERs do not require any payment for what would under normal circumstances be paid for elsewhere, the savings made for using OERs may be seen indirectly as a reward for using the resources.

Regarding access to more information, a lecturer declared:

> *I realise that they are things that give me a lot of information. If you are trying to research on something, you go to the library … you get some information alright but if you go to OER sites, it seems you get more things … You get exposed to those things and it gives you the opportunity to add to knowledge. (F, Lecturer, UEW)*

Interviewees also commented on how OERs enhance their teaching regarding explanations of difficult concepts and the cost effectiveness it offers. These are expressed in the following quotes:

> *It makes the explanation of concepts easy for me. In Chemistry for instance, you need to use simulations or animations to show some concepts at microscopic levels. For instance, if we're talking about atoms we haven't seen the structure of the atoms, but when you use OERs, you will be able to explain them better. (M, Tutor, COE).*
> *If it's a video I'm using, I show it to them and we discuss and that discussion generated would be similar to teaching without using a video, but with the video the students have a visual representation of what I want to teach and it makes the discussion flow more easily than without the visuals. (M, Tutor, COE)*

> *"The use of OERs has exposed me to new knowledge and skills that have enhanced my teaching" (F, Senior Lecturer, UEW).*
> *"They come cheap, you don't have to buy them" (F, Lecturer, UEW).*

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> *"They make my lesson preparations easy because I am able to vary methodologies" (M, Lecturer, UEW).*

Benefits to students

Open educational resources benefit students in a lot of ways. They provide them useful information as well as help them to engage in active learning through discussions and project work. Some OERs visually demonstrate difficult concepts making it easier for students to grasp compared to sitting in lectures and taking notes.

The following are some of the views expressed by interviewees.

> *Again, because you are teaching them to go and teach, you are also directing them to where they can get materials when they move out. I also teach them the sites they can go to search for OERs so it is like I'm modeling how to get resources. In some cases, I give them the source of the materials especially when I print them out I give them the URLs so that they can also go there for materials for their lessons. (M, Tutor, COE).*

> *"Students learn not by rote, but it encourages meaningful learning. It engages the students and encourages active learning" (M, Tutor, COE).*

Another respondent expressed the usefulness of OERs in respect of his students as follows:

> *... For the students once they are exposed to such things, the sky, I shall say is the limit for getting information. So if even in the course of our classroom interaction there is some more to learn they readily go there to check and see and so it's more or less like a check on me and an endorsement... (M, Tutor, COE).*

Another sentiment expressed by a participant is as follows:

> *"Most students nowadays don't want to read. You give them a four page document and they will find that a big chore, but give them a ten minute video and they will happily watch it. It caters for all learning styles."(M, Senior Lecturer, UEW).*

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Quality of materials

The quality of teaching learning materials depict the level at which these materials would be acceptable for use. It also has implications for quality assurance measures and the credibility of the sources. Materials such as videos must be visually clear and audible.

Even though the quality of materials is embedded in most of the responses, some interviewees had this to say.

> *"Most of them are tested before they are given to others to use" (M, Tutor, COE).*

> *"…they normally come out with some information which is well researched and because the information comes from academics who are grounded in their subject areas, if you go there you're likely to get credible information" (M, Tutor, COE).*

> *Open Educational Resources are often created by institutions. Usually on the internet, you find other materials like videos on you tube created by individuals. Those may not have been reviewed. But in an institution like Khan Academy, their resources are moderated. (M, Tutor, COE).*

Another dimension of benefits is expressed in the use of multimedia. Here is a response by a participant.

> *And one other thing, especially when it comes to multimedia: You find that there are certain things that you understand and teach, but the way a video will capture them is much, much better than the way you can. So sometimes there are certain cases where we rely on certain multimedia elements that do the job better than you know. So if you want students to go beyond the content to look at various applications you can show them a video or certain types of multimedia, and based on that, a discussion would come out of it and it can get them to understand a topic a lot better than if you had repeated just the content. (M, Senior Lecturer, UEW)*

4.11.4 Effort Expectancy: (Ease of Use)

Individuals and faculty will utilize materials or resources that are easy to locate and apply in their everyday activities. The indication from the interviews is that it is

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relatively easy to access materials and the motivation it provides to enhance teaching is shown by the following respondents.

> *"It is easy to find them; some are very easy to use. For example, animations which explain concepts better than talking for a long time" (M, Tutor, COE).*

Further light is thrown on how it is used with relative ease as modifications could be made when materials are downloaded. This is a response from an interviewee.

> *"I try to transform them to suit the content that I am teaching and there are times when I can adopt them wholesale because when you are teaching ICT, the steps remain the same" (M, Lecturer, UEW).*

> *"Well, it is not all that difficult to search for OERs. In my case, I try to pick ideas from different OERs and infuse them into what I have to do, … so I do not use any particular one" (M, Lecturer, UEW).*

> *"I pick ideas from different OER sites on the internet to enhance my teaching. For example, I sometimes use power point presentations developed by experts online and combine them with videos online and my own lesson notes" (M, Lecturer, UEW).*

In effect, these respondents adopt, modify or customise or mix OERs to suit their circumstances.

4.11.5 Social Influence

The interviews showed that peers had a lot of influence on faculty adoption and use of OERs so did formal training or through ICT lessons from school.

These are what some participants had to say.

> *"It was through friends. Friends recommended that a particular site was good and I could get educational resources from there" (M, Tutor, COE).*

When probed further in relation to the site, he mentioned "TESSA."

> *"I was introduced to them by colleagues and visiting lecturers from Holland (M, Prof, UEW)".*

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For those who had been trained, the following are some of the views captured.

> *"I was trained to use them. Two years ago, some people made mention of them and when we had a TTEL workshop, the facilitator made mention of them when he wanted material for TLMs" (M, tutor. COE).*

> *"In the course I read at the under graduate level, we did ICT together with Mathematics so I was introduced to them" (M, Snr Lecturer, UEW).*

4.11.6 Facilitating Conditions

Faculty asserted that there was some level of technical support albeit inadequate. The views of faculty on the issue of facilities that enhance faculty use of OERs are captured below.

> *"I would say we have internet facilities, access points and computer labs with some computers. These are limited though" (M, Snr Lecturer, UEW).*

> *We don't have a systematic support system. If you have a problem, you can ask a colleague just as when you're teaching or you need information and ask a colleague, but we don't have a specific person or unit in charge of OERs" (M, Tutor, COE).*

> "*In my college, we have internet connection alright, but it seldom works and you have to buy data at an extra cost. Sometimes, you may have a link and you may want to share it with your students. These days many of the students have smart phones, but where is the data? And that poses a challenge. (M, Tutor, COE)*

> *There was a time that there was a workshop to introduce them. It was not well done though, I didn't understand what they taught at that workshop, but I followed up to find out what it was all about. (M, Lecturer, UEW)*

4.11.7 Compatibility

Issues pertaining to compatibility could be gleaned from participants' belief in the use of interactive materials, new pedagogies and student engagement. The following is a participant's perspective.

> "*I prefer to use these types of resources and methods than the old method of giving notes so I tell my students that I'm not giving them notes so I'll bring something and we'll have a discussion. These resources make teaching a lot easier" (M, Snr. Lecturer, UEW).*

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Another stated that:

> *"It helps in bringing variety during the teaching/ learning process. It makes my teaching very interactive" (M, Lecturer UEW).*

This is another view:

> *I combine different things in order to make the lecture interesting. When you use animations and simulations you realise that the students understand lessons very well. It enables the students to shed off the misconceptions they have about some topics and understand the concepts very well. (M, Prof, UEW)*

4.11.8 Trialability

This involves the extent to which academics' are willing to pilot OERs before using them. Throughout the interviews, faculty affirmed that they did experiment with OERs before using them. By trying them out they are able to determine which ones to use and which not use. They are also able to determine the ones they should adopt wholesale, the ones they should adapt and the ones they should remix. The following are examples of faculty views.

> *"I often go to a few trusted sites where I can get credible information and then I decide which of them to add to my lecture" (M, Tutor, COE).*

> *"You need to experiment with the resources to see how useful they will be to you. If you don't you won't know which one to use, which ones to discard and which ones to combine" (M, Snr. Lecturer, UEW).*

4.11.9 Barriers associated with the adoption and Use of OERs in higher educational institutions in Ghana.

This section of the study deals with the barriers to the adoption of OERs in higher educational institutions of Ghana. Reasons given by respondents in respect of the barriers are discussed below under technical and non-technical sub themes:

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Technical issues

This section of the study deals with the barriers to the adoption of OERs in Ghanaian higher educational institutions. Reasons given by participants in respect of the barriers are discussed below under technical and non-technical sub themes:

Technical barriers

Unreliable internet connectivity

Unreliable internet connectivity was a factor mentioned by most participants as a barrier to the adoption of OERs in higher educational institutions in Ghana. The issues range from breaks in connectivity to speed and then to total absence of internet facilities.

Asked about the barriers, this was what one participant said:

> *"Network system, even if you have a modem getting a reliable network is difficult" (F, Tutor, COE).*

Breaks in connectivity were seen as an issue that prevented the use of OERs because most OERs are online facilities and therefore they can only be accessed via the internet. A break in connectivity simply means the closure of the access way to the OERs. This certainly frustrated many OER users who lost internet connectivity at the time when they needed to access OERs.

The frustration of one respondent was expressed as:

> *"One of the challenges is that these are open resources and you need to hook up unto the internet. Sometimes at home, you want to do your work, but because there is no internet you are compelled to travel all the way from "South Campus" to the office. At times you get here before you get to know that the internet is not working, so you have to go back disappointed. So I will say connectivity is the main problem. (M, Lecturer, UEW)*

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Experiences like this can potentially discourage potential OER users. There are other situations where the facility hardly works. In situation like that, the user will not be in the position to utilize OERs as they would have liked to. Obviously this comes with an additional challenge of buying data as an alternative.

Problematic and incompatible formats

A few respondents found the formats in which resources are presented a bit problematic. According to them, some files are made in ways that make editing and adaptation difficult. Some formats were said to have ceased functioning after they had been used previously. In his words, a Senior Lecturer had this to say:

> *... There are issues with file formats and compatibility with whichever machine you're using. There are cases where I have used some resources and a few years down the line, I realised that either the file format has been blacklisted or whatever because you find that they're no longer useable in that format. For example, a few years ago, I created some courseware ... some three to four years ago, added some videos and I was going to reuse my courseware which included OERs. Now I noticed that the videos that I embedded in the courseware were no longer there, so I had to go and look for fresh ones. Even in some cases, I looked for the same video, but in a different file format to make it work. So there are sometimes issues of compatibility based on where they are coming from. Or sometimes they may use certain fonts that are not readable based on the software you are using to open it. (M, Snr Lecturer, UEW)*

Weak Signals from the Wi-Fi

Weak signals from the Wi-Fi, which does not allow for free downloads, compel the teachers to buy mobile data for that purpose. This was seen as a barrier as it constituted a financial drain on teachers and students alike. Statements like the following made during the interview give a proper indication of their feelings.

> *These days the Wi-Fi is not all that strong. Sometimes it is slow. Sometimes you the teacher will have to buy credit and then use it if you want to download information very fast, so if you are at the college and there is no Wi-Fi it means that you have to use your own money to do and that may be a drain on the teacher's pocket. (M, Tutor, COE.*

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Another participant expressed similar sentiments.

