Authoring and Usage of Useful and Usable OER Reusable Orchestration Appliances

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ABSTRACT

The Department of Library and Information Science at the University of Zambia currently does not have an archive of teaching material including most of the departments. This also supersedes to other Universities across the country. As a result, the learning management system (LMS) such as Moodle gets filled with learning materials as well as notes and assignments, to which this information is deleted once the academic year is done. We intend to build a central repository for the dissemination and preservation of teaching material by leveraging, open-source Islandora repository. The ingestion and retrieving of the education content will be done within the Islandora system. We conducted a usability study with students using the SUS technique. The system got good results from the test with some suggestions of features from users.

CCS CONCEPTS

•Information Systems Applications→ Digital libraries and archives;

KEYWORDS

Learning management systems, digital libraries, institutional repositories, LEARN

1 INTRODUCTION

The Department of Library and Information Science at the University of Zambia currently does not have an archive of teaching material including most of the departments. This also supersedes to other Universities across the country. In this project, we focused on setting up a repository for the dissemination and preservation of teaching material and education content. The purpose of this project was to provide lecturers with the convenience of browsing through their resources from the islandora repository as well as upload content to the repository and students with the convenience of browsing through those past materials from the repository and downloading them. The material uploaded includes assignments and notes (documents, podcasts, videos etc) using the Islandora framework. The framework is embedded with drupal, fedora commons and. In order to solve the problem of Authoring and Usage of Useful and Usable OER Reusable Orchestration Appliances of educators' lessons, and as part of our capstone project, we proposed a solution in the form of a developed open shareable online repository where lesson plans, resources and tools can be stored and shared locally in Zambia to be specific. Once the content is completed by educators' satisfaction levels, they will have a choice in either storing personalized lessons locally, on a storage medium of their choice, or on the open online repository from which they downloaded resources. Through integrating the online repository, we hope to encourage educators to use already existing content as well as create their own content and upload them to be used by other educators to increase both the efficiency and hopefully, in the long term, the quality of education to everyone using the system.

1.1 Project Description

Today's development of information and digital technologies changes the learning process and the specifics of social relations between the student, and the educators. The use of new means of communication makes an important contribution to the development of skills in using technology, intensive self-study and social interaction. A new generation of students use digital technology daily. Thus, educational technological innovations are improving from generation to generation. Development in education technology improves the way students learn and educators deliver and teach content thereby improving the quality of education. Learning has improved with the development of education technology. It has introduced the concept of reusable educational resources, objects and tools; the expectation being that sharing and reuse will result in efficiency and quality gains in education and training. This is, however, often limited to local, private, online environments where educators and students have access to certain parts of repositories such as databases and could store and possibly share resources this way. The open availability of these resources only becomes a possibility with innovations such as wireless network clouds. Today the learning

community has experienced an awakening to the possibilities of Open Educational Resources (OER's) and the benefits these resources can provide to education; from conferences to the development of resource repositories and other services.

In order to solve the problem of Authoring and Usage of Useful and Usable OER Reusable Orchestration Appliances of educators' lessons, and as part of our capstone project, it is seen that developing an open shareable online repository where lesson plans, resources and tools can be stored and shared locally or in Zambia to be specific. Once the content is completed by educators' satisfaction levels, they will have a choice in either storing personalized lessons locally, on a storage medium of their choice, or on the open online repository from which they downloaded resources. Through integrating the online repository, we hope to encourage educators to use already existing content as well as create their own content and upload them to be used by other educators to increase both the efficiency and hopefully, in the long term, the quality of education to everyone using the system.

1.2 Problem Statement

1.2.1 Aim of Study

The aim of this capstone project is to design and implement an OER repository aimed at archiving OERs authored by educators in Zambia and, additionally, designing and implementing effective interfaces for creating OER resources such as virtual orchestration appliances, to increase teaching efficiency and allowing for quality gains in education over time as more educators use and improve teaching in Zambia. The respondents had not really internalized the OER concept, in particular the associated open licensing approach.

1.3 Research Objectives

In order to facilitate the co-creation of useful OER content, such as so-called virtual orchestration appliances, it becomes necessary to design and implement OER repositories that are effective about designing and implementing an OER repository aimed at archiving OERs authored by educators in Zambia and, additionally, designing and implementing effective interfaces for creating OER resources such as virtual orchestration appliances. In specific terms, the study sought to:

1. To design and implement an OER repository aimed at archiving OERs authored by educators in Zambia.
2. To Designing and implementing a scalable OER platform or repository
3. To design and implement effective end-user interfaces for creating OER resources.

1.4 Research Questions

1. How will educators and students find it easy to access OER content?
2. How effective is the end-user interface for

creating OER platform?

3. How useful and Reusable is the OER platform.

1.5 Project Significance

As our final year capstone project, we seek to use information technology to help equalize access to knowledge and educational opportunities in Zambia. The initiative targets educators, students, and self-learners in Zambia. The significance of this study is to introduce the notion of storage and the retrieval of content online using a repository. OER gives a wide variety of materials from which to build a class without having to start from scratch. OER is important because it provides affordable material to students, allows faculty to enhance their own work, and provides faculty with content for classes. The most basic level of openness. People are allowed to use all or part of the work for their own purposes (for example, download an educational video to watch at a later time. Therefore, this study is centered around providing the basic services mentioned above. This will see to it that in Zambia the levels of education, research and learning in general is actually uplifted.

1.6 Definition of Key Terms

OERs stand for open educational resources and refers to educational resources such as textbooks, readings, multi-median files such as videos and audio clips, assessment tools like exams and test banks, online courses, syllabi and lesson plans and even software that are openly licensed. OERs are learning and teaching materials available for free online for anyone to use, examples include full courses modules, lectures, games or teaching materials.

Learning object repository abbreviated as LOR is an online library for storing, managing and sharing your learning resources or learning objects. Learning objects are defined as an entity, digital or non-digital which can be used or re used during technology-supported learning (LOM, 2000).

2. RELATED WORK

This part of the research provides an overview of literature that has been done in relation to OER's. The literature review focuses on the useful and usable OER reusable orchestration appliances. Relevant literature is going to be reviewed in order to identify the existing gaps.

The value and pivotal importance of open educational resources (OER) for the broader field of education have become evident ever since their first emergence at UNESCO’s 2002 Forum on the Impact of Open Courseware for Higher Education in Developing Countries. Notwithstanding that there are no canonical, but numerous competing, definitions, a commonly accepted understanding is that OER describe, 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 license fees. MERLOT (Multimedia Education Resource for Learning and Online Teaching) is an online repository and international consortium of institutions and systems of higher education, industry partners, professional organizations and individuals. MERLOT partners and members are devoted to identifying, peer reviewing, organizing and making available existing online learning resources in a range of academic disciplines for use by higher education faculty and students.[4]

2.1. Open Education Repositories

Repositories of OER (ROER) have been defined by McGreal as digital databases that house learning content, applications and tools such as texts, papers, videos, audio recordings, multimedia applications and social networking tools. Through OER repositories, resources are rendered accessible to learners and instructors on the World Wide Web. It seems therefore to be an opportune moment to build on the considerable work that the OER community has put into the development and use of such repositories, and consider how they might best be implemented or enhanced going forward to the Zambian education.

Reducing the time required to prepare lesson plans can be significantly reduced by making use of Open Educational Resources (OERs). OERs can be thought of as a collection of educational materials that educators can make use of in order to prepare their lessons. OERs have to make use of servers that are connected to the internet so that they can be accessed by other educators in the country, or even worldwide. These “repositories” can be provided by various communities and institutions like libraries and universities. Educators have a standard curriculum of content that needs to be covered in their specific class(es). Teaching materials are often “hidden away” on educators’ personal computers. If all this content can be shared and rated, the highest quality of education can be extracted and educators can efficiently replicate it. OERs can break down this obstacle by presenting a platform that educators can use to share and reuse content from their (and other educators’) lessons. This would enable educators to effectively reproduce lessons that were well received by students.[13]

However, all the content for OERs must first be “found”. Since the aim is for educators to reuse the materials available, it is expected that there will be a rich variety of material shared by educators. However, educators are often too reserved to publicize their teaching materials. They feel that it would not be fair to allow others to freely use the material they worked so hard on. Furthermore, all the content available on OERs might not be relevant. There might be a language barrier between the content and the educator wanting to make use of it. Because of this, the resources need to be reviewed and organized based on relevance and various other categories. An educator should easily be able to search through a repository to find the relevant material they are looking for.

While OERs is a very broad topic, it includes the use of educational software like computer-based simulations. This means that although educators are the primary target of OERs, students are also able to make use of OERs and are seen as the secondary target. There are currently over 2500 open access courses available from over 150 universities. This shows that the idea is plausible. However, in order for OERs to grow, they need to be sustained. In order for OERs to continue its operation of sharing reusable resources, the production of relevant materials need to be continuous. This is because the content is not always applicable anymore when there is a curriculum change. For the most part, funding isn't the main issue. In order to have continuous new materials available, educators need to be continually uploading new materials. Maintenance and running costs of the servers are a given but no massive structural changes need to be made once the OER is up and running. Therefore, what is actually required is "human resources". This does not boil down to merely having educators add new content but also involves having individuals process the content. This means capturing the content, resolving any copyright issues (if any exist), assuring the quality and accuracy of the content, and finally ensuring that the content will be efficiently shared on any operating system.[13,9]

In February 2015, the collaborative report OER development provided an analysis of the current state of the OER movement and this became a roadmap to identify specific strategies to achieve the real adoption of OER. According to the report, currently the platforms that enable the management, discovery, use and reuse of open content are inadequate and not very well known. This project has taken into account a series of educational indicators that determine whether OER's can meet the specific needs of educators and of the education context. This study also helped to determine what can be done to improve OER's and may become a basis for discussion among universities and institutions responsible for these repositories. OER's have become more significant worldwide and their availability and use have expanded, it's full potential has not yet been achieved and entered the mainstream education system. For this reason, our research looked into the usefulness and reuse of OER's that will lead to the improvement of education and the education sector.[13]

2.1.1. Importance of Educational Repositories

Educational repositories provide a method of sharing content for different audiences. For example, research outputs such as publications and data are not only used by educators but are also used by students. Repositories can provide the materials with environmentally controlled, secure physical and digital storage and can oversee their proper handling and use. Equally important, it can provide research access to the content of the records both to the students and educators.

2.1.2. Similar Projects

In 2016, the University of Cape Town Department of Computer Science embarked on a project called Reusable Virtual Orchestration Appliances aimed at aiding the reusability of resources among educators that allows them to share resources with one another and to provide educators with a platform to orchestrate their resources and aid in the execution of lessons both physically and technological. The project discussed the Reusable Virtual Orchestration application element of the project Called the ReVO-App.[11]

The development of the ReVO-App was aimed at allowing for lesson orchestration resources and ultimately in conjunction with an independent development of an online Open Educational Repository (OER).[1]

At the university of Zambia department of library and information science, a research was conducted in 2020 to Investigate the use of learning object repositories in the co-creation of open educational resources by educators. The project aimed at determining the factors that can positively influence educators to be co-creators of OER's using LOR's and to ascertain the learning objects commonly used by educators and identify the appropriate theory that was in identifying the factors that can positively influence educators to be co-creators of OER's.[1]

2.2. Open Educational Resources

The United Nations Educational, Scientific and Cultural Organization (UNESCO) defines Open Education Resources (OERs) as teaching, learning and research materials available in the public domain or released under an open license that enables them to be accessed, used and adapted with limited or no restrictions ("Open Educational Resources (OER)" 2017). In as much as the benefits of OERs, such as the ability for individuals to easily access quality information and their effectiveness in influencing positive student learning.[9]

In February 2015, the collaborative report OER development provided an analysis of the current state of the OER movement and this became a roadmap to identify specific strategies to achieve the real adoption of OER. According to the report, currently the platforms that enable the management, discovery, use and reuse of open content are inadequate and not very well known. This research has taken into account a series of educational indicators that determine whether OER's can meet the specific needs of educators and of the education context [7]. This study also helped to determine what can be done to improve OER's and may become a basis for discussion among universities and institutions responsible for these repositories. OER's have become more significant worldwide and their availability and use have expanded, it's full potential has not yet been achieved and entered the mainstream education system. For this reason, our research looked into the usefulness and reuse of OER's that will lead to the improvement of education and the education sector.[7]

2.3. Evaluation of Repository Software

Based on our review of the literature, there were certain indicators of quality in the design and implementation of ROER, which when taken together, constitute a range of social and technical characteristics and provide a support structure for the themes to access materials by the users.[10]

2.4. Featured Resources

Featuring and highlighting certain resources held in a repository can benefit educators by exposing them to additional materials that can be either interesting, original or novel, or by showcasing resources indicated as high quality by peers.

2.5. Authorship of the Resources

Attributing authorship to the resources can encourage academics to feel confident in making use of existing OER, and might also act to encourage others to share their resources with the full confidence that their intellectual property is recognized. As noted, the function of intellectual property rights is primarily instrumental, it is a societal tool to stimulate innovation [10]. Ensuring authorship of the resources is recorded and displayed is key in motivating use, reuse and sustainability of OER's.

3. METHODOLOGIES

3.1 Overview

This chapter will describe the chosen research methods. It will also state how the data will be collected and how it is going to be analyzed in response to the research questions, furthermore the section will indicate the research design, study site, sample size, data collection instruments, sampling technique and data analysis tools

3.2 Research Design

A research design is defined as the arrangement of conditions for the collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy and procedure [5]. Henry Manheim says that research design not only anticipates and specifies the seemingly countless decisions connected with carrying out data collection, processing and analysis but it presents a logical basis for these decisions.[12]

This research is quantitative in nature, quantitative research method is the explaining of an issue or phenomenon through gathering data in numerical form and analyzing with the aid of mathematical methods.in quantitative research numerical data are collected and analyzed using statistical methods.[2]

The research has employed a case study design. A case study as an intensive analysis of an individual unit (as a person or community) stressing developmental factors in relation to the environment.