> *"As we speak, the Wi-Fi system in the school is not working so you can just imagine, we use our money to buy …" (F, Tutor, COE).*

Power cuts

Unreliable power supply also came up during the interviews as a barrier. Power cuts affect the functioning of the Wi-Fi and all other equipment applied in accessing the OER materials on the internet. The absence of power effectively translates to no internet connectivity. While alternative source of power could be explored, exorbitant cost discourages potential OER users from investing in alternative sources of power. The following are some views from participants:

> *"Sometimes, when you're working, suddenly, the lights go off. You wait and wait and wait, but it does not come on" (M, Lecturer, UEW).*

> *"Madam, power cuts is a problem ooo. During the day, at least you can use your modem, but even then, after about an hour your battery runs down. You cannot do anything unless you have a generator which is expensive" (M, Tutor, COE).*

> *"Power cut is a factor, but not too much" (F, Lecturer, UEW).*
> *Another respondent threw more light on the issue with the following*

> *I normally use Power Point ... We suffer because we do not have a generator, so when the lights go off, we have a problem. A couple of times when we are teaching and the light goes off, it affects us. We don't know what to do because we sometimes put animations into the power point (M, Lecturer, UEW).*

Non-technical issues

Non-technical barriers to the use and adoption of OERs mentioned by respondents include additional cost involved in its use, accuracy and the comprehensive nature of materials. Some respondents felt some OER materials were sub-standard and not comprehensive enough. Therefore, relying on such resource would mean they are

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feeding sub-standard materials to students. One respondent put the foregoing as follows:

> *The issue that I most worry about is the authenticity of resources. Again, some resources don't deal with topics in a holistic manner so there is the risk that you'll take a resource, go and use it and you'll probably notice later on that there are some aspects that you didn't touch. So, there are issues with the quality of the resources, how comprehensive they are, there are issues with accuracy of information. (M, Snr Lecturer, UEW)*

It also came up that the nature of some OER materials was not suitable for our environment as examples cited were esoteric and did not have much to do with our environment. This was aptly expressed by an interviewee in the following words:

> *"…it is not everything you can get to support your teaching. You may want it to look more Ghanaian but those who developed it consider their environment so in an attempt to get the one which will fit your situation it becomes problematic" (M, Lecturer, UEW).*

Other faculty members expressed their views:

> *"Not all topics can be found in the OERs repositories" (M, Tutor, COE).*

> *"Some materials have to be worked on in order to suit our settings and that requires a lot of time" (F, Lecturer, UEW).*

Views of those not using OERs

Lack of knowledge and information, computer illiteracy, time consuming, exotic nature of materials, information overload, no dedicated hardware for exclusive use and the conservative nature of potential users were cited. These are discussed in detail as follows:

Additional costs involved in its use

The additional cost involved in the use of the OERs, as intimated elsewhere in the study emanates mainly from buying of data to support the weak signals of the wi-fi. This

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discourages potential users and even existing users from continuous payment for access.

Lack of knowledge and information/absence of the necessary accessories

Another barrier to the adoption of OERs emanated from the knowledge base of potential users. This was seen from the stand point of whether potential users are aware of the existence of the OERs, where they are aware of its existence. The other question that arises is whether they have the necessary skills to navigate the internet for access. This is particularly so where one is not computer literate. This also holds for situations where potential users do not have the necessary equipment like laptops to download information from OER repositories. Before the non-users, expressed their views, some users made a few remarks indicating why they thought some faculty members were not using OERs.

In the words of a Senior Lecturer,

> *We did a workshop recently and some of the things that I took out of the workshop as a facilitator is that some of the academics are not even aware of the existence of OER. Some may be aware but have challenges of how to access them and what to do with them when they access them. So they know that OER are fine to use but the question is if I find a video online how do I download the video or even if I downloaded it, how do I embed it into my lessons? And of course, there are a group of lecturers who don't think that that way of teaching is a good way. But, I think a good number of them might want to use it but the question is ability… where to find them, what to do … when you find them. So those ones you can solve with training. (M. Senior Lecturer, UEW)*

Here are comments from another participant.

> *"…either they do not know this information is there that they can access or they don't have the skills. Not all of us are conversant with the use of the computer and the internet so they may find it difficult to download or get information from the sites. If they don't have personal computer, they*

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> *might find it difficult. So if the person is not computer literate and doesn't have a laptop to use or there is no Wi-Fi in the environment… it can be a challenge" (M, Tutor, COE)*

Conservative nature of potential users

The application of computer or any computer related activity is still seen by some people as a novelty in spite of its many years of general application in the country. That being the case, there are still people who do not believe in, or trust in the efficiency of computers. These conservatives still do not want to have anything to do with computers. The phenomenon was described by one respondent as follows,

> *"Some are 'BBC' 'Born Before Computer', some of us don't know how to look for materials … the person has old materials why will they bother to go to the net and look for materials which may be non-existent" (M, Lecturer, UEW).*

Time consuming /information overload

The tedium that is experienced in the search for appropriate OERs constitute a barrier to users. On account of the maze of information available online to OER users, a lot of time is spent sifting through them in order to access the most suitable one. In respect of the foregoing, a Lecturer with 5 years teaching experience who was not using OERs stated:

> *"… If you are not careful you will search and search and search and in ICT, we call it information overload and the focus will be shifted from the actual work you will be doing. You get a series of them and making a choice also becomes problematic." (M, Lecturer, UEW).*

Other faculty members who were not using OERs shared their opinions.

> *I don't know how to access them. I know they exist but I don't know how to access them and I also don't know the nature of materials that exist there. Unfortunately I haven't had anybody to teach me how to do it. (M, Lecturer, UEW).*

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A female tutor from COE stated:

> *"… it's time consuming, looking for information is not easy, and I have not been encouraged to use them" (F, Tutor, COE).*

This proves that in the adoption and use of OERs, individual interests and capabilities as well as relevant information on its benefits to the instructor and students are paramount.

4.11.20 Institutional support available for faculty adoption and use of OERs

It came out during the interviews that even though most respondents acknowledged some level of institutional support for the adoption of OERs to teaching and learning in their institutions, they were inadequate. The inadequacy of such support was gleaned from their respective suggestions as to what could be done to encourage the use of OERs and potential users in their institutions. However, there was also clear cases institutional support. Details of these are discussed below:

Good institutional support

There were cases where institutions supported not only teachers but extended such support which came in the form of training to cover students as well. The nature of support the institutions enjoy as described by these respondents is commendable.

Here are some participants' views:

> *"At my school, what we have done is that every office has a laptop so if you don't have a laptop you can download the resources and put them on your pen drive and when you go home you can use them on your personal desk computer" (M, Tutor, COE).*

> *"… We even have an e learning lab where the students together with the tutors go and look for materials that will enhance our teaching and learning. Sometimes we use audio visuals" (M, Tutor, COE)*

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> *"If you want to use a projector for teaching, the college has some computers and projectors for you to use. If you want to print a document, you send your request to administration and they print it for you to use." (M, Tutor, COE)*

> *"The college doesn't ban us from using Open Educational Resources. They don't say don't use this or that. There is no policy on that. The policy on teaching and learning is even advising that we do some creative teaching. So, the college has that kind of support for the use of OERs. So there is a broad support for teaching and learning, but not for OERs specifically." (M, Tutor, COE).*

> *...In fact, our institution has been doing well. Even the new teachers who were employed have been taken through some training. Some are still being trained while others have completed the training programme. So I can say that OLA has been doing well not for tutors only but for students as well" (M, Tutor, COE).*

> *"I'm aware about a year ago, fiber-optic cables were laid on the school campus but we don't use it. I will be glad if the fiber-optic cable launched will see the light of day in terms of its functioning. If it had been put into full functioning mode, it would have done some good to us so that we can use the facility" (M Tutor, COE).*

It is worth-noting however, that the connection to the fiber-optic infrastructure is the sole preserve of the Telecommunication Companies in Ghana. The institutions per se have very little role to play here.

4.11.21 Institutional Support to enhance the use of OERs

There were suggestions for more training. This can be interpreted to mean there is not enough training hence the need for it. This is what a participant said:

> *"... they can train the staff and give them a lot of these sites for them to access because if people know that some of them can access OERs online, then those who are not computer literate would be encouraged to learn and be able to access" (M, Tutor, COE).*

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This was buttressed by other participants with the following statements.

> *"…And again, intermittently organizing workshops to encourage faculty members. At times they run workshops alright, but they hardly complete such workshops and so they leave you in the middle and you wouldn't know what to do with it. So they need to expose us to a lot of these things and train us to the end" (M, Lecturer, UEW).*

> *I think we should be educated first, probably through a seminar or a workshop of a kind. and then my colleagues who probably do not know about the resources should be taught that such and such facilities exist. and the advantages that will accrue to users and then also be encouraged to use them. (M, Lecturer, UEW).*

> *I think we also need some orientation of how to access various OER sites that can help us because sometime we find it difficult to locate the sites where we can get materials from. So regular training and updating may be helpful or maybe the library or some other technical people can help us. (M, Snr Lecturer, UEW)*

Hardware/Internet architectural support

There were indications that some institutions needed to strengthen their total ICT infrastructure. Areas of needed support were mentioned as reliable internet facility. This response from a Senior Lecturer sums it up

> *…I think our internet facility must be reinforced. If possible, they can explore other facilities apart from the one way that we are using. For instance, currently we are using vodafone. If the university can have demarcations so that in one area we use vodafone, and in another area we use MTN, it will go a long way. (F, Snr. Lecturer, UEW)*

Another participant had this to say.

> *"Management should provide us with high internet bandwidth with high speed and a technical support team" (M, Tutor, COE).*

Support Required from Management

Participants highlighted various types of support they would like leaders of their institutions to provide such as giving them the necessary training and equipping the

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institutions with the needed technological tools to work with. Some of them lamented as follows.

> *"I believe that top management must begin to realize the importance of OERs and empower lecturers with computers and training and high internet speed" (M, Lecturer, UEW).*

> *"Top management must recognize OER use. Computers should be made available. Some tutors don't even have access to TESSA computers so it makes it so difficult" (M, Tutor, COE).*

> *"The college itself should be able to put in place people to create OERs so that we shall not always be adapting what others have done" (M, Tutor, COE)*
> *There should be awareness creation for its benefits and training programmes" (F, Lecturer UEW).*

Policy issues

Faculty also expressed the need for the formulation of policy to guide OER use as indicated in the following responses.

> *"We can also have policy to guide teachers and students so that we just don't pick anything and say were using OERS (M, Tutor, COE).*

> *"Management should provide policy guidelines to guide the use and even the creation of Open educational resources (M, Senior Lecturer, UEW).*

> *"There should be institutional policy to motivate the creation and use of OERs. For example, as a condition for promotion" (M, Tutor, COE).*

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Table 4.25 Summary of Themes and Sub Themes of Qualitative Study

OBJECTIVES	THEMES	SUB THEMES
OBJECTIVE I	**Technological Competencies**	Skills to surf the internet Skills to search for OERs Skills to adapt OERs
OBJECTIVE 2	**OER Awareness**	Explanations of OERS Misconceptions of OERS OER licenses
OBJECTIVE 3	**Performance Expectancy (Perceived Usefulness)**	Usefulness to faculty Benefits to Students Quality of materials
OBJECTIVE 3	**Effort Expectancy (Perceived Ease of Use)**	Easy to modify Ease of use Easy to search
OBJECTIVE 3	**Social Influence**	Influence by peers and friends
OBJECTIVE 3	**Compatibility**	Belief in the use of interactive materials, new pedagogies and student engagement
OBJECTIVE 3	**Trialability**	Opportunities for trying out OERs before use
OBJECTIVE 4	**Barriers to the adoption and use of OERs**	Technical barriers Institutional barriers Legal barriers, non-technical issues Views of non-users
General Comments	**Institutional support for OER use**	Good institutional support
General Comments	**Institutional support to enhance OER Use**	Training, Technical support Policy in relation to the creation and use of OER Policies on use of creativity to enhance teaching

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4.12 Summary

This chapter has discussed findings from both quantitative and qualitative studies. In the quantitative study, key findings in relation to the objectives of the study were identified. In addition, correlation results, t-test results and regression results were also displayed. The hypotheses and conceptual framework were also revealed. Various themes and sub themes related to the objectives of the study were discussed. The themes including technological competencies, OER awareness, performance expectancy and effort expectancy and social influence have also been highlighted. Other themes like facilitating conditions, compatibility, trialability and barriers have also been looked at. Sub themes such as benefits, ease of use, technical as well as institutional barriers have been expressed. Facilities available for the successful uptake of OERs have also been mentioned. Also captured is the role of management. It is evident that despite the numerous challenges, most participants are motivated to use OERs. A pattern of use has also emerged whereby participants use OERs mostly to complement teaching and learning. It is hoped that management would provide the necessary support to enhance the adoption and use of OERs to bring them into the mainstream.