A case study design will be used because of the nature of the study which is trying to provide an in-depth investigation of the phenomenon under study. A non-experimental research design approach will be suitable because it does not change a phenomenon under study but simply examines and provides possible suggestions to improve the situations.

This design will be suitable for the research because it will apply a variety of methodologies and will rely on a variety of sources to investigate a problem and in this case methods such as Online questionnaires will be used for data collection, they will be sent via google forms concerning authoring and usage of useful and usable oer reusable orchestration appliances, the study will be conducted at the university of Zambia. This research will have a sample size of 5 participants which will include 2 educators and 3 students. It will use a systematic collection and presentation of data in order to have a clear picture. Furthermore, this research design will have a greater degree of accuracy and precision in the manner in which events will be reported.

3.3 Sampling Method

A random Sampling technique which is a type of probability sampling will be used in carrying out this research, as it will involve identifying key participants who will give us vital information concerning the study. The sample size will be a total of 17 participants who will be chosen at random and it will include 9 educators and 8 students that will take part in this research from the university of Zambia.

3.4 Data Collection Instrument

Since this is a quantitative research, online questionnaires will be used to collect data through the use of Google Forms concerning authoring and usage of useful and usable oer reusable orchestration appliances. An online questionnaire will be used to collect primary data among students and educators. Closed and open-ended questions will be used because they will generate a limited set of responses that will be coded easily in a database. These questionnaires will be self-administered. This tool will be very appropriate because a large number of respondents will be reached easily.

3.5 Data Analysis

This research will consist of only quantitative data. The quantitative data will be analyzed using a descriptive statistic because it deals with the presentation of numeric facts or data in either tables or graphical form. This will be achieved by using the statistical Package for social sciences (SPSS). This is because SPSS has a number of advantages over others in that it is easy to access and possible to design the questionnaires on the computer.

3.6 Ethical Considerations

Ethical issues need to be anticipated and dealt with by any researcher. Therefore, this study will put into consideration possible and potential ethical issues. The

measures undertaken to ensure compliance with ethical issues will include, not forcing the respondents to answer the questions, the principle of confidentiality and respect will also be considered and will respect the rights, values and decisions of the respondents.

4 RESULTS

This section presents the results that were obtained from all respondents using online questionnaires. Further the data analysis was done using statistical packaging for social science (SPSS) and Microsoft Excel and the data is presented in quantitative form.

4.1 Demographic Detail

ITEM	CATEGORY	COUNT
Gender	Male	6
	Female	2
Age Range	18-20	1
	21-25	4
	26-30	2
	31-35	1
	Above 35	

Table 1: Demographic details for students

ITEM	CATEGORY	COUNT
Gender	Male	7
	Female	2
Years in service	1-5 years	4
	6-10 years	1
	11-15 years	3
	15-20 years	
	21-25 years	1
	25-30 years	
	Less than I year	
	Above 30 years	

Table 2: Demographic details for educators

4.2 Results for Students

4.2.1 What factors can motivate you to be interested in OERs?

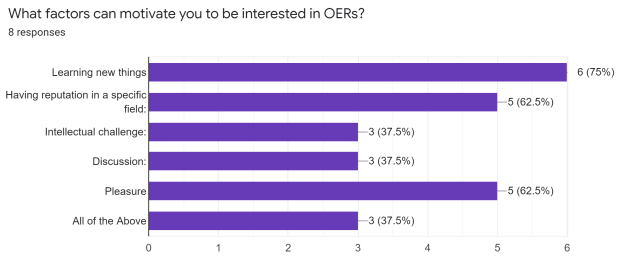


Figure 1: Motivators of OERs

Figure 1 indicates that the study consists of a series of factors regarding what factors would motivate students to be interested in OERs. and from the finding it shows,respondents that choose learning new things is represented by 75%, respondents that choose having reputation in a specific field is represented by

62.5%,respondents that choose intellectual challenge is represented by 37.5%,respondents that choose discussion is represented by 37.5%,respondents that choose pleasure is represented by 62.5%,respondents that choose all the above is represented by 37.5%.

4.2.2 Learning Object Commonly Used

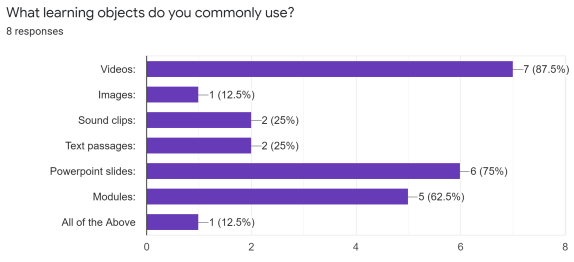


Figure 2: Learning object

Figure 2 indicates the findings based on the series of learning objects that are commonly used by the students to create OERs. The findings indicate that respondents that choose videos are represented by 87.5%, respondents that choose images are represented by 12.5%,respondents that choose that choose sound clips are represented by 25%,respondents that choose text messages are represented by 25%,respondents that choose powerpoint slides are represented by 75% ,respondents that choose modules are represented by 62.5% and respondents that choose all of the above learning objectives are represented by 12.5%.

4.2.3 Types of Resources Most Willing to Be Created

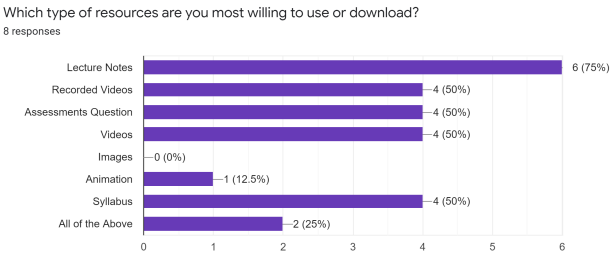


Figure 3: Resources

Figure 3 indicates resources that respondents are willing to mostly use or download and from the findings it shows,,respondents that choose lecture notes notes is represented by 75%,respondents that choose recorded videos are represented by 50%,furthermore,respondents that choose assessment question are represented by 50%,respondents that choose videos are represented by 50%,respondents that choose images are represented by 0%,respondents that choose animation are represented by 12.5%,respondents that choose syllabus are represented by 50% and respondents that choose all of the above resources are represented by 26%.

4.2.4 What Inspires Educators To Be Creators of OERs

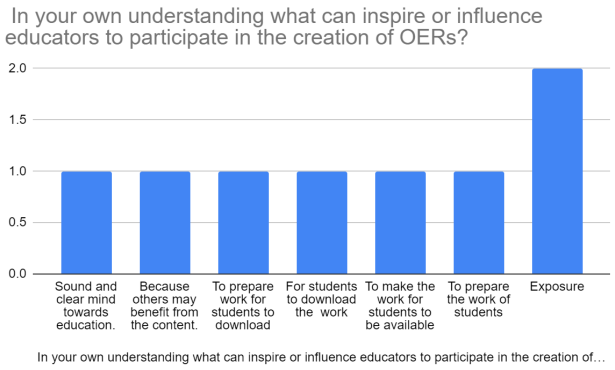


Figure 4: Inspirations

Figure 4 indicates that from the series of factors the respondents were given a chance to give their own opinion on what can inspire them to participate in the creation of OERs and from the finding it shows that sound and clear mind towards education is represented by 1.0,because others may benefit from the content is represented by 1.0,to prepare work for students to downloads represented by 1.0,for students to download the work is represented by1.0,to make the work for students to be available is represented by 1.0,to prepare the work of students is represented by 1.0 and exposure is represented by 2.0.

4.3 Results for Educators

4.3.1 Factors That Can Influence Educators To be Creators of OERs

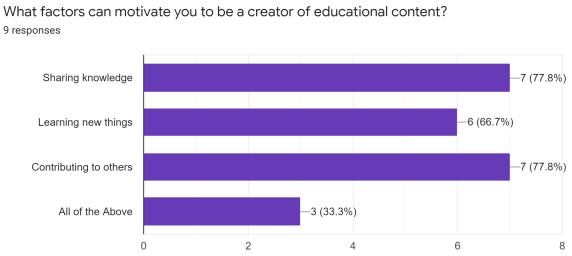


Figure 5: Motivators

The study asked a series of factors regarding what motivates lectures to create content and from the findings it shows ,respondents that choose sharing knowledge are represented by 77.8%,respondents that choose learning new things are represented by 66.7%,furthermore, respondents that choose contributing to others are represented by 77.8% and respondents that choose all of the above are represented by 33.3%.

4.3.2 Learning Objects

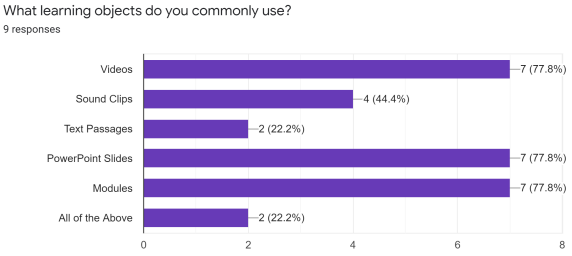


Figure 6: Learning Objects

The study indicates that the series of learning objects that are commonly used by the respondents to create content and from the finding it shows ,respondents that choose to use videos are represented by 77. 8%, ,respondents that choose to use sound clips are represented by 44.4%,respondents that use text passages are represented by 22.2%,,respondents that choose to use powerpoint slides are represented by 77.8%,furthermore ,,respondents that choose to use modules are represented by 77.8% and the ,respondents that choose to use all of the above are represented by 22.2%.

4.3.3 Resources Willing To Be Uploaded

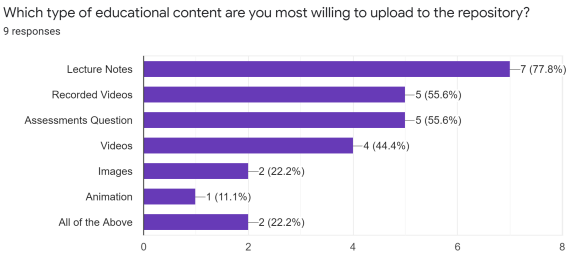


Figure 7: Resources

The study indicates the resources that respondents upload to the repository and from the findings it shows, respondents who choose to upload lecture notes are represented by 77.8%,respondents who choose to upload recorded videos are represented by 55.6%,respondents who choose to upload assessment question are represented by 55.6%,respondents who choose to upload videos are represented by 44.4%,respondents who choose to upload images are represented by 22.2%,furthermore,respondents who choose to upload animation are represented by 11.1% and respondents who choose to upload all of the above resources are represented by 22.2%.

4.3.4 What are the benefits of reusing already existing educational content for educational purposes.

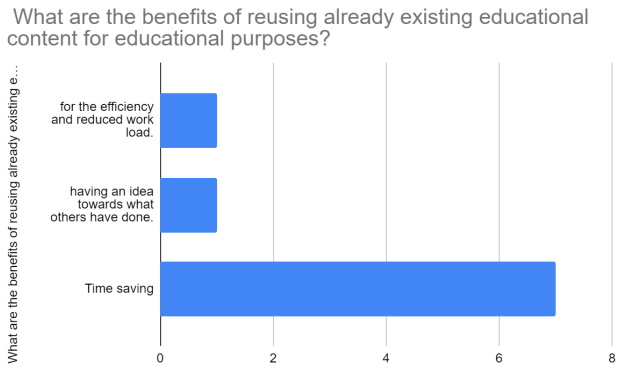


Figure 8: Benefits

The findings above show the benefits of using already existing content,it shows from the graph that for efficiency and reduced workload is represented by 1,having an idea towards what others have done is represented by 1 and time saving is represented by 7.

4.3.5 In your own understanding what can inspire or influence educators to participate in the usefulness of OERs?

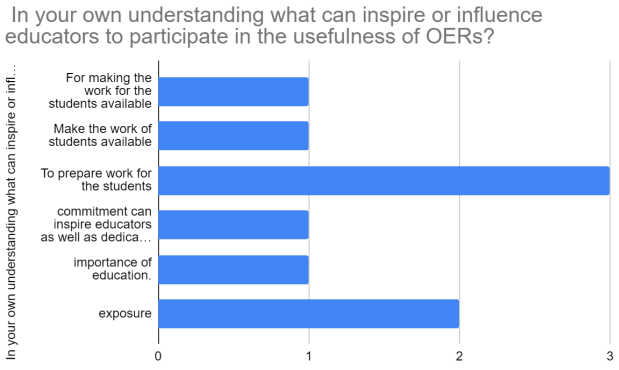
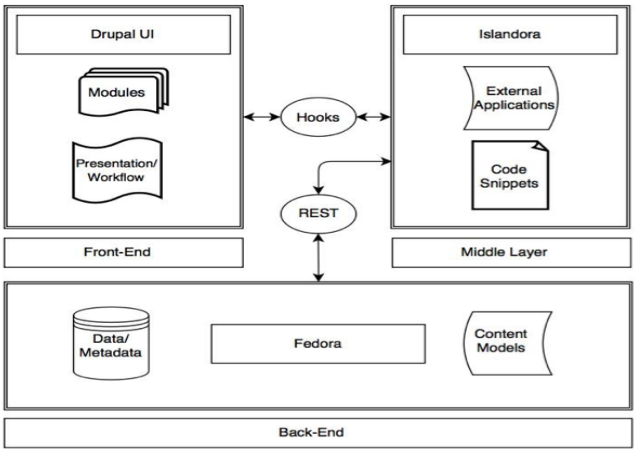


Figure 9: Usefulness

The findings above show the usefulness of the repository.it shows that for making the work for the students available is represented by 1,make the work of students available is represented by 1,to prepare work for the the students is represented by 3,commitment can inspire educators as well as dedication is represented by 1,importance of education is represented by 1 and exposure is represented by 2.