The next chapter discusses the findings established in Chapter Four.

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CHAPTER FIVE

DISCUSSION OF RESULTS

5.1 Introduction

This chapter discusses the results of the analysis in chapter four. It is developed alongside the objectives of the research and the theoretical model adopted for the study.

5.2 Technological Competencies

Technological competency behaviours are directly related to the nature of training and the technical proficiency required to exercise effective control on the use of technological devices. Such competencies require the individual to effectively perform a given task. Technological developments such as big data, cloud computing, the internet of things, robotics, artificial intelligence and immersive communications are likely to have a significant impact on the world of work and employment and trigger far-reaching changes. It is not surprising that there are fears among many employees that there may not be enough work for them in the future. Such concerns are not new. In this study, respondents showed a high level of knowledge of computer applications and knowledge of OER searches (M = 3.75 SD = 1.185). The literature suggests that while this could be an influencing factor for the use of technology, in some cases, it does not apply. It can be inferred from the study that technological competencies could have played a major role in faculty use of OERs. This is indicated by faculty members' knowledge of computer applications such as their ability to browse the internet, download and upload materials, among others. It therefore translated into the ease with which they learnt to use OERs, as well as their use and integration of OERs into their courses. It could also be the reason why faculty members were able to search for and modify OERs for use. This point is supported by Samzugi and Mwinyimbegu (2013)

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who suggested that familiarity with computers and information literacy play a major role in enhancing access to and effective use of OERs. This implies that most faculty use OERs because they are skilled in computer literacy and OER searches. The results suggest that faculty members might have benefited from training programmes on ICT in their respective institutions or elsewhere.

Interviews with some faculty members also reinforced this point as indicated in this statement.

> *"Sometimes I download some videos onto my tablet and I show them to students" So I use some of the resources as they are, without making any changes, and at times, I adapt some to suit my local needs.*
> *(M, Tutor, COE)*

It is also evident that some of them might be self-motivated to search for and use OERs because of their computer literacy skills, as these statements indicated.

> *"The first thing is that anytime I need information, my first point of access is online. So when I go online, I try to look for those ones. So it's a personal motivation because I have the skills in surfing the internet."*
> *(M, Lecturer, UEW)*

> *"I love computers and so when computers became available, I learnt how to use them. Somebody directed me to TESSA long before I was selected from the college to represent the school at Cape Coast. So I had that interest. (F, Tutor, COE)."*

This is contrary to findings by Li, Yuen and Wong (2014) as well as Kelly (2014) that a good knowledge of technology does not necessarily translate into knowledge and use of OERs.

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5.3 OER Awareness

Awareness constitute the ability to directly know and perceive and to be conversant with issues at stake. Therefore, instructors must concern themselves with and be well informed about a particular situation and its development. This means they must have relevant knowledge about OERs and their uses. This will also help them to fully appreciate the materials they are using in teaching and learning. Even though the literature on the seemingly lack of awareness of OERs among faculty members particularly in developing countries is reported by Rolfe (2012) and Allen and Seaman (2014), in this study, the reverse was found. Most faculty members were aware of OERs (M =3.86 SD = 0.904)**.** Faculty members did not only know about OERs, but they knew about some of its core elements such as its reuse, revision, its quality and the fact it is an open resource. This confirmed findings by Chae and Jenkins (2015); de Hart et al. (2015) and Venkaiah & Ambedkar, (2012).

The result indicated that over half of faculty had knowledge of open licenses (M = 3.48, SD =1.238). This is an indication that they are likely to acknowledge the importance of OERs and apply them to their everyday activities. This suggests that they would be able to distinguish between OERs and other digital materials online. However, most of them did not know the types of licenses as revealed in the interviews. It is however essential for faculty to recognize and be well-informed of the various licensing regimes since they help in determining the appropriate license to use when implementing OERs, or when converting materials into OERs or when reusing, remixing or repurposing.

It is possible that the awareness creation is being done by peers and significant others. Also, some academics who were self-motivated may want to learn about the resources.

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Finally, it is also possible that the technology savvy academics may out of curiosity want to know about the resources. This is an indication that some gains have been made since the 2012 Paris Declaration and the 2007 Cape Town Open Education Declaration. It is refreshing to note that some of the qualitative results corroborated the extent of faculty awareness of OER.

A participant had this to say:

> *They are educational resources that are readily, freely available online with copyright licenses that allow people like us, in academic environments to be able to use for academic purposes. We can customize it or reuse them as they are. So, roughly, that is how I view open educational resources. (M, Senior Lecturer UEW).*

Although most respondents had a good knowledge of what OERs were, a few of them faltered when it came to the accompanying details of OERs. Some respondents had misconceptions as to what OERs are. These misconceptions include classifying teaching aids and props as OERs. In other cases, OERs were confused with computer hardware and other tactile computer-related objects applied for teaching purposes. Such misconceptions could be the result of some faculty members having little or no knowledge about the resources or were misinformed by their peers or colleagues.

5.4 Performance Expectancy to adopt and use OERs

Performance expectancy is the extent to which an individual believes that a technology or an innovation will help him or her perform more efficiently at a job. (Venkatesh et al., 2003). Expectancy or (expectancy theory of motivation) proposes that an individual will behave or act in a certain way because they are motivated to select a specific behaviour over others due to what they expect the result of that selected behaviour will be (Vroom 1983). Performance Expectancy therefore constitute the degree to which

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faculty believes that using OERs will help them perform better at their jobs in terms of getting current information on the courses they teach, accessing quality materials for teaching and learning and also improving students' learning outcomes. Getting current information implies up-to -date teaching and learning materials as well as information on teaching methodologies which include a shift from teacher-centred pedagogies to learner-centred ones. It also implies quality materials as well as a reduction in the strain on fair use. Additionally, it is likely to reduce cost and improve both students and faculty access to quality materials, and has the potential of improving the teaching methodologies of faculty. It is likely to widen access to higher education since the cost of buying books may be reduced. It is thus not surprising that faculty believes that the use of OERs impacts positively on students' learning outcomes. The overall perceived benefits of OERs (M = 4.17, SD = 0.6I6) reflect faculty perceptions of the resources as a useful teaching tool. The results on the usefulness of OERs could be from faculty's gradual exposure to OERs and their awareness of the usefulness of the resources. For example, at the University of Education, Winneba, under the PHEA project, faculty technological competencies were improved. Faculty was also made aware of shifts in instructional practices and pedagogies towards learner-centredness (University of Education, Winneba, 2010).

The perceived usefulness of OERs was further confirmed by faculty during the interviews. Some faculty members saw OERs as a learning ground and an opportunity for technology use. Respondents saw OERs as a facility from which they could learn to shore up their competencies. Thus a lot of confidence was placed in OER sources as rightly indicated by this interviewee:

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> *"I continuously upgrade my knowledge in the area so I can say that my competency level keeps on improving because we learn from experts and add to the little knowledge and competency that we have. And once I am in academia I look forward to improving my self-learning and upgrading myself in the subject area to become relevant and current" (M, Tutor COE).*

Thus the experienced faculty who had been using OERs could help the novice lecturer to use OERs. OER materials could provide faculty the ability to enliven their courses and interact positively with their students.

A lot of benefits from the use of Open Educational Resources were recognized by faculty. Most faculty reckoned that the use of OERs would be very beneficial to them (M = 4.21; SD = 0.441) and their students as well (M= 4.01; SD = 0.912). To many of them, OERs provided them with free, quality, and current materials for use in the classrooms and this helped them to upgrade their knowledge and impact on students' learning. It would also give them access to a lot of information as in materials they need in the classroom. These were confirmed throughout the interviews for OER users as the following response asserts.

> *Most cases we don't have up-to-date books and there are situations where you're given a course which is not exactly your area of specialization so you have to educate yourself. And if you don't have up to date books, it becomes a problem, ... Sometimes, you have to fall on these materials because ... sometimes this is the best way to quickly orient yourself with a particular topic before you teach it. So it is very beneficial. As far as I'm concerned, it makes my work easy, especially in recent times where work load is very heavy. (M, Senior Lecturer, UEW)*

It is significant to note that OERs have helped provide current knowledge and information. For example, knowledge keeps on changing and so to be abreast of the times, OERs are helping to upgrade lecturers' knowledge base in their respective subject areas. In essence, it is making faculty access material readily for students as well. This leads to the sharing of materials and links with students which invariably

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would reduce the burden on faculty gathering information and materials as well as preparing lesson notes.

In this case, unlike other sources of educational and research information where users will have to pay to access needed information for such purposes, no such payment is required in the case of OERs, which implies financial gain to instructors and students. For many faculty members, the use of OERs makes explanation of difficult concepts easy because in areas like the sciences where simulations or animations are necessary, OER materials are helping. Thus, the use of videos generates discussions and offers students a visual representation of what is being taught. In this way, creativity in the teaching and learning process is enhanced.

The importance of OERs to students was also essential. OERs have reduced students learning by rote, by encouraging meaningful learning and engaging in active learning. This has become possible due to their surfing the internet for materials and comparing them with those of their colleagues. Also, for most students nowadays reading a four page document has become a difficult task, but they are ready to listen to and watch a ten minute video. Thus OERs tend to cater for all learning styles. Yet, the credibility of such materials are questioned based on the type of academics producing them and the expertise they have. But where they are grounded in the subject matter the people are likely to get credible information.

There was a positive and significant relationship between performance expectancy and behavioural intention to use OERs.

$r = 0.53$ $p = \leq 0.05$

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The results signify that hypothesis 1 is supported.

r^2 which represents the common variance or the degree of determination and determines the level of influence between the independent variable and the dependent variable was .28 or 28%. This shows that performance expectancy explains only 28% of why faculty decides to use OERs. By implication, 72% of behavioural intention to use OERs can be explained by other factors.

The results ($r = 0.53$ $p = \leq 0.05$) compares favourably with that of Padhi (2018) who found that performance expectancy had a positive influence on intentions to use OER ($\beta = .342$, $P < .001$. Percy and Van Belle (2012) as well as Venkatesh et al. (2003) had similar findings.

However, it is contrary to findings by Mtebe and Raisamo (2014b) who found performance expectancy did not have a significant effect on lecturers' intention to adopt and use OERs (Beta = -0.187, $p < 0.069$). Findings from this also contradicts the findings of Singeh et al (2013) who found no relationship between performance expectancy and behavioural intention to use technologies.

It is also significant to note that there was no significant relationship between gender and Performance Expectancy (r=-.062, P=ns) which implies that faculty perception of OERs as being useful was not based on gender. There was also no significant difference between age and Performance Expectancy (r=-.073, P=ns). This also confirms that faculty found OERs useful irrespective of their age. Similar findings were true in respect of rank and Performance Expectancy (r=.080, P=ns).

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These results were at variance with that of Venkatesh et al. (2003) who found that while performance expectancy was the strongest predictor of behavioural intention to use a technology, the strength of the relationship varied with gender and age such that it was more significant for men and younger workers. Wu, Yu and Weng (2012) also found a positive relationship between performance expectancy and behavioural intention with age and gender moderating it.