5. EXPERIMENTAL DESIGN AND EXECUTION

The purpose of Authoring and Usage of Useful and Usable OER Reusable Orchestration Appliances (AURORA) project is to provide users, mainly educators, with a platform which allows them to orchestrate lessons for educational purposes and then additionally give them a choice of sharing these orchestrated packages with other educators through an online repository. This report will be focusing on the open shareable online repository platform and framework of Islandora of the AURORA Project thus not much detail will be given concerning the development of the repository and framework component of Islandora for our project [13,3]. A Feature Driven Development (FDD) approach was used for the open shareable online repository platform and framework of the project as this section of the project aims to determine the useability of the OER platform or repository. This methodology ensures that the features being provided by OER Repository are aligned with the overarching aim of AURORA project. However, in addition to using FDD to correctly design and implement the desired features of the OER-framework it was apparent that intended users of the framework should play a part in the final stages of the User-Interface (UI) design. This has the added benefit of allowing the users to experience the final iteration of the OER-framework as desired [3], thus removing likely negative effects of a confusing UI when determining the scalability and effectiveness of the Islandora framework. The design process consists of 5 processes (Figure 2): Development of overall model process, building a features list process, planning by feature process, Design by feature process and finally concluding with the Build by feature process.[3]



After these processes were completed, users were engaged to aid with the development of the UI in order to make the application more user-friendly and thus increase User-Experience. In the development of an overall model process, information regarding requirements of the application is collected while allowing team members to get frequent with the tasks and tools at hand. In this context the development of the overall model process would be gathering an understanding of the AURORA project and what is required by each of the members. This model is alive throughout the lifetime of the project for referencing and correction purposes. The second process, building a features list, is one that is understood to be self-explanatory. In order to achieve the aims, set forth by the overall model development a list of features will need to be implemented [3,9]. This list will be used in the following processes of the FDD methodology as a design directional "roadmap". Following this process are the final three processes (Plan by feature, Design by feature and build by feature) which will, for this report, be grouped together in one section. These three processes are iterative by feature, in which one feature from the "roadmap" will be taken per iteration, be planned for, designed, and built. The aim of this approach is to put together a complete prototype, like a puzzle, building it piece by piece.[9]

5.1 Develop an Overall Model

5.1.1 AURORA Overall Model Development

The process of developing an overall model for the project was the first step of the FDD methodology for the AURORA project. The focus during this process was to determine the overarching aims of the AURORA project and to provide all stakeholders involved with the development of the different sections of the project with a baseline of understanding. Due to the independent nature of the different sections of the AURORA project, namely OER-framework and OER-Repo platform, it was decided that certain base variables be kept in mind throughout the duration of the project so as to ensure the possibility of smooth integration between the sections. It was agreed a universal metadata standard be observed by both sections. The metadata standard chosen was Dublin Core, for the reason that many educational repositories use Dublin Core as their metadata standard while others extract the necessary information from the Dublin Core metadata format and translates this information to the standard being used by the educational repository, such as fedora Commons. Furthermore, upon research it was discovered that Islandora framework was best suited to be used as the repository platform framework for this project due to its flexibility which empowers users to work with a huge variety of data types (such as image, video, ppt, and pdf) and knowledge domains (such as the Digital Humanities) and provides integration with additional viewers, editors, and data

processing applications and customizability. This choice confirmed the decision to use Dublin Core as it is the default metadata standard used by Fedora repositories, which would be used for the development of OER-Repo.[13]

5.1.2 OER-Framework Overall Model Development

This section briefly outlines the reasons behind some of the choices that were made which led to the overall direction and development of the standalone application and the OER repository. Islandora is a completely free open-source software framework designed to help institutions and organizations and their audiences collaboratively manage and discover digital assets using a best practice framework. Islandora is implemented and supported by an ever-growing international community. Built on a base of Drupal, Fedora, and Solr.[17]

5.1.2.1 Platform Nature

It was decided, the platform nature will be online, to stick to the status quo set by similar tools and host the entire project on an online platform. This ensures continuity between the different elements of the project, also aligning itself with the direction in which education is heading. Over and above this reason, having the project online also allows for device independence, as many smart devices such as phones, tablets, laptops and computers have connection to the Internet. Thus, special considerations will not have to be made for different users who have different machine preferences.[8]

5.2 Building Features List

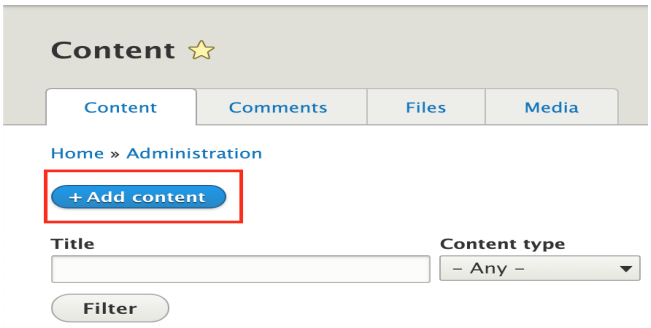
This is the second process of FDD and the one which defines the project and the direction in which it would go. In this section the feature list “Road Map” for the OER-framework and OER-Repo is described and explained.[14]

5.2.1 Sequencer /Orchestrator

As determined, the project's main features are to orchestrate resources shared on the platform. By this it is meant that the resources given as inputs to the designed sequencer will be returned as an output with the difference being that they have been orchestrated in the order desired by the user. Orchestration could include repetition of various resources for emphasis. For this feature to theoretically be implemented it was discovered that three composite features (Upload, Download and Delete) would be added to the start alone application.[6]

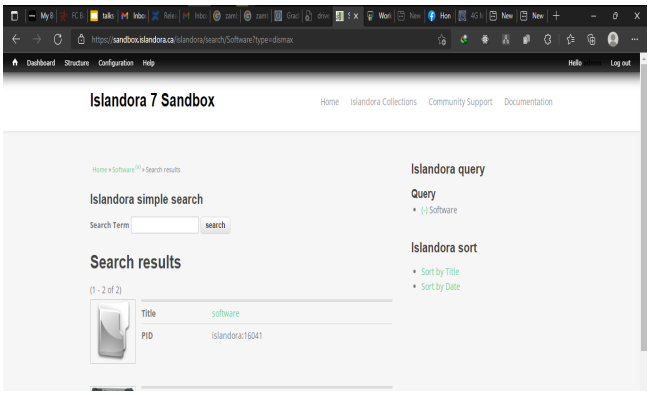
5.2.1.1 Uploading

An upload feature would need to be added to the OER-framework because the user will need to access uploaded resources to be orchestrated as desired. Therefore, if there aren’t files to orchestrate the orchestrator can’t function 16].The figure below shows the uploading interface.



5.2.1.2 Downloading and Searching

Learning resources need to be searchable across repositories, and it must be possible to download. A download feature would be required because if users do not wish to share their orchestrated lessons materials in packaged folders onto the OER-Repo element of the project then they would need to be able to download the files from the OER-repository. Though orchestrated files can be viewed online in OER-repository, a download button would still be needed for the option to save resources onto a personal computer in case there is no availability of internet[16].the figure below shows the download interface.