5.5 Effort Expectancy to Adopt and Use OERs

This relates to faculty finding it easy to access, adapt, and use OERs and the likelihood to engage with it. However, if the process is complex or complicated they are not likely to use it (Mtebe & Raisamo, 2014b; Percy & Van Belle, 2012; Li, et al., 2014). It was evident from the study that generally, faculty found OERs easy to use (M=4.02, SD = 0.777). The interviewees using the OERs confirmed this:

> *"It is easy to find them … Some are very easy to use. For example, animations which explain concepts better than talking for a long time" (M, Tutor, COE).*

> *"Well, it is not all that difficult to search for OERs. In my case, I try to pick ideas from different OERs and infuse them into what I have to do, … so I do not use any particular one" (M, Lecturer, UEW).*

Academics felt that it was easy to learn to use OERs or integrate OERs into their courses (M=4.15, SD = 0.864). This could be the reason why faculty also acceded that searching for OERs and customising them will be effortless. This indicates that where the search for materials and modifying them are stress free, faculty will be willing to use them. Thus, searching for materials for academics ought to be easy and accommodating. This was supported by the qualitative whereby participants were able to transform OERs to suit their course content.

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The correlation between Effort Expectancy and Behavioural Intention to use is both positive and significant ($r = 0.61$ $p = \leq 0.05$).

This implies that hypothesis 2 is supported.

$r^2 = .37$ or 37 %. This means that 37% of Effort Expectancy influences behavioural intention to use OERs while 63% of the difference is explained by other factors.

The correlation result is not surprising since most of the respondents were highly skilled in computer literacy and OER searches, hence a positive correlation between technological competencies and Effort Expectancy. The result corroborates (Mtebe & Raisamo, 2014b; Percy & Van Belle, 2012; Li, et al., 2014; Dulle and Minishi-Majanja (2011); Padhi, 2018). On the other hand, it contradicts that of (Kechine et al. 2014; Singeh et al., 2013) who did not find any significant relationship between effort expectancy and behavioural intention to use technologies.

It becomes easy to transfer such materials to suit the content individual lecturers are teaching. However, where it totally fits into the content it could be adopted wholesale. Thus, as stated by an interviewee, he remixes, adopts, modifies or customizes OERs to suit his circumstances. Thus faculty perception of OER as easy to use may also impact on its use. There was no significant correlation between gender and effort expectancy (Effort Expectancy (r= -.099, P=ns) signifying that gender does not influence intention to use. Similarly, there was no relationship between Age and Effort Expectancy(r=-.055, P=ns) showing that age did not influence whether faculty thought OERs were easy to use or not. However, there was a significant association between rank and Effort Expectancy (r=.214*) such that high ranking faculty found it easier to decide using OERs than low ranking ones. This is contrary to what pertains in most literature where

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younger people are more comfortable with the use of technology. Probably this was so because of high ranking faculty's experience with OERs.

These findings are also contrary to the UTAUT model which posits that effort expectancy influences behavioural intention and is stronger for women, and older workers among others (Venkatesh et al., 2003). Additionally, Dulle and Minishi-Majana found gender and age among the moderators that significantly influence effort expectancy and behavioural intention to use.

5.6 Social Influence on faculty Adoption and use of OERS

The influence of others on individual's use of OERs can be positive or negative depending on what is at stake and the activity or materials concerned. The institution can also have an influence on user intention to use and actual use OERs. This invariably has expression in social relations. It can be among equals or vice versa. Generally, Social Influence was high (M= 3.59, SD =0.838). The result suggested that peers had been influencers in their use of OERs. Also, management had been supportive in faculty use of OERs. However, management support for the remixing of OERs was moderate. This shows that to a large extent, social norms played a role in faculty intention to use OERs. The fact that management support for the creation or remixing of OERs is limited could be the result of inadequate technical support the institutions have. The interviews revealed that the element of social influence was quite mixed as respondents were either introduced to OERs by formal training or through ICT lessons from their institutions or elsewhere while friends and colleagues, some from outside the country had recommended particular sites with lots of good educational resources.

The following are some remarks of faculty:

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"I was trained to use them. Two years ago, some people made mention of them and when we had a TTEL workshop, the facilitator made mention of them when he wanted material for TLMs" (M, tutor, COE).

"I was introduced to them by colleagues and visiting lecturers from Holland (M, Prof, UEW)".

Also, the correlation between Social influence and Behavioural intention to use OERs was positive and significant (r = 0.51 p = $\leq$ 0.05.). This shows that hypothesis 3 is supported.

The coefficient of determination (r^2) = .26 which is an indication that 26% of faculty behavioural intention to use OERs was influenced by social norms.

This corresponds to findings from Kandiero, (2015). It however contradicts findings from Mtebe & Raisamo, (2014b) Beta = -0.094, p < 0.366); and Padhi; 2018) β =.042, P<.423). Percy and Van Belle (2012) found that the Pearson correlation coefficient between SI and BI was not significant. In a related case, Li, Yuen and Wong (2014) found that social influence did not have any influence on students' desire to use OERs. There was no association between gender and Social Influence (r= -.084, P=ns); age and Social Influence (r=-.049, P=ns); Rank and Social Influence (r=.177, P=ns). This denotes that gender, age and rank did not influence Social relations and Behavioural Intention to use OERs.

5.7 Facilitating conditions

This constitutes the extent to which faculty believes that organisational and technical facilities are available to facilitate the adoption and use of OERs. These facilities may include computers, internet speed and access to the internet. The general impression was that conditions in the institutions for the uptake of OERs by faculty were average. (M=3.21, SD = 0.911).

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When asked about facilities that promote faculty use of OERs at the institution, the following are some of the responses:

> *I would say we have internet facilities, access points, computer labs with some computers. These are limited though. (M, Snr Lecturer, UEW)*

> "*In my college, we have internet connection alright, but it seldom works and you have to buy data at an extra cost. Sometimes you may have a link and you may want to share it with your students. These days many of the students have smart phones, but where is the data? And that poses a challenge. ((M, Tutor, COE)*

These indeed confirmed the finding that though institutions may have some facilities to support the use of OERs they were inadequate.

The UTAUT model shows that facilitating conditions influence user behaviour to use OERs, but not user intentions to do so (Venkatesh et al. (2003). In this study, facilitating conditions were found to be positive and significant in relation to the actual use of OERs ($r = 0.46$ $p = \leq 0.05$). This signifies that hypothesis 4 is supported.

It also signifies that faculty has moderate institutional support in the form of technical infrastructure, incentives, skills and policies.

$r^2 = .21$ This shows that only 21% of Facilitating Conditions has an effect on Actual Use, an indication that facilitating conditions have little influence on the use of OERs.

Percy and Van Belle found that facilitating conditions were positively and statistically significantly correlated to faculty use behaviour. Also, Li et al. (2014) and Lwoga and Questier (2014) found that facilitating conditions had an influence on actual use. On

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the other hand, the study contradicted findings of of (Padhi (2018) β = -.047, p < .521); Mtebe and Raisamo, 2014b).

This study found a lack of association between gender and Facilitating Conditions (r=-.071, P=ns) Age and Facilitating Conditions (r=-.074, P=ns); Rank and Facilitating Conditions (r=-085, P=ns).

However, the t-test results signify that older faculty will use OERs more than younger faculty when conditions are right. They may resist change based on how these technologies will impact their traditional modes of teaching. The interviews corroborated the fact that facilitating conditions were not optimum. This may be explained by the fact that some institutions provide support services to faculty but they are hardly enough. Thus even though the institutions in which they are working provide faculty capacity building programmes on OERs, they hardly complete such workshops or/and in some cases they do not understand what is taught. Thus the workshops are unable to provide faculty with what they need.

Some participants had these to say.

> *"... I was trained halfway but then I decided to explore further by contacting other people" (F, Senior Lecturer, UEW).*

The implication is that they would need more support to enhance the effective use of OERs. The support may range from internet facilities, network issues to training and technical support. The institution may however explore other facilities such as using other networks to help in using OERs without interruptions. Another area is policy to guide the use of OERs.

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These comments extracted from the study sum them up:

> *"We can also have a policy to guide teachers and students on the use of OERs so that we don't pick anything and say we are using OERs."*

> *"Every institution must have a Wi-Fi so teachers can use those for teaching. They can download and upload their materials for teaching."*

The policy on internet usage (Wi-Fi) can help in OER usage promoting continuous usage, teaching and learning throughout the day and engaging students.

5.8 Compatibility of Faculty Beliefs and Practices in Relation to OERs

Compatibility is "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and the needs of potential adopters" Rogers (2003, p. 240). The overall mean for faculty perception that their beliefs and practices could influence their use of OERs was above average (M =3.44, SD = 1.080). Faculty in the study found OERs to be compatible with their belief that the creation of OERs fitted into their belief of sharing materials with others, which is a core to open education. They also felt that OERs were similar to other material they used for teaching (M =3.56, 1.084). However, OERs fitting into their teaching methodologies was moderate. This was contrary to the results from the qualitative study where faculty throughout the interactions demonstrated the fact that using OERs was compatible with their belief in the use of interactive materials, new pedagogies and student engagement.

The following statement of a participant's perspectives supports this.

> *"I prefer to use these types of resources and methods than the old method of giving notes so I tell my students that I'm not giving them notes so I'll bring something and we'll have a discussion. These resources make teaching a lot easier" (M, Snr. Lecturer, UEW).*

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Another interviewee remarked

> *I combine different things in order to make the lecture interesting. When you use animations and simulations you realise that the students understand lessons very well. It enables the students to shed off the misconceptions they have about some topics and understand the concepts very well. (M, Prof, UEW)*

The relationship between compatibility and behavioural intention to use OERs was positive and significant although weak. r = .29 significant at 0.05. This indicates that hypothesis 5 is supported.

r^2 = .08 or 8%. This shows that compatibility explains only 8% of faculty's intention to use OERs.

The relationship between compatibility and actual use is also positive and statistically significant.

r = .41 significant at 0.05. This shows that hypothesis 6 is supported

r^2 = .17 or 17%. This suggests that 83% of faculty actual use of OERs is explained by other factors. The results on compatibility compare favourably with studies by (Coleman-Prisco (2017); Zhang and Li 2017) On the contrary, other findings such as (Arendt and Shelton 2009; Martins, Steil & Todesco, 2004) found compatibility a weak determinant of faculty use of OERs.

There was no significant relationship between gender and compatibility (r=- .064, p=ns) age and compatibility (r=-.004 p=ns) as well as rank and compatibility (r=-.102, pns). This suggests that faculty will use OERs irrespective of their gender, age or rank once it is in harmony with their pedagogical beliefs and practices.

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5.9 Trialability of OERs

According to Rogers (2003, p. 258), "Trialability is the degree to which an innovation may be experimented with on a limited basis" or used on a trial basis. Trialability influences the decision to adopt an innovation because "the personal trying out of an innovation is one way for an individual to give meaning to an innovation and to find out how it works under one's own conditions." In relation to OERs, this means that when individuals get the chance to try out an OER, they can decide whether to adopt it or reject it (Hodgkinson-Williams & Paskevicius, 2011). For example, if faculty gets the chance to try out an OER, it would give them the opportunity to know how to modify it to suit their students to improve their learning (Coleman-Prisco 2017).

In this study trialability produced a general mean of (M=3.28; SD =1.22). This suggests that a little over half of faculty members may want to experiment with their materials before teaching with them. The majority of the lecturers indicated their willingness to try out OERs before using them if they had the opportunity (M=3.59; SD = 1.135). This is particularly so for lecturers in the higher ranks. They will do so for credibility and reassurance that the materials are worth using. It can be inferred that faculty tries out OERs or pilot OERs before using them by modifying content to suit the needs of their students. This is corroborated by the interview results which showed that most participants experimented with their materials and modified them to suit the needs of their students. This is exemplified by this interviwee's response.