5.2.1.3 Delete

In any database, when information is actively stored, clutter and volume of work is bound to result and can become overwhelming to manage if there is no option of removing information you no longer require or have long since improved upon. A delete button needs to be implemented to prevent overloading the database as well as to provide the opportunity for users to manage their orchestration spaces[16].the figure below shows the delete interface.

5.2.3 Bundle/Packager

A Bundle feature will be developed to allow for the collective packaging of various raw resource formats as well as orchestrated resources created by the OER-framework sequencer. The aim is to allow for packaging of various content of school resources that could be used in a lesson into a single collectively zipped file that can easily be downloaded and used or

later shared onto the repository once integration has occurred. Along with the packaging of the resources metadata would also have to be captured. This has the benefit of allowing users to get a textual overview of what lies within packages when using OER-Repository to search or browse for resources.[16]

5.2.4 Share Option

The Share option, as partly discussed in the Packager Feature, will allow for user-selected lesson packages to be shared directly onto the element of the project once integration occurs.[16]

6. EVALUATION

6.1 Introduction

This chapter sets out the principles and policies governing the evaluation of our capstone project of making an institution repository. It describes how the evaluation of project achievements improved decision-making, organizational learning, accountability and impact. The chapter clarifies roles and responsibilities and sets out the procedures for managing project evaluations. Project evaluation is a systematic and objective assessment of an ongoing or completed project. The aim was to determine the relevance and level of achievement of project objectives, development effectiveness, efficiency, impact and sustainability.

6.2 Purpose of the Evaluation

Project evaluation for the project Authoring and Usage of Useful and Usable OER Reusable Orchestration Appliances included the process of collecting and analyzing information in order to understand the progress, success, and effectiveness of the project. ... The purpose of this evaluation is to provide information for Usage of Useful and Usable and Reusable. Evaluation of Authoring and Usage of Useful and Usable OER Reusable Orchestration Appliances provides a systematic method to study a program, practice, intervention, or initiative to understand how well it achieves its goals. This project evaluation helped in determining what would work well and what could be improved in a program or initiative of OER resources.[15]

6.3 Objective of the Evaluation

The objectives of this project evaluation will focus on two principles.

1. Formative Evaluation: When evaluating the project Authoring and Usage of Useful and Usable OER Reusable Orchestration Appliances, this objective evaluation addressed how well the OER repository had progressed towards reaching its goal.
2. Summative Evaluation: This objective evaluation aided the determination of pre-established outcomes of the Usage of Useful and Usable and Reusable.

6.4 Evaluation Findings

Participants for the user experience towards the institutional repository were gathered and the experience was done online. There were no restrictions placed on gathering participants where a distribution of participants from various schools was the aim with varying levels of computer literacy. Due to the scope of the study and time factors, these two aspects were not measured. The number of participants was also limited to ten.

For the Usage of Useful and Usable and Reusable study of the Institutional repository, a total of 10 participants were tested. The participants had varying backgrounds and participants ranged in age. This was done in an attempt to cover a wider socioeconomic background as well as the school they belong to. All participants were familiar with finding resources online.

The errors measured and satisfaction levels produced quantitative data to determine the impact the institutional repository will have. Once the survey was completed, the researcher conducted a semi-structured interview to gain insight on the user's thoughts and actions-based Usage of Useful and Usable and Reusable. This further justifies the selection of 10 participants. At the start of answering the questionnaire, a brief explanation was given to the participant detailing what the system does.

6.5 Results

These evaluation results were used to demonstrate Institutional Repository effectiveness, it also identified ways to improve the system as a whole, Usage of Useful and Usable and Reusable of OER it also directed us to justify funding.

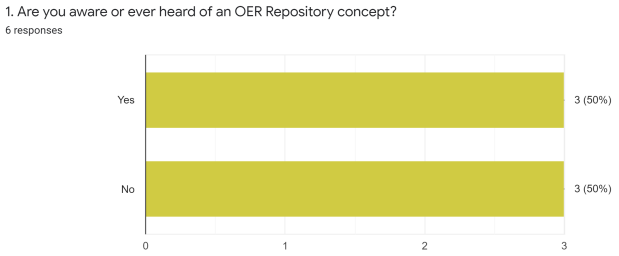


Figure: 9

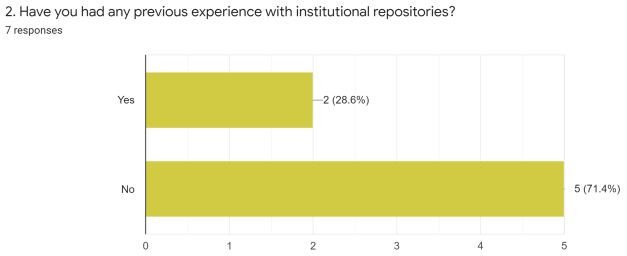


Figure 10: Experience

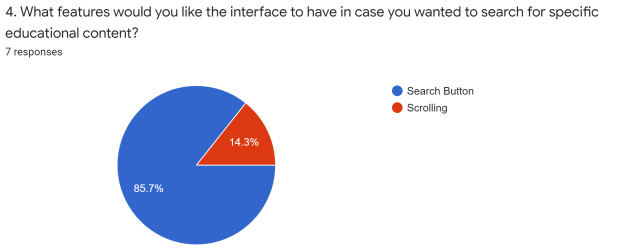


Figure 11: Features

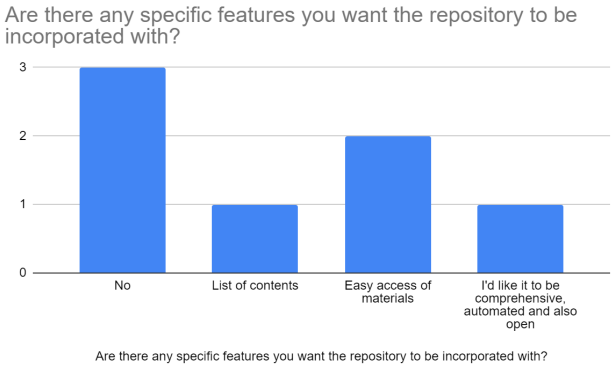


Figure 12: Suggested Features

6.6 Usage, Usefulness and Reusability

According to the survey that was conducted with the 10 participants on the usage of the institutional repository, it was noted that the participant's usage towards the repository was effective. According to the participants the repository gave them an interface that favored their usage. It provided information that would be useful to their research and education content searching. As the participants interacted with the repository, they confidently articulated that the repositories performed the main functions of digital libraries by collecting, classifying, cataloging, curating, preserving, and providing access to digital content which was the idea behind the interaction with the system. The survey carried on the usefulness of the repository. It was discovered that institutional repositories enabled the participants to self-archive their research output and improved the visibility, usage and impact of research conducted at an institution.

6.7 Relevance

According to the findings and results from the participants, it was noted that the usage and main objective of an institutional repository are to provide open access to educational content output by self-archiving in an open access repository, furthermore, it was noted that the participants had visibility a number of educational contents from different educators. This was also interpreted in terms of preservation of educational contents, other institutional digital assets, including unpublished or otherwise easily lost literature such as theses, working papers or technical reports.