> *You need to experiment with the resources to see how useful they will be to you. If you don't you won't which one to use, which ones to discard and which ones to combine." (M, Snr. Lecturer, UEW).*

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The relationship between trialability and behavioural intention to use is also positive and statistically significant. The strength of the relationship is however weak.

r = . 17 significant at 0.05 This shows that hypothesis 7 is supported.

r^2 = .03 or .03%. This suggests that 92% of faculty behavioural intention to use OERs is explained by other factors.

These findings corroborate that of Samaravickrama and Samaradiwakara (2014), Tully (2015) and Martins et al. (2004) who found that trialability was significant in technology adoption. However, it is contrary to finding by (Coleman Prisco, 2017; Hodgekinson Williams & Paskevicius, 2011).

There was no correlation between trialability and actual use. It indicates that trialability does not influence actual in any way.

r= 0.01 p = < 0.05

This establishes that hypothesis 8 has been rejected.

5.10 Behavioural Intention to Use OERs

The construct, Behavioural Intention to use indicates academics' desire to use OERs and it is regarded as a dependent construct in the UTAUT model and in this study. The overall mean for this construct was (M =3.90 SD. 0. 770). Also, most faculty would like to adopt OERs in future (M = 4.02; SD = 0.884).

The relationship between Behavioural Intention and Actual Use is moderately positive and statistically significant (r = 0.44; p = < 0.05). It shows that hypothesis 9 is supported.

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r^2 = 19%. This implies that only 19% of faculty's intention explains faculty desire to use OERs.

According to Davis (1989), empirical research has shown that the strongest predictor of actual use is behavioural intentions. This is supported by Percy and Van Belle (2012), Lwoga and Questier (2014); Dulle and Minishi-Majanja, (2011) and Birch and Irvine, (2009) who found a statistically significant and positive relationship between behavioural intention and actual use. Similarly,Venkatesh et al. (2003) have indicated that the behavioural intention to use a technology has a substantial influence on usage behaviour. However, in this study, it was found to be moderately positive and significant.

5.11 Actual Use of OERs

This has to do with the pattern of OER use. In this study, it was evident that faculty use of OERs in tertiary institutions was average (M=3.22, SD = 0.993). The majority of faculty stated that they had used OERs within the last six months of the data collection, However, faculty had incorporated OERs in their courses in the past year (M=2.91, SD = 1.265). Trends in the use of OERs could be the result of some of the barriers to the use of OERs.

5.12 Challenges of Faculty use of OERs

Faculty is prevented or limited in the use of OERs by technical and institutional barriers. Among these are low internet speed lack of access to computer and low internet bandwidth. Faculty lamented the weak and slow Wi-Fi. Purchasing credit to download materials at high cost for their courses. The effect is that they cannot support and sustain

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this venture. The poor infrastructural facilities coupled with the limited training also hinder the smooth use of OERs in these institutions. This is in spite of academics' eagerness to use the OERs because of the perceived benefits such as improving their teaching and research and students' interactive learning.

5.13 A Framework for the Adoption of Open Educational Resources among Faculty of Higher Educational Institutions in Ghana

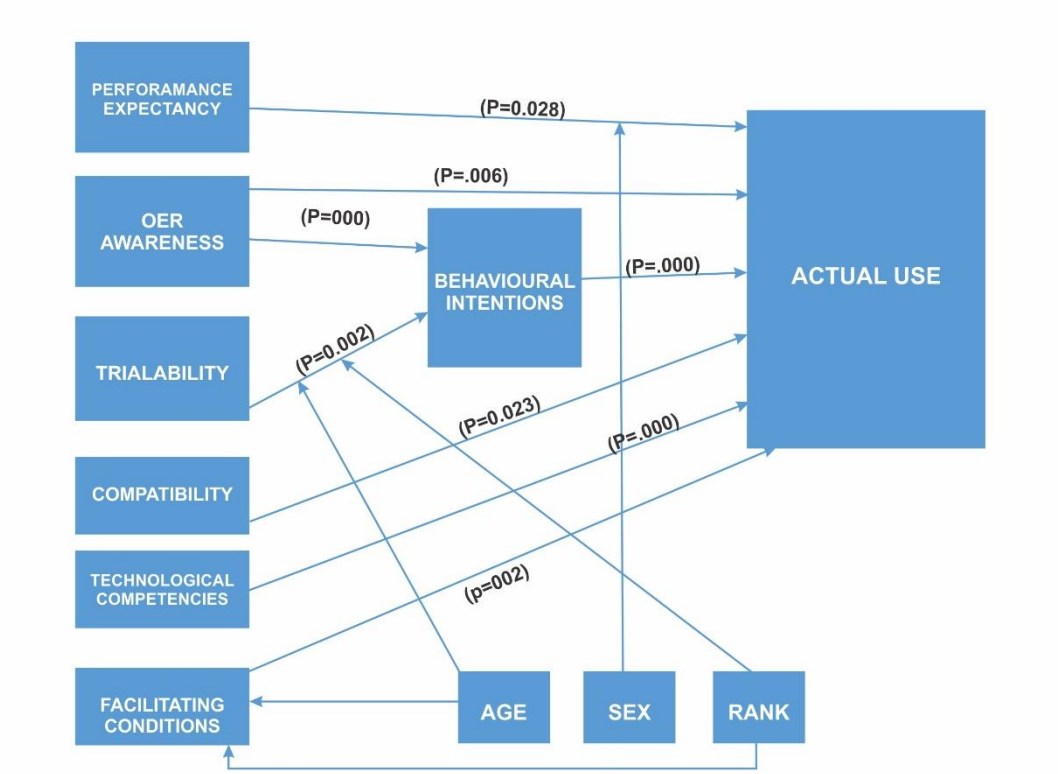

Figure 5.1: Framework for the Adoption of OERs among Faculty of Higher Educational Institutions

Based on the results of the multiple regression analysis a new model was developed for the adoption and use of OERs in higher educational institutions in Ghana. This was based on the fact that OERs are currently in use in these institutions albeit partially or minimally.

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I set out to look at the factors that would influence faculty to decide to use and actually use Open Educational Resource. With this problem in mind, I employed multiple regression to empirically predict the conditions that would favour faculty to adopt and actually use OERs. The outcome of the test revealed that OER awareness and trialability directly determine faculty intention to use OERs while performance expectancy, awareness compatibility technological competencies, facilitating conditions and behavioural intention directly determine faculty actual use of OERs.

5.14 Determinants of Faculty Behavioural Intention to Use OERs

The factors which directly have an effect on faculty intention to use OERs are examined. These are awareness and trialability.

Awareness of OERs: Awareness of OERs predicted both faculty behavioural intention to use OERs and their actual use of the resources. The implication is that once faculty members have enough information about OERs, they will readily use them based on the knowledge that they have. A high knowledge of OERs will lead to adoption and use. When faculty members get a lot of information on OERs in the form of a variety of teaching/learning materials, they are likely to adopt and use them based on the relevance of the materials.

Trialability: In the case of trialability, if faculty members are to adopt OERs, then they would need to try out the materials to see how relevant they are to them and their students in order to take a decision to adapt them to suit their teaching styles, students' learning styles, needs and interest.

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5.15 Determinants of Faculty Actual Use of OERs

In the instance of the determinants of actual use, these are the predictive factors. Performance expectancy, OER awareness, compatibility, technological competencies facilitating conditions and behavioural intention. Once these are present people will not think about whether to use the resource or not; they will readily use them.

Performance Expectancy: Faculty belief in OERs helping them succeed in their teaching, learning or research would make them use the resources. Their perceptions about OERs being useful, current, and its ability to positively impact students' learning outcomes could be enough motivation to make them use the resources. Thus if OERs would benefit faculty members, their students and institutions they would use them, but it would be based on the assumption that the resources are readily available.

Facilitating Conditions: The results indicate that facilitating conditions is a major determiner of actual use. If instructors are to use OERs effectively, then usage must be backed by policies. Institutions should provide incentives, formulate policies implement them through monitoring and supervision. Additionally, organisational and technical support must exist.

Compatibility: It suggests that if faculty would use OERs, then it must suit their teaching style and content.

Technological competencies: This is based on the assumption that the higher the level of computer literacy and digital skills among faculty, the greater they would desire to

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use OERs. It is implied that for faculty to use OERs, their technological competencies ought to be improved through training and upgrading.

Behavioural Intentions: the fact that behavioural intention is likely to lead to actual use reflects a positive attitude towards OER use by academics. It is probable that given the necessary push in the form of technical support, policies, incentives and openness, faculty would adopt and use OERs. Once faculty adopts OERs, the tendency to use them may be high.

5.16 Moderators

Age and rank were found to be statistically significant with trialability and facilitating conditions. The t-test results displayed that older and high ranking faculty would be influenced by essential facilities required to facilitate the use of OERs as well as the need to try the resources to see their potential and advantages before deciding to use them. Perhaps as older adults and leading intellectuals, they would also like to scrutinize the materials before use to protect their reputation. On the other hand, it could be that they would evaluate them to see which ones could be modified or remixed for teaching or which ones to discard all together. The t-test results also suggested that men were more likely to find OERs useful than women, hence were more likely to use them than women. This could be attributed to gender roles which leave men with more free time to explore. It is also possible that because women tend to be more meticulous, they are cautious about using the resources, so before women use OERs they may want to know how useful the resources would be and the success story of someone who has used them.

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Comparing the conceptual framework to the adapted framework, it is obvious that some of the initial assumptions did not hold. In the previous model, Performance expectancy, effort expectancy, social influence, compatibility and trialability had a significant effect on faculty's behavioural intention to use OERs, while facilitating conditions, compatibility and behavioural intention had a significant relationship with actual use. In the new conceptual framework, in respect of adoption, trialability was supported while in the case of actual use, compatibility, facilitating conditions and behavioural intention to use were supported. Performance expectancy which previously influenced behavioural intention to use now directly predicted actual use which signifies that faculty does not need the mediating role of behavioural intention to help them use OERs, Faculty would use OERs once they perceive them as useful. Two other constructs, technological competencies and OER awareness which were not originally part of the modified UTAUT model also directly determined actual use. In the case of the awareness construct, it also influenced behavioural intention to use OERs.

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CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter covers the summary of the study on issues pertaining to the adoption and use of Open Educational Resources particularly the theories adopted by the researcher to explain and conduct the research. Also found in this chapter are the key findings, implications of the study, conclusion and recommendation. It also establishes the contribution of the study to knowledge and the areas for further and future research.

6.2 Summary

There is a dearth of studies on OER in developing countries generally and Ghana in particular. A number of studies have indicated that in spite of the availability of OERs and their potential to improve teaching and learning, particularly in developing countries, it appears that they are not being patronized much (OECD,2007; Ngimwa &Wilson, 2012). Kandiero, 2015; Mtebe & Raisamo, 2014b; Percy & Van Belle, 2012; Dulle & Minishi-Majanja, 2011). All these attest to the fact that the adoption of OERs among faculty in Africa is low. Besides, despite massive investments in OER projects as well as advocacy, their uptake in higher education institutions appear to be limited (Coalition for Networked Information, 2016). Even though there are a number of OER initiatives in higher educational institutions in Ghana, there is no study to determine the status of OER adoption and use by faculty. With students being the major clientele of OER usage, faculty holds the key to the adoption of OERs. The paucity of information on faculty use of OERs limits one's understanding of pertinent issues of OER adoption and strategies that can be put in place to enhance its use in higher education institutions in Ghana.