6.8 Summary

For the usability study of the institutional repository, most of the participants had no difficulty completing the tasks. The profound measured response can be analyzed through the interactions between the participants. This study has been able to identify the importance of utilizing and depositing scholarly materials in the IR, which are relevant for references and usage by educators, students and researchers. An IR is dynamic in all aspects and it satisfies every element of digital scholarship since it is a concept that looks at managing digital data of all sorts both for now and future.

7 DISCUSSION

7.1 Factors that can Motivate Educators to be Creators of OERs

The study reviewed in the questionnaires conducted with the student and educators is that educators can have different motivators in order for them to be creators of OERs and add educational content to the repository. The findings explored in this study are from two questionnaires (students and educators). The assessment of the factors that can motivate educators to be creators of OERs and add educational content to the repository, was based on the uses and Gratification theory. The uses and gratification tend to emphasize on the five generic clusters of needs, which are cognitive, affective, integrative personal, integrative social and diversion needs. Hence the results show that motivators were mainly cognitive, diversion, integrative and affective. Furthermore, sharing knowledge, contributing to other people and intellectual challenge were highly ranked in the two questionnaires compared to the other motivators this was because most educators seem to be motivated through themselves actually taking part in the creation of the content. In addition, this indicates that in order for educators to be creators of OERs and add educational content to the repository, they need to be intrinsically motivated or at least sharing and able to collaborate with others for unselfish reasons, in that from the results most educators did not see pleasure as one of the factors that could motivate educators to create OERs and add educational content to the repository. Hence this indicates that most factors that could actually motivate educators to be creators of OERs and add educational content to the repository are usually the ones that enable them ensure that knowledge is shared among different people apart from their students and is being made use of by people. However, this shows that for educators to create OERs and add educational content to the repository, the motivation is derived from factors that are driven from one's own internal rewards so as to create a suitable environment for educators to create OERs and add educational content to the repository.

7.2 Learning Object

The result showed that there are a lot of learning objects that commonly be used by educators such as videos, images, sound clips, text passages, powerpoint slides and modules. However, students preferred modules because a module structure is important in an online learning environment, as it provides an aid in the presentation and application of the learning process. When students are aware of the structure of the course, they spend less time guessing about what is expected of them and have more time focusing on the right contents and activities. Furthermore, it also allows better evaluation and more focused revision and improvement. On the other hand, educators preferred uploading more of powerpoint slides in that it provides encouragement and support to staff by facilitating the structuring of a presentation in a professional manner and it also enhances the teaching and learning experience for learners, and it would also enable students to fully participate in the interaction

through the use of powerpoint slides and students will follow through the lecture.

7.3 Limitations of the study

The research was restricted by geographical location, since the research will be limited to only learning institutions in Zambia, the research will be limited to groups of individuals such as educators and students,the other limitation will be lack of awareness of open education resources.Due to lack of funding the survey was carried out in Lusaka at the University of zambia.

8.1 Recommendation

The education sector should consider the creation of OERs and platforms for accessing these OERs such as a repository, because it will help in the effective teaching and learning process. The educators will be able to share different materials with their fellow educators from different universities or places of learning and this can be a good way to promote global interaction. This will also enable them in sharing and acquiring knowledge.

8 CONCLUSIONS

The framework was successfully implemented using customization on Islandora Sandbox. The framework is anchored on usability evaluation that gives us an understanding towards the participants. Participants were comfortable enough on features that the framework had during the interaction of the user and the system. The framework has a preposition for injection of educational materials or OERs by the educators. In order for educators to be creators of OERs they need to be intrinsically motivated or be able to share and collaborate with others. In this research the respondents were asked to state what can personally motivate them to be creators of OERs and responses were given.

REFERENCES

[1] Aaron Bangor, Philip Kortum, and James Miller. 2009. **Determining What Indi[1]vidual SUS Scores Mean: Adding an Adjective Rating Scale. J. Usability Studies 4, 3 (May 2009)**, 114–123. hŠp://dl.acm.org/citation.cfm?id=2835587.2835589.

[2] Aliaga, M. and Gunderson, B. (2002) **Interactive Statistics. [Thousand Oaks]**: Sage Publications.

[3] Andrew Waugh, Ross Wilkinson, Brendan Hills, and Jon Dell'oro. 2000. **Pre[1]serving Digital Information Forever.** In Proceedings of the Fi‡h ACM Confer[1]ence on Digital Libraries (DL '00). ACM, New York, NY, USA, 175–184. hŠps: //doi.org/10.1145/336597.336659.

[4] Charles W Bailey Jr. 2008. **Institutional repositories,** tout de suite. (2008).

[5] Claire Selltiz and others, (1962), **Research Methods in Social Sciences,** New York: Holt, Rinehart and Winston: Published for the Society for the Psychological Study of Social Issues, p. 70, Also See: Gupta Mukul and Gupta Deepa, (2011), Research Methodology, New Delhi: PHI Learning Private Limited, p. 32

[6] Francisco Javier D´ıaz, Mar´ıa Alejandra Schiavoni, Mar´ıa Alejandra Osorio, Ana Paola Amadeo, and Mar´ıa Emilia Charnelli. 2015. **Integrating a learning management system with a student assignments digital repository: a case study.** International Journal of Continuing Engineering Education and LifeLong Learning 25, 2 (2015), 138–150.

[7] Heitor Barros, Evandro Costa, Jonathas Magalhaes, and Ranilson Paiva. 2015. ˜ **Integrating Educational Repositories to Improve the Reuse of Learning Objects.** In Proceedings of the 30th Annual ACM Symposium on Applied Computing (SAC '15). ACM, New York, NY, USA, 270–272. hŠps://doi.org/10.1145/2695664.2696056.

[8] Ildefonso Ruano Ruano, Javier Garc´ıa Gamez, and Juan G ´ omez Ortega. 2014. ´ **Building SCORM embedded WebLabs with LMS interaction.** In Frontiers in Edu[1]cation Conference (FIE), 2014 IEEE. IEEE, 1–4.

[9] Jean Gabriel Bankier and Kenneth Gleason. 2014. **Institutional repository so‰- ware comparison**. (2014).

[10]John Brooke. 2013. SUS: **A Retrospective. J. Usability Studies** 8, 2 (Feb. 2013), 29–40. hŠp://dl.acm.org/citation.cfm?id=2817912.2817913.

[11] Lighton Phiri and Hussein Suleman. 2013. **Flexible Design for Simple Digital Library Tools and Services**. In Proceedings of the South African Institute for Com[1]puter Scientists and Information Technologists Conference (SAICSIT '13). ACM, New York, NY, USA, 160–169. hŠps://doi.org/10.1145/2513456.2513485.

[12] Manheim henry, (1977), **Sociological Research: Philosophy and Methods, Illinois**: The Dorsey Press, p. 140

[13] Michel Castagne. 2013. ´ **Institutional repository so‡ware comparison: DSpace, EPrints**, Digital Commons, Islandora and Hydra. Ph.D. Dissertation. University of British Columbia.

[14] Michael Simonson. 2007. **Course management systems.** ‰Arterly review of distance education 8, 1 (2007), VII.