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This study therefore tried to fill these gaps by investigating the critical issue: What factors influence faculty to adopt and use OERs in higher educational institutions in Ghana? This was done by using the Unified Theory of Acceptance and Use of Technology (UTAUT) theory in addition to two constructs from the Diffusion of Innovation (DoI) model through the use of the explanatory sequential mixed methods research approach.

The objectives of this study are to:

i. Find out the level of faculty technological competencies in higher education Institutions in Ghana.
ii. Find out the level of faculty awareness of Open Educational Resources in higher education institutions in Ghana.
iii. Investigate UTAUT and Diffusion of Innovation (DoI) factors that influence faculty adoption and use of OERs for teaching and learning in higher education institutions in Ghana.
iv. Investigate the barriers associated with the adoption of OERs in higher education institutions in Ghana.

The theories that underpinned this study were the modified version of the UTAUT theory and two constructs from Rogers' Diffusion of Innovation, namely Compatibility and Trialability. The Unified Theory of Acceptance and Use of Technology (UTAUT) was created by Venkatesh, Morris, Davis and Davis (2003) by combining constructs from eight Technology Acceptance models to form the UTAUT model. The model is used to analyse constructs which directly determine a users' behavioural intention to use a technology and their usage behaviour. The UTAUT model suggests that there are

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three direct determinants of intention to use namely, performance expectancy, effort expectancy and social influence. It also postulates two direct determinants of usage behaviour, namely, facilitating conditions and behavioural intention (Venkatesh et al., 2003). This study also borrowed two constructs, namely, Compatibility and Trialability from the Diffusion of Innovation Theory. The two constructs are from Rogers' five innovation attributes. They were tested using faculty at University of Education Winneba and four Colleges of Education in Ghana.

The study used the mixed methods approach, specifically, the sequential explanatory design with priority given to the collection and analysis of quantitative data. Two hundred and thirty-nine faculty participated in the study. Two forms of data collection were used: questionnaires through the give and collect later method for the quantitative data and interviews for the qualitative data. The stratified random method was adopted for the qualitative study while the purposive sampling techniques were adopted for the qualitative aspect. Data was analyzed using descriptive statistics – means and standard deviations as well as correlations and factor analysis to test the proposed model. Thematic analysis and narratives using anecdotes were employed for the qualitative section.

Data were collected from the University of Education, Winneba, Komenda college of Education, Holy Child College of Education, OLA College of Education and between 15th December, 2017 and 16th March 2018 for the quantitative data. The qualitative data was collected between 30th April, 2018 and 18th May, 2018.

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6.3 Key Findings

Technological Competencies

The result suggested that faculty had a high level of technological competencies (M=3.75, SD = 1.185). Among the competencies were that faculty had a high knowledge of computer applications as evidenced by their ability to browse the internet, use word, download and upload materials as well as knowledge of OER searches and how to search for OER materials. This finding was corroborated by findings from the interview as explained by a respondent:

> *The first thing is that anytime I need information, my first point of access is online. So when I go online, I try to look for OERs. It's a personal motivation because I have skills in surfing the internet. The next thing is that I also want my students to get access to materials, so I also make sure that they are introduced to those sites (M, Lecturer, UEW).*

OER Awareness

Faculty also had a high level of OER awareness as indicated by an overall mean of (M= 3.86 SD=0.904). The majority of faculty knew about OERs (M =4.08 SD = 1.089) and the fact that they could be used without making any changes or customized to suit the needs of students respectively. It also emerged that knowledge about open licenses for the creation and use of OERs was slightly above average. This was corroborated by the qualitative study where a considerable number of faculty members knew about the core concepts of OERs. However, there were a few misconceptions.

Performance Expectancy

This had to do with the extent to which faculty found OERs useful in their teaching and research activities. They endorsed the use of OERs (M = 4.17 SD 0.616).as faculty benefited mostly from up-to-date materials for teaching and learning (M= 4.29 SD = 0.866). The materials also improved students' learning (M = 4.01, SD = 0.912). These

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benefits were parallel to the qualitative study where most participants validated its usefulness especially in relation to currency of materials they used for teaching and learning as well as perceived advantages to students. The relationship between Performance Expectancy and Behavioural Intention to use OERs was positive and significant (r = 0.53 p = $\leq$ 0.05). This means hypothesis one is supported. r^2 or the coefficient of determination =.28 or 28% shows that performance expectancy explains only 28% of why faculty members decide to use OERs

Effort Expectancy

Faculty acceded that customising OERs will be effortless (M= 3.96, SD 0.819). As well, searching for OERs was found to be stress-free (M =3.96, SD 0.847). This was associated with the ease with which faculty was able to locate, tailor learning materials to suit learners and also use the resources. The study established that faculty found it was easy to learn to use OERs courses (M=4.22, SD = 0.889) and that it was easy to acquire the skills to integrate OERs into their courses (M=4.15, SD = 0.864), as well as locating relevant OERs This was supported by the qualitative results whereby participants declared their ability to transform OERs to suit their courses and content. This result was supported by the results interviews. The correlation between Effort Expectancy and Behavioural Intention to use was both highly positive and significant (r = 0.61 p = $\leq$ 0.05), therefore hypothesis two is supported. r^2 = .37 or 37 %. This means that 37% of Effort Expectancy influences behavioural intention to use OERs

Social influence

As regards social influence the result posited that peers had been influential in their use of OERs ((M=3.86, SD = 1.024). Also, they found management supportive in their use

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of OERs in their respective institutions ((M=3.81, SD = 1.034). However, management support for the remixing of OERs was moderate (M=3.17, SD = (1.196). The result from the qualitative findings did not quite confirm these findings since participants were introduced to OERs by peers as well as by training programmes. Social Influence had a moderately positive effect on Behavioural Intention and the relationship was statistically significant (r = 0.51) p = $\leq$ 0.05). Hypothesis 3 is supported. (r^2) = .26 or 26% an indication that 26% of faculty behavioural intention to use OERs was influenced by social norms.

Facilitating Conditions

Concerning this issue, faculty felt that management support in respect of facilities that would enhance the use of OERs was not optimum (M=3.21, SD = 0.911). They believed their knowledge about how to integrate OERs into their courses was moderate (M = 3.33 SD =1.125). Similarly, faculty considered the resources necessary to access OERs were modest. Faculty interviewed confirmed these assertions by advancing various examples about the availability of institutional support though inadequate. The correlation between Facilitating Conditions and actual use was positive and significant (r = 0.46 p = $\leq$ 0.05). Hypothesis 4 is supported.

r^2 =21%. This implies that (21)% of facilitating conditions have an effect on actual use, an indication that facilitating conditions have little influence on actual use of OERs. Though the correlation is positive, the level of strength is moderate.

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Compatibility

Faculty members surveyed agreed to the fact that OERs were not only compatible with their belief in sharing educational materials to profit everyone (M=3.62, ±SD1.026)**,** but also that OERs are similar to some existing course materials used for teaching However, on the issue of whether OERs fit into teaching styles of faculty members, the results (M=3.26, SD = 1.074) indicated that they were quite uncertain or indifferent. Yet, the interview results showed that OERs were compatible with faculty teaching styles as most participants demonstrated their use of interactive materials, new pedagogies and student engagement.

(r =.29 significant at 0.05). Hypothesis 5 is supported

r^2 = .8 or 8%. This suggests that only 8% compatibilty explains faculty behavioural intention to use OERs.

(r = .41 significant at 0.05). Hypothesis 6 is supported.

r^2 = .17%. or 17%. This suggests that 83% of actual use of OERs is explained by other factors.

Trialability

This involves faculty willingness to try out or pilot OERs before using them. Faculty agreed on experimenting with OERs before deciding to use them (M=3.59 SD = 1.135). There was no correlation between Trialability and Actual use. It indicates that trialability does not influence actual use in any way. On the other hand there was a significant relationship between trialability and faculty's intention to use OERs.

r = .171 significant at 0.05. Hypothesis 7 is supported.

However, there was no correlation between trialability and actual use. Hypothesis 8 is not supported.

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It can be inferred from the interviews that faculty tries out OERs or pilot OERs before using them by modifying content to suit the needs of their students by transforming the downloaded materials to make them relevant to students.

Behavioural Intention to Use OERs

Regarding faculty Behavioural Intention to use OERs, the total mean suggests a strong intention to adopt and use OER in tertiary institutions (M=3.90, SD = 0.770). This is further reflected in academics' agreeing to adopt OERs in future (M = 4.02, SD = 0.884) as well as their expectations to integrate such materials in courses in the upcoming semester (M=3.98, SD = 0.921). This reveals a positive attitude towards the use of OERs by faculty. It is probable that given the necessary push faculty would adopt OERs. The relationship between Behavioural Intention and Actual Use is moderately positive and statistically significant ($r = 0.44$; $p = \leq 0.05$). Hypothesis 9 is supported. $r^2 = .19$ or 19%. This implies that only 19% of faculty's intention explains faculty desire to use OERs.

Actual Use

This denotes the way faculty is really using OERs, is it frequent or sporadic? The total mean suggests that, on the average, faculty will adopt and use OERs in tertiary institutions (M=3.22, SD = 0.993). The majority of faculty intimated that they had used OERs within the last six months of the data collection (M = 3.58, SD = 1.178). However, they had not incorporated OERs in their courses in the past year (M=2.91, SD = 1.265). With such results, it is probable that the use of OERs is still low or just about average in higher education institutions. Also, it can be inferred that the adoption of OERs in higher education is still emerging.

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Barriers to OER Use

Generally, barriers to the use of OERs could be considered as moderate (M=3.22; SD=0.839). The key barriers were technical issues particularly low internet speed (M=3.84, SD = 1.102) and access to computers (M=3.68, SD= 1.152). Other barriers were low internet bandwidth; and frequent power outages. Institutional barriers came second with lack of time to evaluate OERs (M=3.47, SD = 0.690; lack of support from management (M=3.13, SD = 1.395 and lack of institutional policies on the use of OERs (M=3.13, SD= (1.395). However, legal issues were not a problem since faculty was aware of copyright and OER intellectual property issues.

Conclusion

The study concluded on the note that trialability and level of awareness are the conditions that favour adoption while performance expectancy, level of awareness, compatibility, technological competencies, facilitating conditions and behavioural intention favour actual use. However, awareness is critical to faculty adoption (p = 000) and use (p =000) of OERs if the level is high while compatibility and behavioural intention are key to OER use (p = 000). Challenges that would militate against the adoption of OERs include lack of training, lack of institutional policies, inadequate materials and where to locate them. Barriers to the use of OERs would include inadequate technical support. The conceptual framework is relevant since it gives direction to the understanding of the thesis and answers the research problem.

Implications for Adult Education Practice

The results clearly show that for faculty to decide to use and actually use OERs, it is important for OERs to be related to work place needs and be easy to use. It should also

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impact students' learning. These institutions are training adults and therefore adult education principles must be applied. This include teaching them what they can apply to their everyday life in terms of examples from their environments. They can use the OERs to improve upon themselves. This is because faculty tends to learn a lot for their teaching and research. In adult education, project-based learning helps students to gain the needed experience, and so working through OERs allows them to gain the needed experiential learning and to conceptualize issues. OERs help students to be independent thinkers and self-directed learners as they use the materials for classroom discussion and group work. Management needs to improve technical infrastructure as that is what deters faculty and students from using OERs.