[15] Robert Tansley, Mick Bass, David Stuve, Margret Branschofsky, Daniel Chudnov, Greg McClellan, and MacKenzie Smith. 2003. Œe **DSpace Institutional Digital Repository System: Current Functionality**. In Proceedings of the 3rd ACM/IEEE[1]CS Joint Conference on Digital Libraries (JCDL '03). IEEE Computer Society, Washington, DC, USA, 87–97. hŠp://dl.acm.org/citation.cfm?id=827140.827151.

[16] Virginia Rodes Paragarino, Adriana Gewerc Barujel, and Mart ´ ´ın Llamas Nistal. 2014. **Use of Repositories of Digital Educational Resources in Higher Education.** 9 In Proceedings of the XV International Conference on Human Computer Interaction (Interacción '14). ACM, New York, NY, USA, Article 85, 6 pages. hŠps: //doi.org/10.1145/2662253.2662338.

[17] Vladimir Stantchev, Ricardo Colomo-Palacios, Pedro Soto-Acosta, and Sanjay Misra. 2014. **Learning management systems and cloud hosting services**: A study on students' acceptance. Computers in Human Behavior 31 (2014), 612–619.

APPENDICES A

APPENDIX 1: QUESTIONNAIRE FOR EDUCATORS

THE UNIVERSITY OF ZAMBIA

SCHOOL OF EDUCATION

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

RESEARCHERS: Hockings Mambwe, Inutu Lubinda, Jefferson Ndlovu, Lewis Ntembeni and Matthews Lungu.

PHONE NUMBER: 0972564995

The aim of this questionnaire is to obtain information on investigating the Authoring and Usage of Useful and Usable OER Reusable Orchestration Appliances. For this reason, we wish to inform you that you have been purposely sampled to help us with information which will successfully make our research findings representative. We therefore wish to inform you that the information you will give us will be purely used for academic purposes. Furthermore, this questionnaire consists of four types of questions.

Open Educational Resources (OERs) are learning materials freely available for use, repurposed or redistribution. No formal assessment is undertaken and no credits are awarded. It is essentially a process of sharing knowledge and expertise, making aspects of an institution's approach to teaching available to other academics and making educational content available to anyone with an interest in learning.

Learning Object is any entity, digital or non-digital, that can be used, re-used or referenced during technology-supported learning. Examples of learning objects include multimedia content, instructional content, instructional software and software tools that are referenced during technology-supported learning.

Risks: There are no potentially harmful risks related to your participation in this study.

Feedback: feedback concerning the results of this research will be received via email, once the results have been analyzed.

Withdrawal: Your participation is completely voluntary; you have the right to refuse to participate, and withdraw at any time without having to state a reason and without any prejudice or penalty against you. Should you choose to withdraw, the researchers commit not to use any of the 42

information you have provided without your signed consent. Note that the researcher may also withdraw you from the study at any time.

Confidentiality: All information collected in this study will be kept private in that you will not be identified by name. Confidentiality and anonymity will be maintained as no personal or personal identifying information will be submitted with the evaluation.

BACKGROUND INFORMATION

1. I agree to participate in this research

o No

o Yes

2. What is your gender?

o Male

o Female

4. How long have you been working?

▪ 1-5 years

▪ 5-10 years

▪ 10-15 years

▪ 15-20 years

▪ 20-25 years

▪ 25-30 years

▪ Less than 1 year

▪ Above 30 years

SECTION ONE

5. What factors can motivate you to be a creator of educational content?

To what extent do you agree with the following:

Sharing knowledge: Learning new things: Contributing to others:

6. What learning objects do you commonly use?

To what extent do you agree with the following learning objects:

i. Videos:

iii. Sound clips:

iv. Text passages:

v. Powerpoint slides:

vi. Modules:

7. Which type of educational content are you most willing to upload to the repository?

To what extent to you agree above question:

i. Lecture notes:

ii. Recorded lectures:

ii. Assessment questions:

iii. Videos:

iv. Images:

v. Animations:

8. What are the benefits of reusing already existing educational content for educational purposes

……

9. In your own understanding what can inspire or influence educators to participate in the usefulness of OERs?

……
……
……

APPENDIX B: QUESTIONNAIRE FOR STUDENTS

THE UNIVERSITY OF ZAMBIA

SCHOOL OF EDUCATION

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

RESEARCHERS: Hockings Mambwe, Inutu Lubinda, Jefferson Ndlovu, Lewis Ntembeni and Matthews Lungu.

TELEPHONE: 0972564995

The aim of this questionnaire is to obtain information on investigating the Authoring and Usage of Useful and Usable OER Reusable Orchestration Appliances. For this reason, we wish to inform you that you have been purposely sampled to help us with information which will successfully make our research findings representative. We therefore wish to inform you that the information you will give us will be purely used for academic purposes. Furthermore, this questionnaire consists of four types of questions.

Open Educational Resources (OERs) are learning materials freely available for use, repurposed or redistribution. No formal assessment is undertaken and no credits are awarded. It is essentially a process of sharing knowledge and expertise, making aspects of an institution's approach to teaching available to other academics and making the content of that teaching available to anyone with an interest in learning. With this in mind please answer the following questions.

Learning Object is any entity, digital or non-digital, that can be used, re-used or referenced during technology-supported learning. Examples of learning objects include multimedia content, instructional content, instructional software and software tools that are referenced during technology-supported learning.

Risks: There are no potentially harmful risks related to your participation in this study.

Feedback: feedback concerning the results of this research will be received via email, once the results have been analyzed. 38

Withdrawal: Your participation is completely voluntary; you have the right to refuse to participate, and withdraw at any time without having to state a reason and without any prejudice or penalty against you. Should you choose to withdraw, the researchers commit not to use any of the information you have provided without your signed consent. Note that the researcher may also withdraw you from the study at any time.

Confidentiality: All information collected in this study will be kept private in that you will not be identified by name. Confidentiality and anonymity will be maintained as no personal or personal identifying information will be submitted with the evaluation.

BACKGROUND INFORMATION

1. I agree to participate in this research

o No

o Yes

2. Date

……..

3. What is your gender?

o Male

o Female

4. What is your age range?

▪ 18-20

▪ 20-25

▪ 25-30

▪ 30-35

▪ Above 35

SECTION ONE

5. What factors can motivate you to be interested in OERs?

To what extent do you agree with the following:

i. Learning new things:

ii. Having reputation in a specific field:

iii. Intellectual challenge:

iv. Discussion:

v. Pleasure:

6. What learning objects do you commonly use?

To what extent do you agree with the following learning objects:

I. Videos:

II. Images:

III. Sound clips:

IV. Text passages:

V. Power point slides:

VI. Modules:

7. Which type of resources are you most willing to use or download?

To what extent to you agree with the following:

i. Lecture notes:

ii. Recorded lectures:

ii. Assessment questions:

iii. Videos:

iv. Images:

v. Animations:

vi. Syllabus:

8. In your own understanding what can inspire or influence educators to participate in the creation of OERs?

……
……
……