Implications for Educational technology

Almost all faculty members operated in the face-to- face mode. It was only a fraction of them about five percent who engaged in both face-to face, hybrid and distance modes, yet the majority seemed to be comfortable in the online learning environment because of their skills in computer literacy and OER searches. This implies that it is important to take faculty characteristics and needs into consideration when introducing an innovation that requires the use of technology instead of merely dumping a technology-based innovation on them because of its perceived usefulness. Technology, when integrated into the curriculum, revolutionizes the learning process (Guskey, 1988). Notably, technology integration in the curriculum has been found to improve students' learning processes and outcomes. Instructors who recognize technology as problem-solving tools change the way they teach. For instance, the potential of ICT, and for that matter OERs, presents rich learning environments, allowing learners to adopt multiple perspectives on complex phenomena, to foster flexible knowledge

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construction in complex learning domains, and to cater for individual differences (Ertmer 2005).

The introduction of educational technologies into classroom settings has improved in-service teacher education and the preparation of pre-service teachers for a successful integration of educational technologies into their teaching and learning practices. This presupposes that teacher education institutions make efforts in preparing pre-service teachers to integrate technology into their future teaching practices. This can be done by introducing technology to pre-service teachers in delivering a technology course; offering mini-workshops; integrating technology in all courses; modeling how to use technology, etc. It must however be noted that 'full integration of computers into the educational system is a distant goal unless there is reconciliation between faculty and computers. Other factors, next to technical knowledge and skills seem to contribute to teachers' successful technology integration. For instance, knowledge, beliefs and attitudes of faculty.

The results also have implications for the development of instructional design. Here, it is important to develop user-friendly materials that can be easily understood and used to promote self-directed learning and modification in future. It is also important to have OERs in user-friendly formats. The study also relates to the concept of "flip classroom" teaching and learning as well as the development of instructional materials (blogs etc.) by faculty and students.

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Implications for open and distance learning

Open and distance learning connotes a type of education which is open to all categories of persons irrespective of age, sex and other characteristics in which the learner and instructor are separated in time and space. With OERs instructors can develop materials which can be used universally by adult learners both in teaching and learning without the assistance of a teacher. It allows the freedom of use based on the special open licenses. It allows for easy download of materials and offers easy access to educational materials and resources. For open and distance learning cost efficiency is ensured as it eliminates the purchasing of expensive textbooks by both students and instructors. There is also effectiveness of using OERs for science-based courses especially the use of videos and animations and simulations. Thus this study provides the importance and need for OERs in higher educational setting.

Implications for Human Resource Development

Faculty members need to have knowledge and practical skills and competencies in the use of OERs for their career development and advancement. They should know about policies governing OERs. For example, copyright, plagiarism, sale of intellectual property.

6.4 Recommendations

- Even though there is a high level of technological competencies among faculty, not all of them use technology with confidence. Potential users shy away from the use of OERs because they tend not to be technologically savvy. This needs to be addressed.

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- Even though some considerable progress has been made in OER awareness, training in the form of seminars and workshops is required for faculty members to hone their understanding of OERs and their benefits to improve upon OER uptake and attract potential users
- It was evident from the qualitative data that faculty members were ready and willing to use OERs, but courses on OERs were sometimes not completed. It is recommended that training programmes be completed to arm faculty with the necessary tools they need for OER deployment. Also, such training must incorporate adult teaching and learning methodologies as most IT trainers do so from a technical perspective making it difficult for faculty and students to understand what is being taught. Such training should be regular and it should be done for at least three days.
- The study on the other hand found that Social Influence had a positive but moderate impact on faculty behavioural intention to use OERs. It points to the fact that Ghanaians tend to depend on each other for the general good. This suggests that faculty members who are already using OERs can be prevailed upon to advertise the potentials of the materials and also recommend them to others as well as become resource persons for departmental workshops to disseminate and share their knowledge to colleagues.
- Faculty use of OERs is low. The study has come out with factors contributing to this state. It is hoped that management takes the necessary steps to arrest the situation by drawing up policies that would promote the creation and use of OERs in their institutions.
- Most faculty members complained about inadequate facilities. Open Educational resources are supposed to be free to the end user. However, because

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of barriers, such as low internet speed, poor network, poor internet connectivity and a Wi-Fi system that is often not working, faculty members have to bear some amount of cost. It is hoped that these barriers would be cleared to promote a more effective use of the resources.

- It also emerged that some faculty would be willing to create or remix OERs should they get the necessary institutional support. This suggests the need for a policy framework in that direction. First, web sites which provide OER services should be made available through an interface that is simple and able to increase learning efficiency to the maximum. Provision of the most convenient search function should enable learners to easily find OERs that they want. Services that OER service operators can actively use to help learners should be included.
- Based on the level of significance of predictive factors, if institutions want faculty to adopt and use OERs, then the most important condition to consider for adoption is awareness while in the instance of use, the prevailing factors are, awareness, technological competencies and behavioural intention.

Contribution to Institutional Growth

It is evident that faculty finds OERs useful and easy to use. They also believe that students profit from the resources. They also find the sharing of resources compatible with their beliefs in sharing resources and on the average, it is compatible with their teaching styles. Every tertiary institution could do with the visibility of their institutions. If the necessary props are put in place, a lot more academics may create and use OERs.

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Contribution to knowledge

The research extended previous research by integrating trialability and compatibility from the DoI model. Thus a fusion of the two theories has brought about new dynamics in technology adoption and usage. In my conceptual framework, OER awareness and trialability predicted behavioural intention to use while performance expectancy, compatibility, technological competencies, awareness, facilitating conditions and behavioural intentions determined actual use. It is important to note that even though compatibility is integrated in facilitating conditions in the UTAUT model, the study found it necessary to transform it into a construct.

6.5 Suggestions for Further Research

The following research topics are suggested for further studies.

The impact of Open Educational Resources on students' learning

Students' satisfaction with the use of Open Educational Resources

Determinants of OER adoption and use among faculty in institutions with OER policies

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APPENDICES

Appendix A: Questionnaire

IDENTIFICATION

Questionnaire Identification Bar Code (…….)

1. RESPONDING DATE: ___\ ____\ _____

2. HIGHER EDUCATION INSTITUTION
   _____

3. Faculty/Department
   ……..……

Dear Sir/Madam,

I am a doctoral student of the College of Education, University of Ghana. I am conducting a research on the **Determinants of Open Educational Resources adoption among faculty of higher education institutions in Ghana.** The study seeks to examine the factors that can influence the decision of academics in higher educational institutions in Ghana to adopt OERs. I would appreciate it if you could take time off your busy schedule to answer the questionnaire as honestly and accurately as possible. Your responses will remain confidential and will be used for academic purposes only. By completing the questionnaire, you indicate that you voluntarily wish to participate in this research.

Thank you.

Beatrice A. Torto

0244790733

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DETERMINANTS OF OPEN EDUCATIONAL RESOURCES ADOPTION AMONG FACULTY OF HIGHER EDUCATION INSTITUTIONS IN GHANA

SECTION A

DEMOGRAPHICS

1. Gender: Male □ Female □ (*Tick as appropriate)*

2. Age:
   - Below 26 years □
   - 26-35 □
   - 36-45 □
   - 46-55 □
   - 56-65 □
   - 66+ □

3. Faculty/Department
   ……
4. Rank:
   ……
5. Please indicate your mode of teaching: Tick as many as apply.
   a. Face to face (Regular) □ b. Distance education □
   c. Blended teaching □
6. Teaching experience:
   a. 1 – 5 years
   b. 6 – 10 years
   c. 11 – 15 year
   d. 16 – 20 years
   e. 21+

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SECTION B

7. **Technology Competencies**

Which of the following best describes the type of technology competencies you have acquired in the past five years? Please indicate your level of agreement or disagreement on the following statements.

Tick where appropriate using the Likert scale: 5. Strongly agree; 4. Agree; 3. Neutral; 2. Disagree; 1. Strongly disagree.

Items	5	4	3	2	1
I am able to use computer applications such as Word Processing					
I am able to use computer applications such as Spreadsheets					
I am able to use computer applications such as Power Point					
I can browse the internet					
I know about OER search engines					
I know how to access OER repositories					
I can search for OERs					
I can upload materials					
I can download materials					

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SECTION C

OER AWARENESS

8. Please indicate your level of agreement or disagreement on the following statements.

   Tick where appropriate using the Likert scale: 5. Strongly agree; 4. Agree; 3. Neutral 2. Disagree; 1. Strongly disagree.

Level of OER awareness	**5**	**4**	**3**	**2**	**1**
OERs are educational materials that are available to everyone					
OERs are inexpensive sources of educational materials for teaching, learning and research					
OERs are materials that can be adopted for use in the classroom					
OERs are materials that can be adapted for use in the classroom					
I know about OERs					
I will rate the quality of OERs as high					
I am aware of open licenses that permit the free use of OERs					
I am aware of open licenses that govern the creation of OERs					

SECTION D

OER ADOPTION

9. **Performance Expectancy**

   Please indicate your level of agreement or disagreement on the following statements.

   Tick where appropriate using the Likert scale: 5. Strongly agree; 4. Agree; 3. Neutral; 2. Disagree; 1. Strongly disagree.

Items	**5**	**4**	**3**	**2**	**1**
I would find OERs useful in my teaching					
Using OERs enables me to accomplish teaching tasks more quickly					
Using OERs increases my productivity					
Using OERs will allow me to have access to current information about the courses that I teach					
Using OERs will increase learning outcomes of my students					

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10. **Effort Expectancy**

Items	**5**	**4**	**3**	**2**	**1**
My interaction with OERs will be clear and understandable					
Learning to use OERs would be easy for me					
It would be easy for me to become skillful at integrating OERs into my courses					
I will find OERs easy to use					
I will find it easy to modify OERs					
I will find it easy to search for relevant OERs					

11. **Social Influence**

Items	**5**	**4**	**3**	**2**	**1**
People who influence my behaviour think that I should integrate OERs into my courses					
People who are important to me think that I should integrate OERs into my courses					
The senior management at my institution has been helpful in the use of OERs					
In general, my institution has supported the use of OERs					

In general, my institution has supported the creation OERs

12. **Facilitating conditions**

Please indicate your level of agreement or disagreement on the following statements.

Tick where appropriate using the Likert scale: 5. Strongly agree; 4. Agree; 3. Neutral agree; 2. Disagree; 1. Strongly disagree.

Factors	**5**	**4**	**3**	**2**	**1**
I have the resources necessary to access OERs.					
I have the knowledge necessary to integrate OERs into my courses					
Help will be available when I get a problem in integrating OERs into my courses					

Help will be available when I get a problem in creating OERs

13. **Compatibility**

Factors	**5**	**4**	**3**	**2**	**1**
OERs are similar to other course content I use for teaching					
I think that using OERs fits well with the way I like to teach					
Using OERs fits into my teaching style					
Using OERs fits into the practice of sharing resources in my department					
My department has a website with open materials					
Creating OERs is compatible with my belief in sharing educational materials to benefit everyone					

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14. **Trialability**

Factors	**5**	**4**	**3**	**2**	**1**
I will use OERs if I get a great deal of opportunity to try various OER applications					
I will like to be able to properly try OERs out before deciding whether to use them					
I will need to know where I can go to satisfactorily try out various uses of OERs					
I will need to use OERs on a trial basis long enough to see what they can do					

15. **Behavioural intention to use OERs**

Factors	**5**	**4**	**3**	**2**	**1**
I intend to integrate OERs into my courses next semseter					
I predict I will integrate OERs into my courses next semester					
I plan to adopt OERs in future					

16. **Actual Use**

Factors	**5**	**4**	**3**	**2**	**1**
I frequently use OERs					
I use OERs many times in a week					
In the past six months, I have incorporated OERs into my courses					
In the past year, I have incorporated OERs into my courses					

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SECTION E
BARRIERS TO THE USE OF OERs

17. What, in your opinion, are the barriers to the use of OERs in higher education institutions in Ghana? Please indicate your level of agreement or disagreement on the following statements.

    Tick where appropriate using the Likert scale: 5. Strongly agree; 4. Agree; 3. Neutral; 2. Disagree; 1. Strongly disagree. *(Tick as many as are applicable)*

BARRIERS	**5**	**4**	**3**	**2**	**1**
Lack of awareness of copyright issues					
Lack of awareness of intellectual property (IPR) issues					
Lack of institutional policies on the use of OERs					
Lack of support from management level					
Lack of time to evaluate OERs					
Inadequate technical support					
Inadequate infrastructure					
Low internet bandwidth					
Frequent power outage					
Lack of access to the internet					
Lack of access to computers					
Low internet speed					

THANK YOU

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Appendix B

Interview Guide for Faculty who Use Open Educational Resources (OERs)

1. What do you know about Open Educational Resources?
2. What are the factors that influenced your decision to adopt and use OERs?
3. How do you use OERs in your teaching?
4. What concerns do you have regarding the use of OERs in your classroom?
5. How beneficial have the resources been to you as an academic?
6. What can your institution do to ensure an effective use of OERs?

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Appendix C

Interview Guide For Faculty Who Do Not Use Open Educational Resources

1. What do you know about Open Educational Resources?

2. Why are you not using Open Educational Resources?

3. How can your institution facilitate the use of the Open Educational Resources?

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Appendix D

Good morning, Sir, can we please begin our conversation on OERs?

Que .What are Open Educational Resources?

They are educational resources that are readily and freely available online with copyright licenses that allow people like us, in academic environments to be able to use for academic purposes. We can customize them or reuse them as they are. So, roughly, that is how I view Open Educational Resources.

Probe: Ok, **when you talk about customizing what exactly do you mean?**

Just to give you a typical example: there are some places where I take power point slides from. For example, you will see that the slides are for an entire chapter, if I'm going to teach maybe parts of a chapter, it would mean l would have to take some of the slides out. There are also cases where the content you're looking for is not contained in one resource so you may have to pick and choose from different resources and combine them so you customize them as and when the need arises.

Probe: How did you get to know about these resources?

Ans: Through the moodle project, but before then I was taking materials from you tube for teaching. Back then, I didn't know about OERs.

Que: What factors influenced your decision to adopt and use OERs.

Several reasons: The area of ICT is fast changing, and there are times when you don't have access to the current books, but then we can find them online on some of the OER sites. There are also cases where for example, again with power points, the one that you download has certain illustrative materials or some animations in there that either you can't find or it takes a lot of time to develop on your own, so if you have content that have been developed, then its best to take those animations and use them instead of developing new ones. It is like reinventing the wheel.

Probe:

Any more?

Que: How do you use the OERs in your teaching?

Ans:

Two ways

Well in preparing my lessons, I use them ah (laughs). I use them in more than two ways, I use them to inform myself, you know, there are cases where I need to refresh myself so sometimes before I go to class, I go through some videos to bring myself up to speed because sometimes some of the topics, I haven't looked at them for a while, so in that case, I prepare myself for a lesson.

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And I also use some of the resources also in class. So there are certain situations that I show a video in class or I use a power point and there are certain situations that I refer my students to go and have a look at certain materials. So sometimes I would download materials and give to them or I will point them to the URL to go and open a site and read those materials. So there are various ways in which I use those materials.

Is there a difference between that and the online resources?

Erm, well, there are some resources that are classified as OERs, but some that are not necessarily classified as OERs.

In your view, what is the difference?

Well, OERs come with open licenses that gives you the permission to for example modify and remix the material, you know, … but in the case of other digital materials, you can only use them without making any changes to them. That's the little I know.

What are the advantages of using OERs?

For certain sites which are properly classified as OERs, I suppose they have gone through some quality assurance mechanisms and for me that is the key thing because for example, ICT is changing very fast you will see that that people are using certain definitions or certain classifications that are not widely acceptable in that field so if it's gone through the relevant reviews then I suppose that it would be seen as authentic as compared to anything you see on line because if you find just anything online you don't know whether you're dealing with authentic material or not, so for me that is one key distinction.

Is there any other?

Well that's about that

What concerns do you have about OERs?

Well, aside the issue of copyright which is the key thing with OERs at least again, with OERs, if it's properly classified as OERs you know it goes with some copyright

The issue that I most worry about is the authenticity of resources. Again, some resources don't deal with topics in a holistic manner so there is the risk that you'll take a resource, go and use it and you'll probably notice later on that there are some aspects that you didn't touch. So, there are issues with the quality of the resources, how comprehensive they are, there are issues with accuracy of information and copyright or intellectual property. If you're dealing with authentic websites, probably it might not be a big concern.

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What challenges are associated with OER use?

Well, I suppose issues to do with file formats and other things also come in. You might have a format or a thing may come with pdf. If you want to edit it, is difficult for you to edit it. There are software tools that can help you convert it to a useable format, maybe from pdf to power point. But when you convert it into those formats because of the way they were done originally, you will see that it gives you a lot more work. You will find that there are 5 or 6 texts boxes on one slide which might require you to cut and paste, or sometimes a sentence would be broken into 2 different texts and if you are not careful, you won't even get the actual import what was originally there. So sometimes there are issues that give you a lot more work than normal

What about technical issues?

… There are issues with file formats and compatibility with whichever machine you're using. There are cases where I have used some resources and a few years down the line, I realised that either the file format has been blacklisted or whatever because you find that they're no longer useable in that format. For example, a few years ago, I created some courseware … some three to four years ago, added some videos and I was going to reuse my courseware which included OERs. Now I noticed that the videos that I embedded in the courseware were no longer there, so I had to go and look for fresh ones. Even in some cases, I looked for the same video, but in a different file format to make it work. So there are sometimes issues of compatibility based on where they are coming from. Or sometimes they may use certain fonts that are not readable based on the software you are using to open it. And so there are some technical issues that you may face. Though there are some challenges, all in all I won't call them a barrier that would stop me from using them.

What are the Benefits of using OERs

Most cases we don't have up-to-date books and there are situations where you're given a course which is not exactly your area of specialization so you have to educate yourself. And if you don't have up to date books, it becomes a problem, … Sometimes, you have to fall on these materials because … sometimes this is the best way to quickly orient yourself with a particular topic before you teach it. So it is very beneficial. As far as I'm concerned, it makes my work easy, especially in recent times where work load is very heavy. So for example if you want to create a 40 or 50 slide power point presentation if you can get 15 or 20 slides already from an OER then it reduces your workload by half, so yea it's very useful.

And one other thing, especially when it comes to multimedia: You find that there are certain things that you understand and teach, but the way a video will capture them is much, much better than the way you can. So sometimes there are certain cases where we rely on certain multimedia elements that do the job better than you know. So if you want students to go beyond the content to look at various applications you can show them a video or certain types of multimedia, and based on that, a discussion would come out of it and it can get them to understand a topic a lot better than if you had repeated just the content

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Do your students use OERs?

Yes and no. I think it depends on the type of OER. From my experience students don't like a lot reading. If it is a long document they might not use it. They prefer short bullet points or a video or some kind of image so normally I think they are inclined towards certain types of formats media as compared to long texts

Most students nowadays don't want to read. You give them a four page document and they will find that a big chore, but give them a ten minute video and they will happily watch it. It caters for all learning styles.

How is the way you like to teach compatible with the resources you use?

I prefer to use these types of resources and methods than the old methods of giving notes so I tell my students that I'm not giving them notes so I'll bring something and we'll have a discussion. These resources make teaching a lot easier.

You've mentioned a lot of benefits academics gain from the use of OERs, why are some faculty not using them?

We did a workshop recently and some of the things that I took out of the work as a facilitator is that some of the academics are not even aware of the existence of OERs. Some may be aware but have challenges of how to access them and what to do with them when they access them. So they know that OERs are fine to use but the question is if I find a video online how do I download the video or even if I downloaded it, how do I embed it into my lessons and of course there are a group of lecturers who don't think that that way of teaching is a good way. But I think a good number of them might want to use it but the question is ability. Where to find them, what to do with it, when you find them, so those ones you can solve with training.

What about issues with the internet?

Of course there are technical issues … Yes because these days a lot of videos are coming with high definition and make the files bulky so most people might not want to buy their own data and use the data to download a file because it is expensive and of course sometimes again, the freely available Wi-Fi might not be fast enough to stream or to download those videos. So yes, there are technical and infrastructural challenges and connectivity issues that also exist.

Que: What facilities does your institution have to support faculty use of OERs?

Ans: I would say we have internet facilities, access points, computer labs with some computers. These are limited though.

What institutional support will you recommend to encourage the use of OERs?

Of course, … institutional support. Having a multimedia lesson or preparing such a lesson is a lot of work, but the question is: "what is in it for me?" So I think the

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institutions should do a lot more to encourage their staff to use it because for example, if you tie using multimedia lesson or PowerPoint to promotion or assessing your teaching, then people will know that I must do this to ensure that my teaching is viewed with kind eyes, so that is also one thing. So for me, that is one of the things institutions could do because even though there are technical and infrastructural challenges, if those challenges exist we could improvise. There have been cases where I have used my mobile phone to open a picture and gone round the class to show it to my students so there are various ways of using these things without necessarily having all the flashy projectors and all the speakers and those kind of things so there are ways of going round this.

To a limited extent, for me, if some of the resources are available, there is no need to duplicate it. However there might be certain kinds of things that are unique, nobody has talked about them. So there must be a platform for people who want to create new OERs to do so or those who want to combine, so I can also put what I have done online because some of the licences say that share alike. So if I have also taken and repurposed, I should also share alike. Also if the institutions make it a policy to encourage lecturers through various means to use them, then I think the usage will be a lot higher.

Would you like to add anything else?

Yea, I think I have mentioned training. Yes, some training will be useful and some more technical support.

Ok, thank you very much

My pleasure

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Appendix E

SAMPLE TRANSCRIBED SCRIPT FOR NON-USERS OF OPEN EDUCATIONAL RESOURCES

Good morning,

Can you tell me what you know about OERs?

I know OERs to be freely available materials that whoever wants and cares for can access and use for his teaching and learning.

Is that all?

Yes basically that's my knowledge of it.

But do you know about the benefits of using the materials?

Oh yes

What are some of the benefits of using the resources?

Its time saving, instead of just shopping around for materials you can go there and I hear there are so many materials that the difficulty becomes one of selection.

It could also be a learning point to the user. You get there and probably there have been new information that you may not be privy to, available there, that you can use to revise and update your teaching materials.

Ok, So why are you not using them?

I don't know how to access them. I know they exist but I don't know how to access them and I also don't know the nature of materials that exist there. Unfortunately I haven't had anybody to teach me how to do it.

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In that case what do you think your institution should do to help people like you to access the materials to use?

I think we should be educated first, probably through a seminar or a workshop of a kind and then to other colleagues of mine who probably do not know about it at all, they should be taught that such and such facilities exist and the advantages that will accrue to users and then also be encouraged to use them.

That would be all for now. Thank you very much.

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Appendix F

UNIVERSITY OF GHANA
DEPARTMENT OF ADULT EDUCATION AND
HUMAN RESOURCE STUDIES
SCHOOL OF CONTINUING AND DISTANCE EDUCATION

Ref. No.:.....

August 15, 2016

TO WHOM IT MAY CONCERN

Ms. Beatrice A. Torto (ID 10010284) is a Ph.D. candidate of the Department of Adult Education and Human Resource Studies of the School of Continuing and Distance Education under the College of Education, University of Ghana, Legon.

She is undertaking a study in connection with her thesis **(Determination of Open Educational Resources Adoption Among Faculty of Higher Educational Institutions)** which requires contacting institutions and organisations for data collection.

I should be very grateful if you would give her the needed assistance.

Thank you.

Dr. Samuel K. Badu-Nyarko
Head of Department

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